

**THE NATURE OF TEACHER REFLECTIVE PRACTICE
IN AN UNFORGIVING LEARNING ENVIRONMENT**

by

Lesley Dianne Alexander

Bachelor of Physical Education, University of British Columbia, 1979

Master of Physical Education, University of British Columbia, 1982

Master of Education, University of British Columbia, 1989

A Thesis Submitted in Partial Fulfillment of

The Requirements for the Degree of

Doctor of Philosophy

In

The Faculty of Graduate Studies

The Centre for the Study of Curriculum and Instruction

We accept this thesis as conforming

to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

April, 1998

© Lesley Dianne Alexander, 1998

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of FACULTY OF EDUCATION
(CURRICULUM & INSTRUCTION)

The University of British Columbia
Vancouver, Canada

Date April 30/98

Abstract

This study supported Schön's notions of reflective practice as being applicable to teachers involved in teaching physical activities in the context of unforgiving learning environments and specifically to teachers in the sport diving community. According to Schön, one's ability to recognize patterns and act effectively and efficiently in situations of uniqueness and uncertainty depends upon one's capacity to frame problems. In doing so, one draws upon a repertoire of past experience and ways of capturing that experience which enables the development of the ability to reframe problems in light of information gathered from the direct experience. Reframing occurs through the processes of reflection-in-action and reflection-on-action and is a response to an internal dialogue related to the action setting, in which something has not happened as expected, thus producing a curious or intrigued response.

A number of issues specific to teacher reflection in unforgiving learning environments emanated from the analysis of one sport diving teacher engaged in teaching an entry-level sport diving course which involved three different teaching environments (the classroom setting, the confined water [pool] and open water [ocean] environments). Three research questions guided the analysis. In answer to the first research question: **What factors do sport diving practitioners reflect upon in each of the three environments?** six reflective themes were identified in this case study with five being common across the three teaching environments and the remainder being specific to the classroom environment. The common themes were: a trusting relationship, the necessity of teacher control, to see the 'unforgivingness' of the environment, learning from one's practice, challenges to one's practice and understanding one's practice. In answer to the second research question: **What influences the reflective process?** the analysis revealed thirteen underlying or influencing factors or dispositions across the three teaching environments with eight of them being common to either two, or all three, of the environments. In answer to the third research question: **What is the nature of sport diving practitioners' reflective practice?** five categories have been used to address the analysis: 1) across environment related, 2) classroom and confined water (pool) related, 3) confined water (pool) and open water (ocean) related 4) classroom and open water (ocean) related and 5) specific to one environment.

The reflection process documented in this study suggested that Schön's notion of reflective practice is very applicable to the professional development of sport diving as his conception of reflection applies to the three areas of teaching which exist in unforgiving learning environments: the problem solving disposition of teacher reflection, the learning from one's practice, and the probing of internal dialogue.

Table of Contents

Abstract	ii
Table of Contents	iii
List of Tables	viii
List of Figures	ix
Acknowledgements	x
CHAPTER 1	1
Introduction	1
I. The problem	1
Research about teaching practice	1
Reflective practice	2
Teacher reflection in unforgiving learning environments	4
II. The study	6
The purpose of the study	6
Research questions	7
Research method	8
Data analysis	8
Pilot study	9
Limitations to the study	10
Contribution of the study	11
III. Organization of the chapters	12
CHAPTER 2	13
On Developing a Theoretical Perspective of Reflective Practice in Teaching the Physical Activity of Sport Diving	13
I. Reflective practice in teacher education	14
What does it mean to 'learn to teach'	15
The student teacher experience	16
Orientations to teacher education	19
The 'traditional' behavioristic orientation	19
The inquiry-orientated orientation	21
Educating the reflective teacher	24
Reflective practice in unforgiving learning environments	25

Table of Contents Continued

II. The nature of reflection	26
Dewey's notion of experience	26
Knowing as a constructive conceptual activity	27
Habits of mind	27
The directly experienced situation	27
The act of reflection	28
Inferences and reflection	29
III. Schön's conception of reflection	31
The paradox of learning	31
Schön's argument: technical rationality versus reflective practice	31
Reflection in and on action	33
Reflective experimentation: problem setting and problem solving	33
The virtual world of the reflective practicum	35
Between the high, hard ground and the swamp	37
IV. Reflective practice and teaching the physical activity of sport diving	39
Sport diving: a constructive perspective	39
CHAPTER 3	41
Reflective Practice as The Research Method	41
I. The case study and stimulated recall approach	41
The case study	41
Stimulated recall	42
II. Data capture	43
The structure for the investigations: 'reflection on teacher action sequence'	43
The participants	45
III. Data collection procedures	46
The beginner sport diving course	46
The classroom environment	47

Table of Contents Continued

	The confined water (pool) environment	49
	The open water (ocean) environment	53
	Video taping the course	55
	Stimulated recall sessions	56
	Data collection report	56
	Data collection	58
	Video tape, audio tape, and transcript designations	58
	IV. Data analysis	60
	Transformations	60
	V. The reflective process involved in the data review	63
	Participant involvement	63
	Researcher involvement	64
CHAPTER 4		67
	Reflection as Reconstructing Experience in The Classroom Environment	67
	I. Introduction	68
	II. Analysis of reflection in the classroom environment	68
	Transcription	68
	Significant elements or events	68
	Factors and dispositions influencing reflective activities	96
	Dominant themes	100
	III. Summary	103
CHAPTER 5		104
	Reflection as Reconstructing Experience in The Confined Water (pool) Environment	104
	I. Introduction	104
	II. Analysis of reflection in the confined water (pool) environment	105
	Transcription	105
	Significant elements or events	105
	Factors and dispositions influencing reflective activities	127
	Dominant themes	131

Table of Contents Continued

III. Summary	134
CHAPTER 6	135
Reflection as Reconstructing Experience in The Open Water (Ocean) Environment	135
I. Introduction	135
II. Analysis of reflection in the open water (ocean) environment	136
Transcription	136
Significant elements or events	136
Factors and dispositions influencing reflective activities	156
Dominant themes	161
III. Summary	165
CHAPTER 7	166
Reflection as Reconstructing Experience - A Recurring Reflective Theme Across the Three Environments	166
I. Introduction	166
A recurring reflective theme across three teaching environments: problem management	166
The reconstruction of Henri's experience in teaching 'problem management'	167
II. Analysis of supervisory dialogue	168
In the classroom environment	168
In the confined water (pool) environment	173
In the open water (ocean) environment	176
III. Summary	179
CHAPTER 8	180
Conclusions, Discussion, and Implications for Practice	180
I. Conclusions emanating from the research questions	180

Table of Contents Continued

Question 1: What factors or themes do sport diving teachers reflect upon in each of the three teaching environments?	180
Question 2: What influences the reflective process or themes?	184
Question 3: What is the nature of sport diving practitioners' reflective process?	185
1. Across environment related	189
2. Classroom and confined water (pool) environment related	191
3. Confined water (pool) and open water (ocean) environment related	193
4. Classroom and open water (ocean) environment related	195
5. Specific to one environment	195
II. Discussion of critical issues arising from the study	199
The problem solving disposition of teacher reflection	199
Learning from one's practice	200
The probing of internal dialogue or guided discovery	202
III. Implications for practice	203
Observation of others	203
Self-assessment of teaching	204
Problem setting versus technical problem solving	205
The community practicum	206
IV. Further research	207
Accepting change to the sport diving curriculum	207
The psychological skills training and the learning and instructional process	208
The practicum as professional development for sport diving practitioners	208
References	210
Appendix A - The camera and the researcher	220

List of Tables

Table 1. Orientations to teaching education: position on selected issues	23
Table 2. Integrated teaching sequence of lessons in the beginner course	52
Table 3. Data collection report	57
Table 4. Reflection in the classroom environment: frequency of significant elements and events	95
Table 5. Reflection in the confined water (pool) environment: frequency of significant elements and events	126
Table 6. Reflection in the open water (ocean) environment: frequency of significant elements and events	155
Table 7. Themes the sport diving practitioner reflected upon across three teaching environments	183
Table 8. The underlying factors and dispositions which influence the sport diving practitioner's reflective process across the three teaching environments	185
Table 9. List of influencing factors and dispositions for the reflective themes	187
Table 10. An example of different levels of influencing factors and depositions	187
Table 11. The nature of teacher reflection across the three teaching environments	198

List of Figures

Figure 1. The student teacher experience	17
Figure 2. Dewey's notion of experience	30
Figure 3. Schön's conception of reflection: reconstruction of experience	36
Figure 4. Teaching in the classroom environment	48
Figure 5. Teaching in the confined water (pool) environment	50
Figure 6. Teaching in the open water (ocean) environment	54
Figure 7. Sample transcript excerpt designation	59
Figure 8. Levels of transformation in the data analysis of each of the three teaching environments	62
Figure 9. Reflection in the classroom environment: significant elements and events	70
Figure 10. Reflection in the classroom environment: factors and dispositions influencing reflective activity	99
Figure 11. Reflection in the classroom environment: dominant themes	102
Figure 12. Reflection in the confined water (pool) environment: significant elements and events	106
Figure 13. Reflection in the confined water (pool) environment: factors and dispositions influencing reflective activity	130
Figure 14. Reflection in the confined water (pool) environment: dominant themes	133
Figure 15. Reflection in the open water (ocean) environment: significant elements and events	137
Figure 16. Reflection in the open water (ocean) environment: factors and dispositions influencing reflective activity	160
Figure 17. Reflection in the open water (ocean) environment: dominant themes	164

Acknowledgements

First and foremost, I wish to acknowledge the participation of the students and teachers in this project and the preceding pilot study: Crystal Bolduc, Ivan Antoniuk, Cheryl Meszaros, Mike Ehly, Bryan Miller, and Randall Eckert. I wish to also thank the many Divemasters, Instructors, Instructor Development Course Staff Instructors, Instructor Trainers, Master Instructors, Course Directors and Instructor Examiners for their reading, insight and comments on various issues contained within this document.

A special thanks to Dr. Tony Clarke, whose interest in my research topic from the very beginning of my doctoral programme, was always much appreciated. Tony's own thesis was instrumental in the development of many of the ideas in this document.

I would also like to thank my committee, Dr. Gary Sinclair, Dr. Gaalen Erickson and Dr. Jay Powell. Your commitment of time and expertise has contributed significantly to the development and completion of this project. Our discussions were focused, challenging and stimulating, resulting in ideas and issues which have found their way into the following pages. I wish to say, without hesitation, that your enthusiasm in my research has made this a fun and rewarding experience. My sincere thanks.

A particular note of gratitude to Dr. Gary Sinclair, my mentor. I have been inspired by your skilful integration of people skills and technical aspects of professional practice. Your expertise has sustained my interest in practitioner experiences.

Finally, a very special thanks to my parents, Edna and Stephen Alexander, whose continued support and encouragement, each and every day of my doctoral programme, was very much appreciated. From both of you I have learned many unspoken lessons of character and principled behavior and you have taught me the value of lifelong education.

CHAPTER 1

Introduction

I. The problem

Research about teaching practice

For more than a century the field of professional practice in physical education has been a vigorous enterprise for research. The bulk of this body of literature consists of master's thesis and doctoral dissertations, many of them involving teaching method comparisons and inventories of teacher characteristics.

Too often, debate in teacher education for teachers of classroom subjects and of physical education has been carried out within the parameters of ideologies or paradigmatic orientations which were dominant at particular points in time (Zeichner, 1983). For example, movement education (Logsdon, Barrett, Ammons, Broer, Halverson, McGee, and Robertson, 1984) has discernibly altered both teacher preparation and teacher practice at the elementary level (primary school), while in contrast, instruction at the secondary level (junior and senior high school) remains relatively unaltered.

Over the past two decades, systematic observation instruments (Darst, Mancini and Zakrajsek, 1982), ethnographic descriptive analysis of life in the gymnasium (Placek, Silverman, Shute, Dodds, and Rife, 1982; Wang, 1977), process-product studies of teacher effectiveness (Siedentop, Birdwell and Metzler, 1979), behavioral analysis of training interventions (Fisher, Filby, Marliave, Cahen, Dishaw, Moore and Berliner, 1978), task analysis studies (Tinning and Siedentop, 1985), the use of the qualitative paradigm (Bain, 1985) and studies regarding the reflective activities of physical educators (Curtner-Smith, 1996; Sebren, 1995; Tsangaridou and O'Sullivan, 1994) have been used to inform professional practice in physical education.

In examining teaching models recommended by teacher educators it is difficult to discern the elements which have their source in research on classroom subjects from those which have been validated for motor skill acquisition (Placek and Locke, 1986). It

makes pragmatic sense that findings of educational research which are applicable across subject matter, context, school level and student characteristics also operate in the teaching of physical activity. The term physical activity is used here to encompass not only the physical activities taught in the traditional school system, such as physical education class and after school sporting activities, but also, to include physical activity classes outside of the school setting, and, specific to this project, the physical activity of sport diving. Teacher education programmes for physical educators in the school setting and teacher development programmes for the sport diving instructor in the recreational setting have both made use of research methods and theoretical concepts developed through classroom inquiry and have been remarkably eclectic in identifying effective methods of teacher preparation.

Of late, research about teaching practices involving physical activities have been mainly approached from process-product or teaching effectiveness studies complimented by a smaller number of studies from cognitive psychology which have focused on practitioners' thought processes (Shulman, 1986a). Process-product research has been limited to the analysis of relatively simple or simply conceived teaching skills and behavior despite the fact teaching is a complex task and its practice requires dynamic performance. Generally, cognitive studies have concentrated upon practitioners' thoughts in relation to the kinds of activities studied in the process-product research. The subtleties, nuances, and complexities of practitioners' performance have not yet been fully explored. For years, most educational research on teaching has focused primarily on practitioners' pedagogical behavior and student outcomes rather than on practitioners' cognitive processes involving the ways they make diverse decisions and judgments within their practice (Westerman, 1991).

Reflective practice

Professional development is the primary focus of teacher education programmes for class subjects and physical activity (Zeichner, 1987). The impact of professional development upon teacher practice is governed by a number of factors, one of which is the ability of practitioners to be reflective about their practice with the argument being that the reflection or improvement of one's practice should be a career-long pursuit (Wildman, Magliaro, Niles and McLaughlin, 1990). Reflection upon the diverse decisions and judgments, which teaching practice requires, permits insight to understanding how

some practitioners achieve that extraordinary unity of cognitive problem solving judgment and physical skill against the background of psychological and corporeal tensions to which practitioners are subjected. Gaining insight into the reflective practice of practitioners is, therefore, an important step in understanding, fostering and subsequently incorporating the development of reflective practice in the field of teaching and in particular the field of professional practice of teaching physical education and physical activities such as sport diving.

Recent studies have suggested developing reflective practitioners in school and recreational learning settings is a difficult goal to achieve. A number of challenges exist which include 1) the conservative influence of teacher preparation programmes (Feinman-Nemser, 1983, 1986; Goodman, 1988), 2) the utilitarian emphasis that seems to pervade the political setting, and specific to the recreational learning setting is its 3) profit oriented mandate and its 4) strict adherence to standards and procedures due to a litigious society (Dougherty, 1990; Sciarappa, 1990; Shreeves, 1995a, 1995b). Unless practitioners are encouraged to examine the taken-for-granted-assumptions associated with these challenges, the development of a reflective disposition is likely to be severely constrained. One area which has considerable potential for precipitating such a dialogue in the recreational activity arena of sport diving is to specifically engage practitioners in 'reflection-on-action' activity in the three different teaching environments that exist in the sport: the classroom environment, the confined water (pool) environment and the open water (ocean) environment.

In recent years notions of 'reflection' and 'reflective thinking' have become firmly established in teacher education (Grimmett, Erickson, MacKinnon and Riecken, 1990; Comeaux and Peterson, 1988; Pugach and Johnson, 1990). Initially, research aimed at trying to characterize the nature of reflection-on-teaching took the form of expert-novice comparisons (Berliner, 1987; Carter, Sabers, Cushing, Pinnegar and Berliner, 1987). For others, reflection means taking particular aspects of one's practice which are problematic and through reflection gain new insights into that practice. More recently attention has focused upon the 'practical' knowledge teachers appear to use in guiding their everyday actions and how practitioners generate this knowledge. Practical knowledge in this sense is "the knowledge teachers use in classroom situations, with an emphasis on the complexities of interactive teaching and thinking-in-action" (Johnston,

1992, p. 124). It appears this knowledge is embedded in the skilled action of a teacher and although it can be demonstrated in use, it is difficult to describe verbally (Yinger, 1987; Gagné, Yekovich and Yekovich, 1993). The skilled action teachers exhibit in their daily work of professional practice has been referred to as knowledge-in-action. The notion of knowledge-in-action has been used as a theoretical perspective by many researchers to guide their studies. The work of Donald Schön, (1983, 1987) has contributed significantly to the conceptualization of reflective practice.

Schön's thinking on the nature and development of teachers' professional knowledge is not drawn from the field of teacher education, rather, his studies are grounded in the practice of master teachers working with gifted protégés; Quist, a master designer, with Petra an advanced design student, and Franz a world famous pianist, with Annon, a talented young musician. Using these ideal situations, Schön describes how reflective practice might look, might be identified, and might be nurtured.

In his text, *"The reflective practitioner: How professionals think in action"*, Schön (1983) stresses the idea of practical professional knowledge, which he terms 'knowledge-in-action'. Knowledge-in-action is central to Schön's conception of professional practice. Knowledge-in-action refers to the unstable, tacit knowledge that drives practitioners' actions. For Schön, reflection operates upon this knowledge-in-action resource which is constructed by practitioners through the processes of 'reflection-in-action' and 'reflection-on-action' (Grimmett, 1988). Reflection-in-action is generated through on-the-spot, real time, mental experimentation, whereas reflection-on-action is generated through a post-hoc replay and deliberation of the action already taken. A practitioner is reflective when s/he becomes intrigued or curious about some element of the practice/performance setting, a novel puzzle; frames it in terms of the particulars of the setting, so the setting is seen differently within the context of action; reframes it in terms of past experience and knowledge; and then develops a plan for future action (Clarke, 1992). 'Reflection-in-action' is central to the 'art' by which practitioners deal with situations of uncertainty, instability, uniqueness and value conflict.

Teacher reflection in unforgiving learning environments

Professions such as nursing, medicine, aviation and most outdoor recreational activities such as rock climbing, downhill skiing and snowboarding, sport diving, and

white water kayaking involve an element of physical risk for both the teacher and student. This element of physical risk is generally precipitated by both poor decision making processes and delayed inappropriate problem solving practices predicated by either or both the teacher and student while in the practice setting. The nature of the practice setting, for these professionals, is dynamic, novel, ruthless, unpredictable, and difficult to control. The term *unforgiving learning environment* will be used, in this project, to refer to these practice settings and in particular the practice setting for sport diving practitioners.

The role of a sport diving practitioner is probably one of the most challenging teacher roles as it involves the attempt to reach many goals with a diverse student body, within three different teaching environments, safely. Adding to the complexity is the fact that sport diving is an equipment intensive activity in which learners are unfamiliar with the use of the life supporting equipment necessary for survival in the underwater world. The sport diving practitioner's role is further complicated by the fact that only one third of the teaching occurs in the confines of the classroom environment while the remainder of the teaching occurs in the practice setting of unforgiving learning environments, specifically water mediums.

The traditional school setting affords the opportunity for student teacher reflection to occur in the 'practicum setting' (Clarke, 1992). Student teachers, undertaking their professional year of study at a tertiary institution, procure a pre-service teaching role in the actual school setting. For the sport diving practitioner, however, the pre-service teaching role in an actual sport diving practicum setting is not possible. Strict standards and procedures derived and enforced internationally by the Recreational Scuba Training Council (RSTC) require practitioners become fully accredited sport diving teachers, without the benefits of the pre-service teaching experience found in the school system, before instructing others in the sport diving arena. Therefore, the concept of 'student teacher', in the sport diving industry, and in this project in particular, needed to be conceptually redefined. As such, the term 'student teacher' would be analogous to 'inexperienced teacher', and would be defined as one who has received sport diving teaching credentials and is teaching a sport diving course under the direct supervision of a more highly qualified and experienced sport diving teaching professional. At this time, pre-service teaching experience in the form of the 'practicum setting' of the school

system, is not a prerequisite to obtain or maintain teaching credentials in the sport diving industry. Thus, the 'student teacher' in the sport diving industry is a 'certified instructor' who is interested in learning about their practice in a way which will help them become better and safer at making diverse decisions and judgments within their practice.

As is typical of student teachers in the school practicum setting, the sport diving practitioner engages in the practice of teaching in the classroom then moves to the unforgiving learning environments where s/he encounters many events, some familiar and anticipated, others new and surprising. When the practitioner deals with the familiar and anticipated events s/he is likely to draw upon a repertoire of responses based upon prior experiences as a student scuba diver, a certified diver, experiences at the work place and experiences of family life, etc. (Magill, 1998; Gagné et al, 1993). At times, however, these practitioners are challenged by many new and unanticipated events for which no appropriate response will be present in their repertoire. In these situations practitioners will have to construe responses sensitive to the situation by problem setting, problem framing and reframing, experimentation and 'back talk' (Schön, 1983). The sport diving professional must bring to bear any prior knowledge and experience which might be appropriate, and do so quickly. At times, this is an exciting and invigorating experience, at other times it is unnerving, bewildering and dangerous. For the sport diving practitioner, all teaching practice in which events may be anticipated or unanticipated, routine or unique, provides opportunities for reflection. Any opportunity to examine their practice in light of past experience and knowledge, and to develop or modify a plan for future action is a safe opportunity to reflect upon their actions.

II. The study

This part of the introduction presents a brief overview of the study and is presented in seven parts: the purpose, the research questions, the method, the analysis, the pilot study, the limitations and the contribution of the study.

The purpose of the study

This case study design is set in the "situatedness" (Brown, Collins and Duguid, 1989) of teaching in unforgiving learning environments and is grounded in the notion that knowledge is personally constructed and socially mediated as teachers reflect upon their

practice (Schön, 1983, 1987; von Glasersfeld, 1987). Schön proposed that a practitioner is reflective when s/he becomes intrigued or curious about some element of the practice setting, frames it in terms of the particulars of the setting, reframes it in the terms of past experience and knowledge, and then develops a plan for future action. Reframing occurs as a response to the 'back talk' and/or 'self talk' (Sinclair and Sinclair, 1994) in the action setting where something unexpected and surprising has occurred rather than the expected. This 'surprise' occurrence produces the 'curious' or 'intrigued' response. This definition of reflection is used throughout this study.

The purpose of the study was to examine the nature of teacher reflective practices, using Schön's conceptualization of reflective practice, in an unforgiving performance situation. More specifically, the aim was to provide additional insight into the practices of instructors teaching in a sport diving setting involving three different teaching environments (the classroom environment, the confined water [pool] environment and the open water [ocean] environment). Furthermore, an additional aim was to determine the circumstances which were conducive to the development of teacher reflection in this setting.

Research questions

To examine teacher reflection in teaching in unforgiving learning environments, the activity of sport diving was used, and the study was divided into three parts: the first, sought to identify the factors that teachers reflect upon; the second, to establish the elements that influence teacher reflection; and the third, to identify the nature of the reflection. Each of these three parts was addressed in each of the three learning/practice settings encountered in the presentation of a beginner sport diving course: the classroom environment, the confined water (pool) environment and lastly, the open water (ocean) environment. Thus, the research questions were:

- *What factors do sport diving practitioners reflect upon in each of the three teaching environments?*

This question sought to identify the process of framing and reframing in which sport diving practitioners engage as they reflect upon issues of control, equipment concerns, problems, safety, etc., encountered in each of the three teaching environments.

- *What influences the reflective process?*

This question sought to identify the instances and elements, within each teaching environment, which influenced or elicited the reflective process.

- *What is the nature of sport diving practitioners' reflective practice?*

This question sought to determine the meaningfulness of these instances and elements upon the sport diving practitioner's framing and reframing of issues encountered in each of the three teaching environments.

Research method

A typical beginner sport diving course, as defined by the Recreational Scuba Training Council (RSTC), provided the structure for the investigations outlined in the research questions. Overlaid on each of the eleven sessions of the beginner sport diving course, which were conducted in three different learning environments, were a series of stimulated video recall sessions (Tuckwell, 1982). These sessions allowed both the certified instructor and students to independently comment upon any and all instances that occurred during the course, which were significant to them. The combination of the video and the video recall sessions was defined as the teacher action, or process, of reflective practice. One teacher, two certified and insured assistant instructors and ten students participated in the beginner sport diving course in this study. Eleven class sessions, (four in the classroom setting, three in the confined water, with the remainder in the open water environment), were taught and filmed over the duration of the course (approximately three sessions per week for four weeks). The teacher and two of the students independently participated in eleven stimulated recall sessions (approximately four sessions per week for three weeks).

Data analysis

The audio tapes from each of the video recall sessions for the teacher were fully transcribed. The constant comparative method (Glasser and Strauss, 1967; Lincoln and Guba, 1985) was used to analyze the data in which incidents and events were catalogued and grouped according to frequency of occurrence, common features and characteristics. A variety of trends emerged and were classified into appropriate

categories. Some categories were retained while others were either collapsed or expanded to create additional categories.

Four levels of documentation or 'transformation' (Novak and Gowin, 1984) were established with every level of analysis considering each teaching environment independently. The first level of analysis was simply the verbatim transcription of the audio tapes made during each of the eleven reflective recall sessions. The second level focused on the identification of the nature of teacher reflection about the individual elements or components. The third level built upon the second level analysis, to identify the underlying dispositions and factors which influenced teacher reflection. Lastly, the fourth level extended the third level of analysis by identifying the dominant trends and themes the teacher reflected upon.

Pilot study

A pilot study was completed prior to the main project. This preliminary study involved one teacher and two students who participated in three video taped sessions of instruction and three audio taped stimulated recall sessions. Each of the three teaching settings, the classroom environment, the confined water (pool) environment and the open water (ocean) environment were represented. The main purpose of the pilot study was to determine if the data collection procedures were significantly rigorous to enable the answering of the three research questions. An unintended affirmation occurred through the 'blending in' of both the camera and the researcher as they were regarded by the participants as a 'normal' part of the teaching settings for any beginner sport diving course within the sport diving facility in which the main study was to take place. The preliminary analysis demonstrated that the data collection procedures afforded the researcher an opportunity to gain some insight to the processes of teacher reflection and were adopted for the main study.

Limitations of the study

Six limitations were identified: the researcher's role, limiting and limitations of interpretation, temporal constraints, textual constraints, selection of informants, and the presence of a video camera and the researcher in the practice settings of the beginner sport diving course.

Initially, the major limitation was the complexity of the dual roles of the researcher as she was also an instructor examiner for one of the nationally recognized certifying organizations in the sport diving industry. The issue in question was whether it would be possible for the researcher to collect data relating to the processes of teacher reflection while simultaneously maintaining her status as an instructor examiner who must ensure strict adherence to professional standards and procedures thus avoiding the introduction of concerns regarding liability issues. The effect of the dual role of the researcher in the study was not a factor. The fact that all sessions of the beginner sport diving course were video taped without incident validated the conclusion that the dual role of researcher-examiner was accepted as a routine procedure.

Secondly, the concern of the limiting and limitations of interpretation and the limited scope and power of the researcher were acknowledged. A study of this nature must proceed within a limited scope of research perspectives, therefore, the approach has been to view this investigation as a contribution to the enterprise of knowledge development.

The third limitation concerned temporal constraints and recognizes this study addressed actions and understandings at a particular time, at a particular place, with particular people.

The fourth limitation of this study involved textual constraints as the written description of what is communicated orally and visually is the assimilation of one form of communication with another. Humans are meaning-making individuals comprehending and ordering reality through language. Language operationalizes, in the communicative exchange of information, the encoding and decoding of messages, but can not convey total meaning. Inherent in (re)presentality of language is the notion of inference or interpretation. Through the process of cultural socialization people develop internal and external landscapes, perceptual processes, which distinguish them from any one else. Through this praxis humans see the world differently. This uniqueness of personal landscapes lends to the development of different interpretations of text. Consequently, the researcher's written text can not convey what she has seen, smelt, heard, felt as she listened to or observed others describe and act out their experiences. There will

inevitably be some loss of meaning in the creation of the text, and later the possibility of an additional loss through the reading of the text by others.

The fifth limitation evolved as a result of the selection of informants. The researcher can not guarantee that the teacher and students who voluntarily participated in this study are completely representative of the sport diving community. Nor can the researcher assume the generalizability of the ideas and actions of those who have participated. This is a necessary outcome of an interpretive study.

Finally, this study required the presence of both a video camera and the researcher in the practice setting and slightly altered the typical practice setting, particularly in the classroom environment. To minimize any possible effects of this intrusion, the researcher video taped the pilot study within the same sport diving educational facility which participated in the main study. Since the confined water (pool) environment and the open water (ocean) environment involved the extensive use of a great deal of equipment, the integration of the video camera was not an issue.

Contribution of the study

Schön (1983, 1987), employing gifted protégés, conceptualized reflective practice as the knowledge practitioners display when confronted with problematic and surprising situations. This study has not attempted to select exemplary teachers, students or teaching environments. In actual fact, every step was taken to ensure the teacher, students and teaching settings were typical of most sport diving courses. Hence, the study became 'situated' beyond the 'clinical' setting, that is, the relatively risk free 'virtual' world, to include instances and elements of the 'real' underwater world.

The significance of this study lies in its potential contribution to an extended understanding of the nature and dynamics of the teaching process in the context of unforgiving learning environments.

Given the current and future emphasis on health and wellness, non-formal recreation education organizations will increasingly offer adventurous sporting activities and growing numbers of practitioners will be involved in the teaching enterprise. This

research, which focuses on the practitioners' perspective, may also help to bring congruence to the gap which exists between theory and practice in teaching.

From a practical perspective, the identification, and understanding of complexities involved in making diverse teaching decisions and judgments, in unforgiving learning environments, the sport of scuba diving will become a safer activity.

III. Organization of the chapters

This study is presented within a framework of eight chapters. The introduction, literature review and method chapters provide the fundamental theoretical platform upon which the study was based and conducted. Chapters four, five, and six, contain data analysis for each of the three teaching settings, (i.e., the classroom environment, the confined water [pool] environment, and the open water [ocean] environment respectively). Each of these chapters addresses the three research questions and discusses the nature of reflective practices for the particular teaching setting and includes summary and diagrammatic representations of the themes, factors and related issues which emerged from the examination of the teacher's reflection. Chapter seven identifies and discusses a recurring reflective theme across the three environments. The concluding chapter presents a cumulative discussion of the similarities and differences in reflective themes for the three teaching environments by drawing the results of the three different teaching environments together, discussing them in relation to perspectives in the literature, and presenting the implications of this study for the improvement of teachers' reflective action in the unforgiving learning environments of the sport diving setting as well as providing suggestions for further research.

CHAPTER 2

On Developing a Theoretical Perspective of Reflective Practice in Teaching the Physical Activity of Sport Diving

The term *reflective practice* can be interpreted in a variety of ways. Over the past fifty years the work of Dewey (1925, 1933), Schön (1983, 1987, 1988), as well as that of many other scholars, have provided extensive practical and theoretical accounts of how the construct of reflection might be fashioned in conceptualizing teaching practice in a variety of contexts. Close examination of this body of literature, on the nature of reflective teaching, revealed little shared meaning among those who write about the essential elements of processes characterized as reflective. Consequently, there are a diversity of meanings attached to this and similar terms. Furthermore, there appeared to be even less agreement on what characterized the content of reflective practice and on what kinds of contexts tend to foster such a process. Regardless of how reflection is understood and operationalized it seems to be supported by all as a worthy aim of teacher education (Grimmett, 1988).

This circumstance of varied understanding resulted from a diverse literature and called for a clarification of both the usage of terms and the nature of the underlying assumptions operative in one's perspective of reflective practice. This chapter provides the theoretical perspective which underlies and led to, the research interest in reflective practice and begins by contrasting two different perspectives on teacher practitioners' professional knowledge; that is, the traditional behavioristic orientation and the inquiry-oriented perspective. The significance of knowing-in-action of the inquiry-oriented perspective is then highlighted by a discussion on the nature of reflection which captures the common properties reminiscent of Dewey's thoughts. Secondly, the chapter provides a composite picture of Schön's epistemological assumptions and the most salient features underlying his conception of reflection. Beginning with his argument contrasting two different perspectives of professional knowledge, that is, as received knowledge or 'technical rationality', and as knowledge-in-action, this section continues with an explanation of Schön's main elements of processes featured in reflective practice. Finally, the researcher's assumptions regarding the reflective teacher and

her/his engagement in the professional practice of teaching physical activities and in particular the recreational activity of sport diving are presented.

I. Reflective practice in teacher education

Of late, educational research has focused upon the question of how individuals, undertaking some form of formal teacher preparation, 'learn to teach' (Carter, 1990; Feiman-Nemser, 1983; Widen, Myer-Smith and Moon, 1993). Findings from this form of research have produced conceptual diversity and considerable ambiguity as researchers and teacher educators hold distinctly different positions about 'what' skills or 'what' knowledge individuals should learn during their teacher preparation programme. The lack of cumulative research findings has left the 'what' question unresolved thereby leaving the 'how' question, and the types of experiences individuals in teacher education programmes should engage, also unresolved. As a result, a number of conceptual orientations or frameworks have been used in guiding the design of teacher education programmes for classroom subjects and physical education (Fenstermacher and Soltis, 1986; Feiman-Nemser, 1990 and Zeichner, 1983).

There has been a great deal of controversy and debate over the ways in which teachers should be prepared for practice. Many paradigms or conceptual orientations have dominated educational discourse and specifically teacher education preparation in the last few years. Although there is diversity and differences 'within' paradigms it is recognized that each paradigm consists of a set of common assumptions which distinguishes the basic goals of the general approach from another. Within each orientation the 'student teaching experience' plays a particular role in helping individuals to 'learn to teach'.

Within a 'technological' orientation to teacher preparation the student teaching experience is viewed as a form of 'technical apprenticeship' whereby the goal of teacher education is to 'train' individuals to master a set of specific instructional procedures (Feiman-Nemser, 1983). The student teaching experience is where student teachers learn and execute, with competency, managerial skills such as instructional planning. An alternative to this technical orientation to teacher preparation is a 'practical' orientation which views the teacher as a reflective practitioner (Schön, 1983, 1987).

This orientation emphasizes the 'situated nature' and the cognitive dimensions of teacher's knowledge. The teacher becomes a reflective practitioner as a result of practical experience in the student teaching experience but does so by receiving assistance in learning from it (Grimmett and MacKinnon, 1992). Both orientations assume expertise in teaching evolves from the student teaching experience, however, they differ in how this expertise is acquired.

Before looking more deeply into how the student teaching experience has been conceptualized from these two different perspectives of teacher education, one needs to have a firm grasp on what it means to learn to teach.

What does it mean to 'learn to teach'?

Few would disagree with the position that the notion of 'learning to teach' is central to the purpose of teacher education programmes (Wideen, Mayer-Smith, and Moon, 1993). Nevertheless, it is a concept that is poorly understood as a result of the inconsistent ways and varying scope in which the phrase is used (Carter, 1990). 'Learning to teach' has been used to refer to the entire enterprise of teacher education including such concepts as the development of teaching skills and how it is teachers learn the constraints which impact their role as teacher. On the other hand, 'learning to teach' may be taken to mean the knowledge of classroom practice and the acquisition of such. Consequently, the design of many teacher education programmes have focused on training for specific skills and knowledge outcomes. According to Johnston, in her 1992 article "*Images: A way of understanding the practical knowledge of student teachers*", "...less account has been taken of the actual ways in which student teachers and teachers hold, develop, and use the knowledge which guides them in the practice of teaching" (p. 123).

There are many divergent and conflicting views of the learning to teach process and little is available which can act as a firm basis for teacher educators to plan programmes for preparing prospective teachers (Johnston, 1992). Rather than using an understanding of knowledge held and used by practicing teachers and student teachers as a starting point, teacher education programmes have traditionally been planned on the basis of the knowledge which teachers are 'thought' to require and how they can be

'trained' (Carter, 1990). This process of 'training' is partially accomplished by way of the 'student teaching experience'.

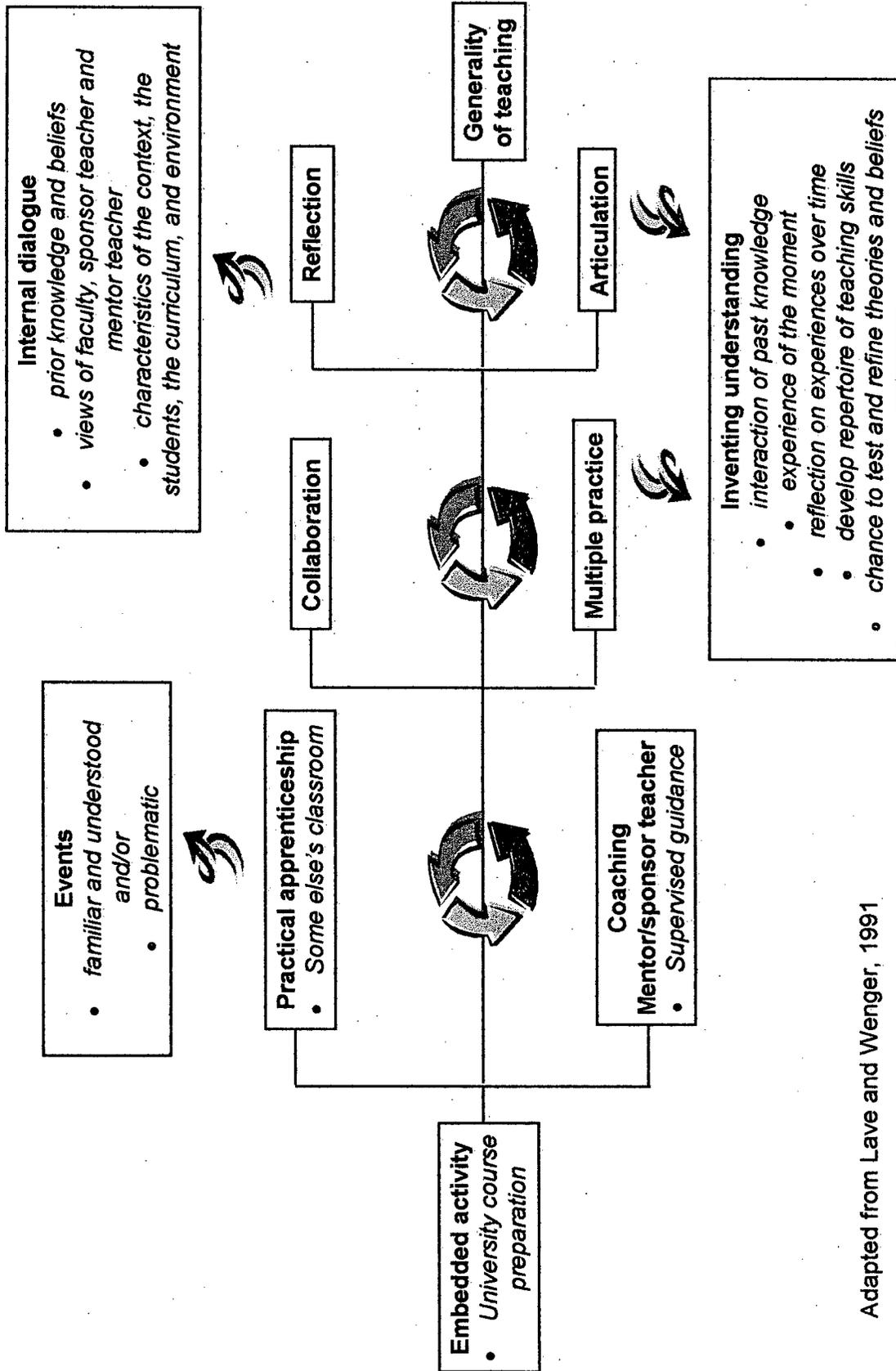
The student teaching experience

Since the 'student teaching experience' is held central as an opportunity to learn to teach, clarification of this process is necessary. During a student teaching experience student teachers encounter 'events', some of which are familiar and understood while others are unanticipated, surprising and problematic. The repercussions of each of these events are held equally important as they support or challenge what the student teacher understands about teaching and learning. In attempting to make sense of and gain a level of understanding of these events, student teachers draw upon a variety of resources to formulate a plan of practical action. These resources include the student teacher's prior knowledge and beliefs about teaching, the views of faculty, sponsor teachers and mentor teachers, and the characteristics of the context of students, curriculum, content being taught, and the environment in which teaching and learning occurs. It is through the interface of these events, resources and the student teaching experience, that a student teacher engages in the process of learning to teach.

The student teaching experience is of utmost importance as it is through this experience student teachers actively participate in making sense of the constant interplay of factors involved in the immediacy of the action setting. As student teachers move from their 'apprenticeship of observation' (Lortie, 1975) into formal periods of teacher education they conduct an 'internal dialogue' (Goodman, 1988) through which they begin to develop an understanding of the teaching world around them. According to Doyle (1990) a student teacher learns to teach through the process of "...inventing understanding, and this invention involves an interaction of past knowledge with the experience of the moment. This constructivist perspective emphasizes the importance of direct experience and the gradual accumulation of knowledge structures from the reflection on that experience over time" (p. 17).

Many qualified teachers and student teachers rate the 'student teaching experience', depicted in Figure 1, as the single most beneficial segment of their teacher education programme (Haring and Nelson, 1980). The student teaching experience is a first hand encounter of someone else's classroom and offers an opportunity to teach

Figure 1. The student teacher experience.



Adapted from Lave and Wenger, 1991

under the supervision and guidance of an experienced teacher. The student teacher has also the opportunity to observe an experienced teacher in action and can reflect about their own practice, to develop a repertoire of teaching skills and a chance to test and refine their own theories and beliefs about teaching and learning.

The learning involved in the student teaching experience is similar to the learning process described by Lave and Wenger (1991) as an integral and inseparable aspect of social practice. They have presented their view of learning under the rubric of 'legitimate peripheral participation', that is, as a form of practical apprenticeship.

"Learners [student teachers] inevitably participate in communities of practitioners [experienced teachers] and that the mastery of knowledge and skill requires newcomers [student teachers] to move toward full participation in the sociocultural practices of a community [teaching]. 'Legitimate peripheral participation' provides a way to speak about the relations between newcomers [student teachers] and old-timers [experienced teachers], and about activities, identities, artifacts and communities of knowledge and practice. It concerns the process by which newcomers [student teachers] become part of a community of practice [teachers]. A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a sociocultural practice. This social process includes, indeed it subsumes, the learning of knowledgeable skills [learning to teach]" (Parentheses added, p.31).

Today, much learning occurs in the form of some sort of apprenticeship, especially whenever high levels of knowledge and skill are in demand, such as, in medicine, law, the academy, professional sports and the arts. The student teaching experience has been regarded so highly by many, one might expect the process to be grounded in a sound theoretical framework involving a general agreement concerning the engagement and outcomes of specific activities. However, there appears to be a lack of explicit curricula for this experience (Turney, Eltis, Towler and Wright, 1985) which occupies a central role in teacher education. The nature and the role of the student teaching experience can be conceptualized quite differently depending upon the particular orientation toward the process of teacher education. In trying to capture the

nature of the student teaching experience one might characterize it as a form of 'apprenticeship' which will differ depending upon one's conceptual orientation.

Orientations to teacher education

In recent years four paradigms have dominated the discourse of teacher education: 'behavioristic', 'personalistic', 'traditional-craft', and 'inquiry-oriented' teacher education (Zeichner, 1983).

The next section of this review presents two of these orientations toward teacher education: the 'traditional behavioristic' paradigm and the 'inquiry-oriented' paradigm, which are viewed by some as occupying opposite ends of the continuum. These orientations to teacher education consist of a matrix of beliefs and assumptions about the nature and purposes of teacher education and the student teaching process (Popkewitz, Tabachnick and Zeichner, 1979).

The 'traditional' behavioristic orientation

The behavioristic orientation to teacher education has been present in one form or another since the turn of the century. This orientation rests upon the assumptions of a 'positivistic epistemology' and 'behavioristic psychology' and emphasizes the development of specific and observable skills of teaching which are assumed to be related to pupil learning.

Student teachers are taught knowledge, skills and competencies which are felt to be most relevant at the time. The teacher education curriculum is specified in advance and the criteria by which success is measured are predetermined with student teacher competence being a prescribed, pre-specified level of mastery of performance. The behavioristic teacher education orientation is not concerned with the fact the same behavior may be governed by quite different motives. Nor does this orientation to teacher education concern itself with the development of the teacher as a person over and above mastery of teaching skills and content knowledge. The desire to have teachers critically reflect upon the purposes and consequences of their work in terms of issues as social continuity and change are not central concerns.

Metaphorically speaking, underlying this orientation to teacher education is the concept of 'production' (Kleibard, 1972). Teaching is viewed as an 'applied science' where the teacher is an 'executor' of the laws and principles of effective teaching (Tom, 1980). Teacher education professional content knowledge and teaching skills are fully determined in advance presumably primarily through research on teacher effectiveness and the student teacher is viewed as a passive recipient of the prescribed professional knowledge who plays little part in the substance and direction of her/his preparation as a teacher.

Many have deemed this orientation as the 'technical' tradition of teacher education. The primary goal is with fostering the development of skill in an actual performance of a predetermined task. Whether the specific predetermined tasks and the context in which these tasks are to be carried out are worth pursuing, are not a concern for the behaviorist. The primary problem with this orientation of teacher education is the notion of the social context of education 'as given'.

The student teaching experience, in the traditional behavioristic orientation to teacher education, has failed to evolve past a traditional apprenticeship model (Guyton and McIntyre, 1990). The notion of apprenticeship has a long reputation as a form of control over the most valuable, least powerful workers. In the behavioristic orientation to teacher education the teaching apprenticeship is viewed as an opportunity for nothing more complex than reproducing task performances in routinized ways, where knowledge is accumulated through 'trial' and 'error' experiences in the real world, and a master teacher to student teacher apprenticeship relationship is seen as the "proper vehicle for *transmitting* the cultural knowledge possessed by good teachers to the novice" (Emphasis added, Zeichner, 1983, p.5). This technological orientation to the student teaching experience is seen as an opportunity to infuse student teachers with the knowledge, skills and values considered important for 'surviving' in schools. The student teaching experience becomes little more than an occasion for student teachers to confirm their occupational choice, try their hands at prescribed teaching rituals, and measure themselves against the social postures of teachers (Locke, 1970). Consequently, while the student teaching experience is considered one of the most valuable episodes in the teacher education process, "it is also widely regarded as a

problem, an on-the-spot experience that promotes isolation, practical expediency and dependence on conventional wisdom" (Cochran-Smith, 1991, p. 104).

This leads to questioning the adequacy of traditional behavioristic teacher education programmes and the student teaching experience as the teaching apprenticeship has difficulty addressing the needs and problems of student teachers. Teacher education programmes which follow the traditional approach to the student teaching experience merely "...educate future generations of teachers to accept uncritically those skills, attitudes, and dispositional qualities that support the dominant social order" (Giroux, 1981, p. 156). According to Schön (1983), professional knowledge is "...mismatched to the changing characteristics of the situations of practice - the complexity, uncertainty, instability, uniqueness, and value conflicts which are increasingly perceived as central to the world of professional practice..."(p. 14) are not being addressed in teacher education programmes nor the student teaching experience by the traditional behavioristic orientation to teacher education. Consequently, teachers are called upon to perform tasks for which they have not been educated.

The inquiry-oriented orientation

The inquiry-oriented orientation to teaching is one which prioritizes the development of inquiry about teaching and about the contexts in which teaching is carried out (Zeichner, 1983) and is concerned with the development of orientations and skills of critical inquiry. Advocates of this orientation highly value the technical skills of teaching, not as an end in itself, but as a means for bringing about desired ends. The underlying assumption of this approach is in the critical inquiry which supplements the ability to carry out the technical skills of teaching. This orientation to teacher education and the student teaching experience attempts to prepare teachers who have the skills to do and the inclination and skill to analyze what they are doing in terms of its effects upon those being taught and the context in which the teaching occurs (Feiman, 1979; Zeichner, 1981; and Zeichner and Teitelbaun, 1982). As Feiman (1980) pointed out, cited by Zeichner (1983), this orientation views

"...the prospective teacher as an active agent in his or her own preparation for teaching and assumes that the more a teacher is aware of the origins and consequences of his or her actions and of the realities that constrain these

actions, the greater is the likelihood that he or she can control and change both the actions and the constraints" (p.6).

The role of both internal and institutional constraints shaping student teachers' actions are not ignored as this orientation to teacher education advocates student teachers assume a greater role in shaping the direction of teacher education and the student teaching experience. This orientation encourages the student teacher to both render problematic that which is frequently taken for granted about the role of the teacher, the tasks of teaching and learning to teach in general and reflect upon and examine the rationales and consequences of teacher education and the student teaching experience.

Teacher education from this perspective is fundamentally concerned with developing the student teacher's capability for 'reflective action' (Dewey, 1933). Moral, ethical, political, and social issues are instrumental, embedded in everyday thinking and practice, and are to be examined. In contrast to the traditional behavioristic orientation to teacher education, the knowledge and skills to be taught from an inquiry-oriented view are not specified in advance and although the self-perceived needs and concerns of student teachers are considered, they are not a central concern. The central concern is the teaching of technical skills associated with critical inquiry. The basic tenants of this approach (Berlak and Berlak, 1981) to teacher education and the student teaching experience is succinctly summarized by Zeichner (1983):

"The proper role of the formal education for teachers is to help persons develop their capabilities to see their classroom behavior in the perspective of culture and time, from the point of view of historical and contemporary others, thereby clarifying for themselves and others the alternatives for action.....The entire programme, all courses and practical experiences, should provide the aspiring and experienced teacher with access to persons who can help initiate and sustain a process of critical inquiry" (p. 252).

The typology presented regarding the two paradigmatic approaches to teacher education, as illustrated in Table 1, p. 23, has been largely descriptive and focused on illuminating the assumptions, priorities and distinguishing aspects of one approach to the other. Both orientations are concerned in some way with mastery of content knowledge and technical skill in teaching. The behavioristic paradigm seeks a teacher education

Table 1. Orientations to teacher education: positions on selected issues.

Issue	Behavioristic paradigm	Inquiry-oriented paradigm
1. Inquiry aim	explanation: prediction and control	understanding: reconstruction
2. Nature of knowledge	verified hypothesis established as facts or laws	individual reconstructions coalescing around consensus
3. Knowledge accumulation	accretion - 'building blocks' adding to 'edifice of knowledge'; generalizations and cause-effect linkages	more informed and sophisticated reconstructions; vicarious experience
4. Goodness or quality criteria	conventional benchmarks of 'rigor': internal and external validity, reliability, and objectivity	trustworthiness and authenticity and misapprehensions
5. Values	excluded - influence denied	included - formative
6. Ethics	extrinsic: tilt toward deception	intrinsic: process tilt toward revelation; special problems
7. Voice	disinterested	passionate participant
8. Teacher education programme	technical, quantitative and qualitative: substantive theories	resocialization: qualitative and quantitative; history; values of altruism and empowerment

Adapted from Guba and Lincoln, 1994

curriculum from teacher effective research and views student teachers as passive recipients of that which is to be imparted in the teacher education programme. On the other hand, the inquiry-oriented paradigm views the student teacher as an active participant in the teacher education process. The behavioristic paradigm accepts as given the educational and social contexts within which student teachers work and evaluate their abilities in terms of predetermined skills. On the other hand, the inquiry-orientated paradigm seeks to foster a problematic attitude on the part of the student teacher whose competencies are evaluated upon their ability for reflective action.

Educating the reflective teacher

Learning to teach is a complex process. Inherent in the inquiry-oriented perspective is the intentional, problem solving aspects of student teachers' and teachers' work as reflective thinking activity. In recent years notions of 'reflection' and 'reflective teaching' have become firmly established in teacher education (Grimmett et al, 1990; Comeaux and Peterson, 1988; Pugach and Johnson, 1990). Initially, research aimed at trying to characterize the nature of reflection-on-teaching took the form of expert-novice comparisons (Berliner, 1987; Carter et al, 1987). For others, reflection means taking particular aspects of one's practice which are problematic and through reflection gain new insights into that practice. More recently attention has focused upon the 'practical' knowledge teachers appear to use in guiding their everyday actions and how practitioners generate this knowledge. Practical knowledge in this sense is "the knowledge teachers use in classroom situations, with an emphasis on the complexities of interactive teaching and thinking-in-action" (Johnston, 1992, p. 124). This knowledge is embedded in the skilled action of a teacher and although it can be demonstrated in use, it is difficult to describe verbally (Yinger, 1987). The skilled action teachers exhibit in their daily work of professional practice has been referred to as knowledge-in-action. The notion of knowledge-in-action has been used as a theoretical perspective by many researchers to guide their studies and the work of Schön (1983, 1987) has contributed significantly to the conceptualization of reflective practice.

Recent studies have suggested that the development of reflective student teachers and teachers in school settings is difficult to achieve (Feiman-Nemser, 1983; Russell, 1988). In teaching physical education activities, the reflective thinking activity and practical knowledge held by teachers and developed by student teachers through

the student teaching experience differ little from those of traditional classroom subject areas. The reflective thinking activity and practical knowledge required to teach in 'unforgiving learning environments' requires one to engage in reflective practice which is made more complex as well as difficult by the addition of a multitude of salient contextual factors.

Reflective practice in unforgiving learning environments

Unforgiving learning environments are teaching and learning contexts in which human misjudgment or error on the part of either teacher or student may result in injury and possibly a loss of life. Professions such as nursing, medicine, aviation and any outdoor recreational activities, such as, rock climbing, downhill skiing and snowboarding, sport diving, and white water kayaking involve an element of physical risk for the teacher and student. This element of physical risk is generally precipitated by both poor decision making processes and inappropriately delayed problem solving practices, predicated by either or both the teacher and student while in the practice setting.

The role of a sport diving practitioner is probably one of the most challenging teacher roles as it involves the attempt to achieve many goals with a diverse student body, within three different teaching environments, safely. Adding to the complexity is the fact sport diving is an equipment intensive sport in which learners are unfamiliar with the use of the life supporting equipment necessary for participation and survival in the underwater world. The sport diving practitioners' role is further complicated by the fact that only one third of the teaching occurs within the confines of a classroom environment while the remainder of the teaching occurs in the practice setting of unforgiving water mediums. The novel, ruthless and ever dynamic and unpredictable elements of the water environments, the diversity of the student group, the extreme error range of participants and the uniqueness and complexity of the equipment itself makes practitioners acutely aware of the unpredictability of success. Indeed, uncertainty, variability, contextual and individual uniqueness give the sport of diving its particular charm, allure, and addictive quality.

The meaning of reflective practice of student teachers and teachers in unforgiving learning environments is best explained by referring to reflective thinking as:

1) reflection on general teaching practices and contexts, 2) reflection-on-action, and 3) reflection-on-'reflection-in-action'.

To advance this 'practical' perspective to teacher education for unforgiving learning environments, Dewey's (1925) original ground work regarding the concept of reflection and Schön's cogent thinking on the nature and development of teacher's professional knowledge is now presented.

The nature of reflection articulated by Dewey (1925) is central to Schön's (1983) conception of reflection which is grounded in his study of the practice of master teachers working with gifted protégés. Using these ideal situations, Schön described how reflective practice might look, be identified, and be nurtured. His work has attracted considerable interest among teacher educators as the basis of an epistemology of practice which can inform the practice of teacher education programmes, with specific reference to the role of the student teaching experience. Schön has provided insight into some of the occupation specific problems associated with the professional development of those who engage in teaching in the unforgiving learning environment of the sport diving industry.

II. The nature of reflection

Dewey's notion of experience

At the highest level of generality, Dewey's philosophical orientation can be characterized as a kind of naturalistic empiricism, and the two most fundamental notions in his philosophy can be gleaned from the title of his most substantial work, "*Experience and nature*" (1925). His concept of experience had its origin in his Hegelian background where he fashioned a notion of experience wherein action, enjoyment, and what he called 'undergoing' were integrated and equally fundamental. The felt immediacy of experience, which Dewey characterized as its aesthetic quality, was basic and unable to be expressed in simpler terms. Cognitive experience was situated against this broader background as arising from, and conditioned by, this more basic experience. Cognitive experience was the result of inquiry, which he viewed as a process arising from a felt difficulty within experience, processing through the stage of conceptual elaboration of possible resolutions, to a final reconstruction of the experience wherein the initial

fragmented situation is transformed into a unified whole. Cognitive inquiry is this mediating process from experience to experience, and knowledge is what makes possible the final more integrated experience, which Dewey termed a 'consummation'.

Knowing as a constructive conceptual activity

In Dewey's view, knowing is a kind of doing, and the criterion of knowledge is 'warranted assertability'. From the times of Plato, knowledge had been viewed as a kind of passive recording of declarative facts and success was seen as a matter of the correspondence of one's beliefs to these antecedent facts. To the contrary, Dewey viewed knowing as a constructive conceptual activity which anticipated and guided one's judgement to future experiential interactions with the environment.

The purpose of knowing is to effect some alteration in the experiential situation, and for this purpose some cognitive proposals are more effective than others. For Dewey, successful cognition was a present resolution of a problematic situation resulting in a reconstructed experience or consummation.

Habits of mind

The fundamental aim of education, as perceived by Dewey, was not to convey information but to develop critical methods of thought. He saw education as future-oriented and the future is uncertain, hence, he viewed it paramount to develop habits of mind enabling one adequately to assess new situations and to formulate strategies for dealing with the problematic dimensions of them. Past experience is to be valued for its role in developing and guiding critical capabilities which enables one to deal with future activity. According to Dewey (1933) a specialized form of thinking, that of reflection, is necessary to access and examine past experience. Inferences drawn from the observed phenomena of past experience are tested as the basis for future action.

The directly experienced situation

Directly experienced situations, which puzzles or surprises, results in reflection. The activity of reflection occurs when the mind is perplexed, surprised, experiences uncertainty or is troubled with self-doubt. It is the mind's need to deal with perplexity, surprise, sudden change and the unexpected that draws out reflection (Grimmett, 1988). When the mind is presented with such unresolved difficulty "...the function of reflective

thought is, therefore, to transform [this] situation in which there is experienced obscurity, doubt, conflict, disturbance of some sort, into a situation that is clear, coherent, settled, harmonious" (Parenthesis added, Dewey, 1933, p. 100-101). Furthermore, the reflective process is ongoing and subject to further deliberation as resolutions are tentative. Reflection emotionally involves and compels one to inquiry, that is, the "...active, persistent and careful consideration of any belief or supposed form of knowledge in light of the grounds that support it and further conclusions to which it tends" (Dewey, 1933, p. 9).

The act of reflection

The act of reflection leads to solutions. "Demand for the solution of a perplexity is the steadying and guiding factor in the entire process of reflection" (Dewey, 1933, p. 14). Reflection begins with one's direct experience and the observations one makes of that experience. These observations or gathered data are then visualized, consciously and subconsciously played back and forth in the mind, as possible ideas or courses of action to be taken. According to Dewey, these two processes, the gathering of data and observations and the mental activity associated with constituting ideas leading to possible actions, are fundamental and are correlative factors of reflection. Correlative in the sense observations of situations perplexes one causing the mind to consider suggestions for action to occur. The perplexity one sees is conceptualized as a problem to be solved and reflection occurs when one withholds immediate action and mentally entertains possible actions via mental trial and error. One mentally elaborates upon the situation and reasons in a hypothetical manner before taking overt action. This conscious elaboration takes the form of a mental experiment where conjectured ideas are tested and corroboration of ideas are supported with evidence before resolution to the problem is reached. Mental experimentation, reflective inquiry, transforms a perplexing situation into a settled one.

Reflective inquiry involves one in an extensive search requiring one to order ideas progressively and sequentially until the procedure leads to "...a conclusion that contains the intellectual force of the preceding ideas....making some idea worthy of belief....making it trustworthy" (Dewey, 1933, p. 47). As a result reflective inquiry transforms the perplexing situation into a settled one by constructing a resolution to the initial problem.

Inferences and reflection

Inferences are made when one is involved in the transformation of a situation of perplexity into a situation of clarity and coherence. The process of arriving at ideas of what is absent in the situation on the basis of observing what is present in the situation is what Dewey describes as inference. Inference involves juggling back and forth from what is known into the unknown. The direct experience provides the grounds for the formulation of inference. Inference in itself is neither fact nor fiction, right nor wrong, leading nor misleading, informing nor misinforming but a means to an end. Inferences are tested by mental elaboration and overt action. This mindful rigorous testing is what Dewey refers to as the reflective process.

The construction of inferences involves elements of anticipation and prediction. These elements are inevitable in the make up of inferences as inferences are drawn from one's past experience and suggestions arise out of the directly experienced situation as it was experienced. As such, reflection involves anticipating and predicting future action upon the reference of past experience. Reflection entails looking to the future as well as examining the past. The examination of past experience and events becomes more critical as one moves closer to a resolution to the felt problem. As such, reflection enables one to step beyond the firm hard ground and the acquisition of simple declarative facts into the changeful stimulating sea towards the accumulation of wisdom.

Dewey's work, outlined in Figure 2, p. 30, lays the foundation from which Schön framed his conceptualization of reflection in terms of the immediacy of the action setting. The next section provides a composite picture of Schön's epistemological assumptions and the most salient features underlying his conception of reflection. It begins with presenting Schön's argument contrasting two different perspectives of professional knowledge. The first as received knowledge or 'technical rationality', so named by Schön, and the second knowledge-in-action, Schön's new epistemology of practice based on 'reflective practice'. The section continues with an explanation of Schön's main elements of processes featured as reflective practice.

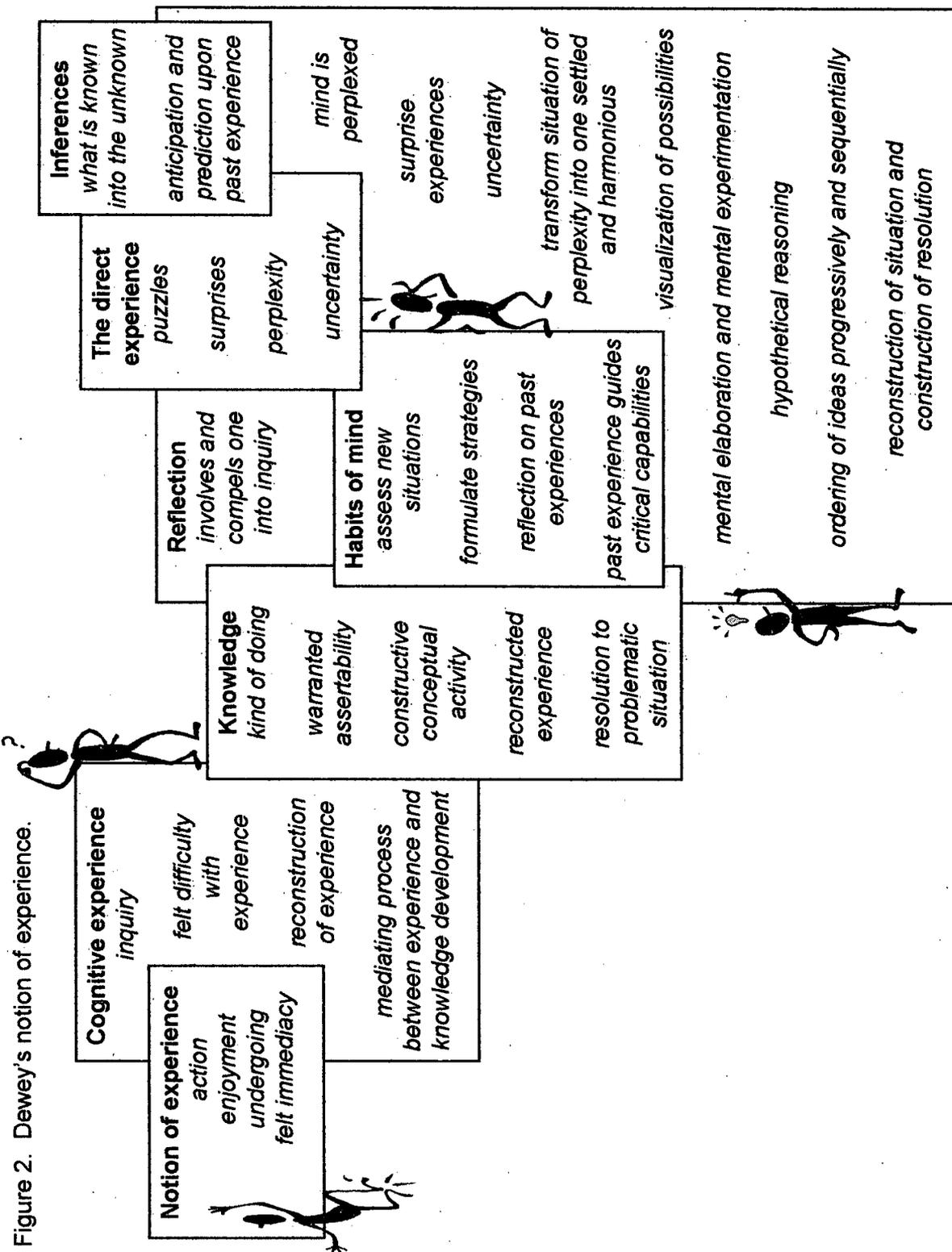


Figure 2. Dewey's notion of experience.

III. Schön's conception of reflection

The paradox of learning

"But how will you look for something when you don't in the least know what it is? How on earth are you going to set up something you don't know as the object of your search? To put it another way, even if you come right up against it, how will you know that what you have found is the thing you didn't know?" (Plato, 1964, p. 80)

Meno, a student of Socrates, formulated the above paradox of learning. The paradox of learning, of which all students experience at one time or another, is where the student does not understand that which is to be learned yet starts the learning process as if s/he understood. This equivocation is a necessary stepping stone for all learners. It is a step taken with uncertainty, perplexity, skepticism, apprehension and doubt. These unknowns cause curiosities and excitement which trouble the mind and of itself drives the student to the inquiry process seeking resolution. As such, the paradox of learning becomes an essential distinguishing proclivity of reflection.

The nature of reflection expressed by Dewey and embodied by Meno's paradox of learning, as described in the above passage by Plato, appear to be central to Schön's conception of reflection.

Schön's argument: technical rationality versus reflective practice

Schön (1983) expands upon the idea of practical professional knowledge, which he terms 'knowledge-in-action', which he argues is attained from the professional action of practitioners and their reflection in and on these actions. The idea of professional practice being generated from a positivistic theoretical kind of thinking (technical rationality) is refuted and the idea which suggests professional practice is an 'applied science', where the professional is an 'executor' of the laws and principles central to the discipline, is opposed. The position is taken that the professional knowledge-in-action of teachers does not consist of content knowledge and teaching skills fully determined in advance. Teachers are not viewed as a passive recipient of the prescribed professional knowledge nor as ones who play little part in the substance and direction of their teaching. Propositional knowledge, espoused in the epistemology of practice (technical

rationality) does not 'drive', 'produce' or lead to 'predictability' of practice. Instead, Schön's search and examination of professional knowledge-in-action ruminates around "...an epistemology of practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict" (Schön, 1983, p. 49).

The predominant model of technical rationality "...depends on agreement about ends. When ends are fixed and clear, then the decision to act can present itself as an instrumental problem. But when ends are confused and conflicting, there is as yet no "problem" to solve. A conflict of ends cannot be resolved by the use of techniques derived from applied research." (Schön, 1983, p.41). Uncertainty, uniqueness, instability, and value conflict are troublesome to advocates of the positivistic epistemology of practice as there is no clearly established context for the use of technique. Since there is contention over the multiple ways of framing the practice role, each with a distinct approach to problem setting, practitioners' professional knowledge is situated in the 'messy indeterminate zones of action' which do not fit the predominant model of technical rationality.

Further, Schön (1983, p. 42) bolsters his ideas of professional education by drawing upon an analogy to point to the dilemma of 'rigor or relevance'. A varied topography of professional practice is imagined as consisting of a high, hard ground "...where practitioners can make effective use of research-based theory..." and a swampy lowland "...where situations are confusing 'messes' incapable of technical solution". The problems which exist on the high, hard ground are often relatively unimportant, well-formed theoretical problems of practice which can be solved by applying the methods of science. The problems which exist down below in the swamp are crucially important, but are messy and are difficult problems of practice. The dilemma this topography suggests is whether one should choose to remain on the high, hard ground where it is possible to be rigorous in solving problems or choose to descend into the swamp where the problems are relevant but one can not be rigorous in any way that one knows how to describe.

Reflection in and on action

Since the model of technical rationality is incomplete, in that it fails to account for practical competence in 'divergent' situations, Schön proposes the processes of 'reflection-in-action' and 'reflection-on-action' as the 'artistry' displayed "...by competent practitioners as they confront problems which are ambiguous, unclear or indeterminate..." (Clarke, 1992, p. 22). One's ability to recognize patterns in situations of uniqueness and uncertainty, and to act effectively and efficiently in those situations, depends upon one's capacity to 'frame' problems. In doing so, one is drawing upon a repertoire of past experience and ways of capturing that experience, both of which lead to an ability to 'reframe' problems in light of the information gathered from the direct experience. Reflection-in-action is where the reframing occurs in the action setting, "...an action generated and tested through on-the-spot experimenting..." (p. 141) and reflection-on-action is where reframing takes place after the action setting has taken place, "...an action planned on the basis of post-hoc thinking and deliberation..." (Grimmett, 1988, p. 9). The processes of reflection-in-action and reflection-on-action then, are "...the mechanisms he proposes which permits practitioners to continue to develop a rich repertoire of strategies and ways of making sense of experiences that, ultimately, accounts for their competence in dealing with the 'messy' problems of practice". (MacKinnon and Erickson, 1988, p. 117).

Reflective experimentation: problem setting and problem solving

The reflective processes of reflection-in-action and reflection-on-action both involve some form of experimentation in which practitioners attempt to create meaning of the problematic aspects of the practice situation. This form of experimentation is referred to by Schön as 'problem setting' and 'problem solving'.

"Problems do not present themselves to the practitioner as givens. They must be constructed from the materials or the problematic situations that are puzzling, troubling and uncertain. When we set the problem we select what we will treat as the "things" of the situation, we set the boundaries of our attention to it, and we impose upon it a coherence which allows us to say what is wrong and in what directions the situation needs to be changed. Problem setting is a process in which, interactively, we *name* the things to which we will attend and *frame* the context in which we will attend to them". (Italics in original, p. 40)

The process of reframing the problem situation enables the practitioner to make sense of and to make use of their "repertoire of examples, images, understandings, and actions" (p. 66). The practitioner applies past experiences on the situation; imposes frames which highlight certain aspects of the phenomena at work in the situation; sets problems, reframes the situation and engages problem solving actions. In order to see what can be made of the practitioner's reframing of the problematic situation s/he tries to adapt the situation to the frame through a 'web of interconnected actions', discovered consequences, implications, and 'appreciations'. This process of reframing yields phenomena to be understood, problems to be solved, or opportunities to be exploited all of which produces unintended changes which give the situations new meaning. The situation 'talks back', the practitioner listens and in understanding what is heard s/he reframes the situation yet again. Thus, reflection engages the practitioner in a 'reflective conversation' with the problematic situation.

"In this reflective conversation, the practitioner's effort to solve the reframed problem yields new discoveries which call for new reflection-in-action. This process spirals through stages of appreciation, action, and reappreciation. The unique and uncertain situation comes to be understood through the attempt to change it, and change through the attempt to understand it". (Schön, 1983, p. 132)

What a practitioner sees in a problematic situation of practice and what s/he makes of what s/he sees in the practice setting depends upon s/he seeing the new situation as some element of her/his repertoire.

"It is our capacity to see unfamiliar situations as familiar ones, and to do in the former as we have done in the latter, that enables us to bring our past experience to bear on the unique case. It is our capacity to *see-as* and *do-as* that allows us to have a feel for problems that do not fit existing rules". (Italics in original, p. 140).

When a practitioner sees new situations as some element of her/his repertoire s/he "gets a new way of seeing it and a new possibility for action in it, *but the adequacy and utility*

of [her] his new view must still be discovered in action". (Emphasis and parenthesis added, Schön, 1983, p. 141)

Schön's epistemological assumptions and the most salient features underlying his conception of reflection regard reflection as the reconstruction of experience and is significant for the purpose of capturing practice settings in problematic ways. Reflection is situated and constituted by action settings which precipitate problems and surprises for the professional practitioner. Fundamental to this undertaking, is how practitioners generate professional knowledge in and 'appreciate' problematic features of action settings (Grimmett, 1988). Dewey's foundational properties of reflection are extended in a manner which emphasizes the action setting of practice.

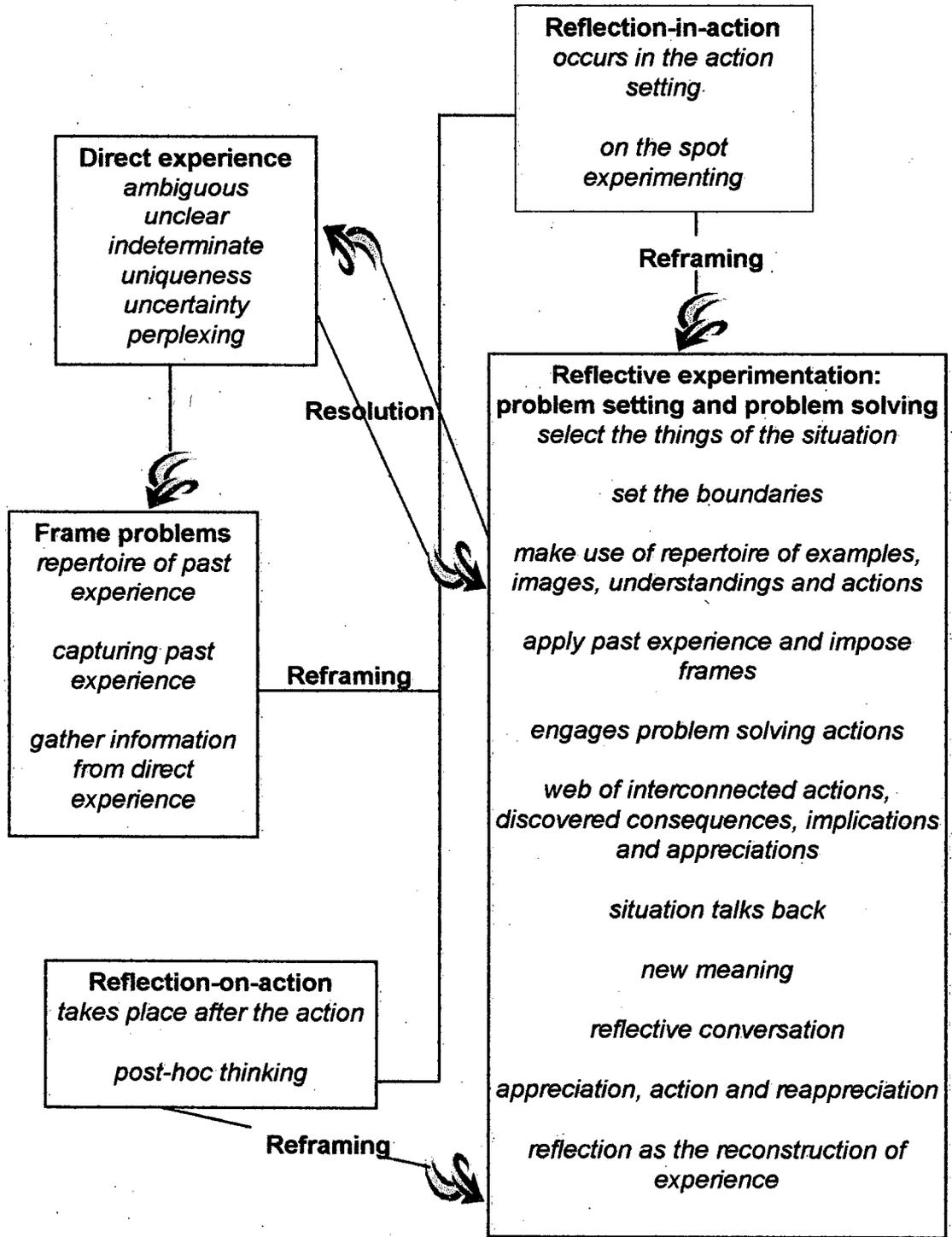
The virtual world of the reflective practicum

Schön advanced the notion of a 'reflective practicum' in an effort to link the deviant position of the arts with the legitimate role and function of the sciences in rethinking the role of practicum in professional education where students could 'appreciate' the process of reflection by being emerged into the reality of the practice setting. Houston and Cliff, (1990) suggest that one can only develop an understanding of reflection from within the process of *doing* and through this process the practitioner learns to construct meaning from the action setting. The clarification of intended meanings and the discovery and resolution of incongruities are best achieved through action and reflection (Clarke, 1992).

Central to the practicum setting is the provision of a 'virtual world' that represents all the particulars of a practice world, which allows the student to 'experiment at a lower cost'. In the context of teacher education, the student teacher is actually immersed in the practice setting in which supervisory dialogue and the student teacher's own internal dialogue forms a type of virtual world (MacKinnon and Erickson, 1988). The cost of experimenting in this practice setting, however, may indeed be costly to the student teacher as their self-esteem, ability to cope and carry through the practicum, and their future teaching prospects may be at risk.

Since the emergence of Schön's ideas, summarized in Figure 3, there has been a natural adaptation of his suppositions in the context of teacher education. These ideas

Figure 3. Schön's conception of reflection: reconstruction of experience.



have as yet to be examined in the context of professional practice in teaching physical activities and in particular the teaching of activities in an unforgiving learning environment.

The development of professional practice in teaching in unforgiving learning environments involve an element of *physical* risk for both the teacher and student. Hence, this type of teaching becomes 'situated' beyond the 'clinical setting', that is, beyond the relatively risk free virtual world found in the practice setting of professional classroom school teachers, to include instances and elements of danger encountered in the 'underwater' world. The cost of experimenting in this practice setting is potentially high and indeed, possibly life threatening.

Between the high, hard ground and the swamp

Schön's compelling argument distinguishing between the 'rigor' of science, 'technical rationality', and the 'relevance' of art, 'reflective practice', is a source of concern for a number of researchers. The concern focuses around the issue of two divergent, mutually exclusive, competing conceptions of teaching (Gilliss, 1988; Harris, 1989; Selman, 1988; Shulman, 1988; Wildman, Magliaro, Niles, and McLaughlin, 1990). Specifically, some have interpreted his argument to be condoning, unequivocally, a position of teaching as reflective activity. Thus, it would follow that improvement in teaching would only occur if teachers become inquirers into their own practice. On the other hand, others have interpreted his discussion as an argument against a conception of teaching as a scientific enterprise. Thus, it would follow that improvement in teaching would only occur if the research base on teaching improves. Countering this issue are those who contend that Schön is not forcing a face-off between technical rationality and reflective practice as two competing models but in fact highlights the different contribution each makes to professional practice (Grimmett, 1989; MacKinnon and Erickson, 1988; and O'Gorman, 1989). Schön himself suggests, "...the dilemma of rigor or relevance may be resolved if we can develop an epistemology of practice which places technical problem solving within a broader context of reflective practice" (Schön, 1983, p. 69).

Schön is consistent and insistent that reflection occurs only in conditions of uncertainty – "Surprise and puzzlement are at the heart of reflective teaching" (Schön,

1983, p. 22). Some researchers have questioned the boldness of this supposition. Most researchers on reflective practice, in teacher education, have focused upon situations of perplexity (Grimmett, 1989). However, there are those who suggest reflection-in-action can be both 'spontaneous', a practitioner is faced with a perplexing situation, and 'deliberate', a practitioner makes an element of practice problematic (LaBoskey, 1989; Selman, 1988; Houston and Cliff (1990). Schön's (1987) notion of reflection-on-action, is a riposte to this issue.

Kilbourn (1989) suggests

"Donald Schön's recent work (1983, 1987) has had considerable appeal in the context of professional practice. Reflection-in-action and reflection-on-action are concepts which play a major role in his discussion of a variety of educational contexts such as training in design and psychotherapy. While his work has intuitive relevance to school people, none of his detailed examples come from commonplace educational settings – public schools with teachers and classrooms of thirty or more children. Consequently, those of us concerned with these settings have the task of illuminating the particular ways in which his work has relevance to teachers and their classes. (p.91)

What Kilbourn and other researchers find perplexing is whether reflection-in-action can be a functional process within the daily practice of an elementary or secondary classroom vignette. Kilbourn (1988) suggests teachers are bound up by the active pursuit of survival which is generally found in a routinized curriculum. Court (1988) argues that reflection-in-action requires "...at least a momentary time-out from action..." (p. 146) and suggests reflection-on-action as a more prudent and viably obtainable concept within the teaching practice setting.

The gray territory of the notion of reflective practice – between the high, hard ground and the messy swamp, as pronounced by these and other researchers, have caused Schön and others to expand and refine the concept of reflection. This project is an attempt to further the conception of reflective practice.

IV. Reflective practice and teaching the physical activity of sport diving

Sport diving: a constructivist perspective

In the recreational industry of sport diving there has been a paucity of published research dealing in the ways in which sport diving teachers make intuitive sense of their practice. Information acquired in the past and present, in the form of questionnaires, formal and informal discussions with curriculum developers and those practitioners involved in the teaching of the sport at various levels, have been collected and interpreted by the researcher in terms of a constructivist view of teaching and learning (Alexander, 1982, 1989). Central to the constructivist perspective is the notion that individuals construct their own meaning of new information and ideas on the basis of their existing knowledge and understandings (Schön, 1983, 1987, 1988; von Glasersfeld, 1987). Further, the constructivist view holds that learners are 'purposive' beings (Magoon, 1977) and as such, the constructivist account is concerned with the 'internal landscapes', the intents, beliefs and emotions of individuals as well as their conceptualizations, and recognizes the influence that prior experience, or lack thereof, has on the way information is perceived and interpreted.

For the sport diving certified instructor (student teacher) teaching in the form of teaching an entry-level course (student teaching experience) is the first opportunity to engage in systematic reflection on classroom, confined water (pool) and open water (ocean) practices. As the sport diving teacher engages in the practice of teaching in unforgiving learning environments s/he encounters many events, some familiar and anticipated, others new and surprising. When the teacher deals with the familiar and anticipated events s/he is likely to draw upon a repertoire of responses based upon prior experiences as a student scuba diver, a certified diver, experiences at the work place and experiences of family life, etc. (Magill, 1998; Gagné et al, 1993). At times, however, sport diving teachers are challenged by many new and unanticipated events for which no appropriate response will be present in their current repertoire. In these situations teachers have to construe responses sensitive to the situation by problem setting, problem framing and reframing, experimentation and 'back talk'. In the sport of diving teachers must bring to bear any prior knowledge and experience which might be appropriate, and do so quickly. At times, this is an exciting and invigorating experience, at other times it is unnerving, bewildering and dangerous. For the sport diving teacher

the teaching experience in which events may be anticipated or unanticipated, routine or unique, provides opportunities for 'reflection-in-action', that is, an opportunity to examine their practice in light of past experience and knowledge, and to develop or modify a plan for future action.

This study has drawn upon two general perspectives – Schön's account of the development and growth of professional knowledge in practice settings and a particular approach to sport diving instruction referred to as a 'constructivist perspective'. From this orientation the researcher developed an approach to the reflective teaching of sport diving which supports the notions: 1) a reflective sport diving teacher recognizes s/he and the students are constantly constructing meaning in each of the three learning environments: classroom, confined water (pool) environment and open water (ocean) environment situations; 2) a reflective sport diving teacher has the disposition for attempting to 'see' their own teaching actions and the learning actions of their students from the student's perspective; 3) a reflective sport diving teacher is in a better position to teach her/himself about handling perplexity and unique events of uncertainty and 4) a reflective sport diving teacher is in a better position to teach her/his students to creatively imitate the particular kind of learning-by-doing on which the action setting of sport diving depends.

CHAPTER 3

Reflective Practice as The Research Method

Chapter three presents the details of the research design, specifically the case study and the associated stimulated recall approach, the data capture, data collection, and the reflective analysis involved in the data review procedures.

I. The case study and stimulated recall approach

The case study

The case study approach permitted levels of understanding and explanation not possible through conventional experimental or survey designs (Merriam, 1985) and has a long history of use in the fields of medicine, law, anthropology, psychology and social work. Educational researchers have found the case study to be helpful in providing insights into the complexities and nuances, as well as into the deeper understandings involved in the process of teaching and learning to teach.

The case study approach provided a suitable vehicle for the 'thick description' (Geertz, 1973) essential in understanding the context and the situation under investigation:

"Thick description involves literal description of the entity being evaluated, the circumstances under which it is used, the characteristics of the people involved in it, the nature of the community in which it is located, and the like....Thick description also involves interpreting the meaning of such demographic and descriptive data in terms of cultural norms and mores, community values, deep-seated attitudes and motives, and the like" (Geertz, 1973, p.11)

This method of inquiry has been referred to in the literature as ethnography, field study, or participant observation. Some researchers have regarded the strategy as getting at cultural knowledge (Spradley, 1980), or refer to the detailed patterns of social interaction (Gumperz, 1981), or the holistic analysis of societies (Lutz), sometimes the case study is referred to as story-telling (Walker, 1981), or a platform for multi-logging

(Goldman-Segal, 1995), and yet some researchers make the claim that a case study can develop and test theory (Glaser and Strauss, 1967; Denzin, 1978). Whatever a case study is, it is a social research method. In this research project the case study was used as a method of arriving at a comprehensive understanding of a social unit, the processes of teacher reflection, and of the social contextual phenomenon under investigation, that is, teaching in the unforgiving learning environments of sport diving.

The assumptions underlying this method of research were those common to Guba and Lincoln's (1982) description of naturalistic inquiry. Specifically, the assumptions were: 1) the subjectivity of the researcher in a natural setting provided a means of knowing of which there were multiple perspectives of reality, 2) that the context impacted on the imperative interactive social behavior and relationships between the inquirer and the subjects and finally 3) that control and truth evolved from a conveyed knowledge base (Rist, 1982; Guba and Lincoln, 1981; and Smith, 1982).

Stimulated recall

Research into the cognitive activities of professionals as they solve problems, make decisions or process information has commonly relied upon introspective reports as a means of tracing thought processes. As such, stimulated recall is a technique designed to facilitate retrospective verbalization of thought processes which occurred simultaneously with some recorded overt behavior. Bloom (1953) described the nature of the technique as one in which "...a subject may be enabled to relive an original situation with vividness and accuracy if he is presented with a large number of cues which occurred during the original situation" (p. 161).

Stimulated recall procedures have been used in studies in education (Marx and Petersen, 1975; Shulman and Elstein, 1975; Conners, 1978; Tuckwell, 1980; and Clarke, 1992) and have typically involved a teacher whose thought processes are disclosed to an interviewer via reliving a video or audio taped recording of an event. Educational researchers have found the technique useful as under these circumstances the teacher is a participant in an event at one time and is a teacher reporting her/his conscious thought participation after the event. The stimulated recall session was used in this study as a method to gain insight into the practitioners' cognitive processes

associated with the ways they make diverse decisions and judgments within their practice of teaching sport diving in unforgiving learning environments.

II. Data capture

This section of chapter three presents the structure for the investigations associated with the research questions, and outlines the procedures used to select the participants.

The structure for the investigations: 'reflection on teacher action sequence'

A typical beginner sport diving course, as defined by the Recreational Scuba Training Council (RSTC), provided the structure for the investigations outlined in the research questions. The RSTC is an internationally recognized body comprised of representatives from each of the sport diving certification agencies. This governing body sets the standards and procedures for the industry and decides upon the minimum course content for sport diving's theoretical and practical components of the entry-level and instructor level courses.

Since most certifying agencies design their programmes to be performance based, the amount of time required to complete the programme is based on class size, logistical considerations, student aptitude and student performance. However, most entry-level courses consist of a minimum of eight hours of academic training in the classroom environment, nine hours of confined water training in the pool environment and fifteen to twenty hours of open water training in the ocean environment.

Many studies of teacher reflection in education involve 'a regular teaching cycle'. Clarke (1992) created a regular teaching cycle which included "...a student teacher's pre-lesson discussion with a sponsor teacher, the teaching of a lesson, and a post-lesson discussion with the sponsor teacher..." (p. 64). Stimulated video recall sessions are generally scheduled to occur intermittently with the regular teaching cycle. Consequently, the combination of the regular teaching cycle and the video recall sessions would constitute a 'reflective teaching cycle' (Clarke, 1992). Central to this theme of investigation is: 1) the prominent features of the practicum experience, 2) the

cycle can be continually repeated throughout the practicum, and 3) the cycle captures the influence of the sponsor teacher (Clarke, 1992).

Unlike the procedures and theme of investigation described above, this project was specifically interested in the nature of teacher reflective practice. This study was focused on 'getting at' the practitioner's cognitive processes associated with the ways diverse decisions and judgements are made within the practice of teaching in unforgiving learning environments. Consequently, rather than calling for a 'reflective teaching cycle' this investigation called for a 'reflection on teacher action sequence'. This reflection on teacher action sequence was used to examine the reflective processes of one sport diving teacher as he engaged in reflection upon the issues and/or concerns which he identified in each of the three teaching environments.

The significance of a 'reflection on teacher action sequence' is that it was based upon the most prominent features of the teacher's own perception of the experience. The teacher chose situations of relevance and reflected upon his own reflection-in-action. Since the community of sport diving does not implement a pre-service student teaching experience, as is required in education, no attempt was made to integrate sessions of actual teaching with sessions of stimulated recall. In fact, since learning to dive is a recreational activity, all classroom and confined water sessions occurred between six and ten in the evening allowing the general work force the opportunity to participate. This schedule made it difficult for the researcher to engage the teacher or students in a stimulated recall session after the evening session. It was equally difficult to arrange for stimulated recall sessions during the following day as those who participated in the study were engaged in occupational activities. Therefore, the decision was made to video tape the entire course and schedule the stimulated recall sessions to take place in the evenings following the course. Eleven direct experiences were video taped followed by the audio taping of the eleven stimulated recall sessions.

The reflection on teacher action sequence may be repeated throughout different courses. In doing so, the reflective activity of practitioners may be tracked within a specific course or across several courses. This type of tracking may provide insights into the circumstances which are conducive to the development of teacher reflection in this setting.

An unintended but important product of the research design was the opportunity to analyze the effect of the supervisory dialogue of the more experienced teacher. This supervisory dialogue occurred a number of times in the course of the reflection on teacher action sequence. Although not central to this study, the interplay between the more experienced teacher and less experienced teacher could be examined as a result of this method of data capture.

The participants

This study did not attempt to select exemplary teachers, students or teaching environments. In actual fact, every step was taken to ensure that the teacher, students and teaching settings were typical of most sport diving courses. Hence, the study became 'situated' beyond the 'clinical' setting, that is, beyond the relatively risk free 'virtual' world to include instances and elements of the 'real' underwater world.

There were four criteria associated with the selection of the participants in this study: geographic opportunity, voluntary participation, the safety of the students and teachers involved, and that the sport diving facility offered appropriate space for video taping the classroom sessions of the entry-level course and that the same classroom space was available to conduct the stimulated recall sessions.

The researcher's residence in the lower mainland of British Columbia provided access to the sport diving facilities in the area and permitted her to visit each facility and ask volunteers to participate in the project. Several sport diving facility owners agreed to participate and provided the names of teachers who might, if approached, volunteer for the project. Each teacher contacted demonstrated interest and a willingness to commit time to the study. Based upon available space and time within the facilities, to video tape the classroom session and conduct the stimulated recall sessions, two teachers at one facility were selected. One teacher was selected for the pilot study and a second for the primary study. At the commencement of each of the volunteers' courses, the researcher addressed the students in the course and asked for and received their voluntary participation. All names have been changed for anonymity purposes.

This case study focused upon the teaching procedures of Henri, a certified instructor who has been teaching sport diving for nearly eight years. Henri lives in North

Vancouver, a community skirting the ocean waters of Burrard Inlet and Indian Arm and situated in the foothills of the Coast Mountain Range of British Columbia. He became involved and intrigued with sport diving when fulfilling a prerequisite requirement for entry into the North Vancouver Fire Department and decided to continue in sport diving education to the level of instructor. He is now the store manager of the same dive center in which he acquired his diving education.

Two students participated in stimulated recall sessions. Frank, an engineer from North Vancouver, became involved in the beginner sport diving course to overcome a personal challenge of being able to go underwater. He was in attendance at all classes and struggled to grasp the cognitive and physical skills necessary to achieve his own personal challenge. Frank had a quiet demeanor and was often frustrated with his lack of physical ability. Brock, a broker from West Vancouver, was an avid snorkeler and had traveled and snorkeled, in his younger single years, in exotic destinations. Now, a father of two teenage girls, his desire was to take up the sport of diving so he would have an understanding of the activity the whole family would eventually participate in together. Brock was intrigued by the whole process and the theory of diving and practical skills came easy. Keeping his future planned diving experiences with his girls in mind, he often asked very interesting and relevant questions.

III. Data collection procedures

One teacher (Henri), two certified and insured assistant instructors (Shirley and Cynthia), one divemaster (Adam) and ten students (of which Henri referred to five of the ten students; Frank, Brock, Todd, Richard and Tom) participated in the beginner sport diving course in this study. Eleven class sessions, (four in the classroom setting, three in the confined water, with the remainder in the open water environment), were taught and filmed over the duration of the course (approximately three sessions per week for four weeks). The teacher and two of the students independently participated in eleven stimulated recall sessions (approximately four sessions per week for three weeks).

The beginner sport diving course

Approximately one third (four classroom sessions) of the total entry-level sport diving course involved helping students acquire the cognitive skills and knowledge base

necessary to begin diving safely.

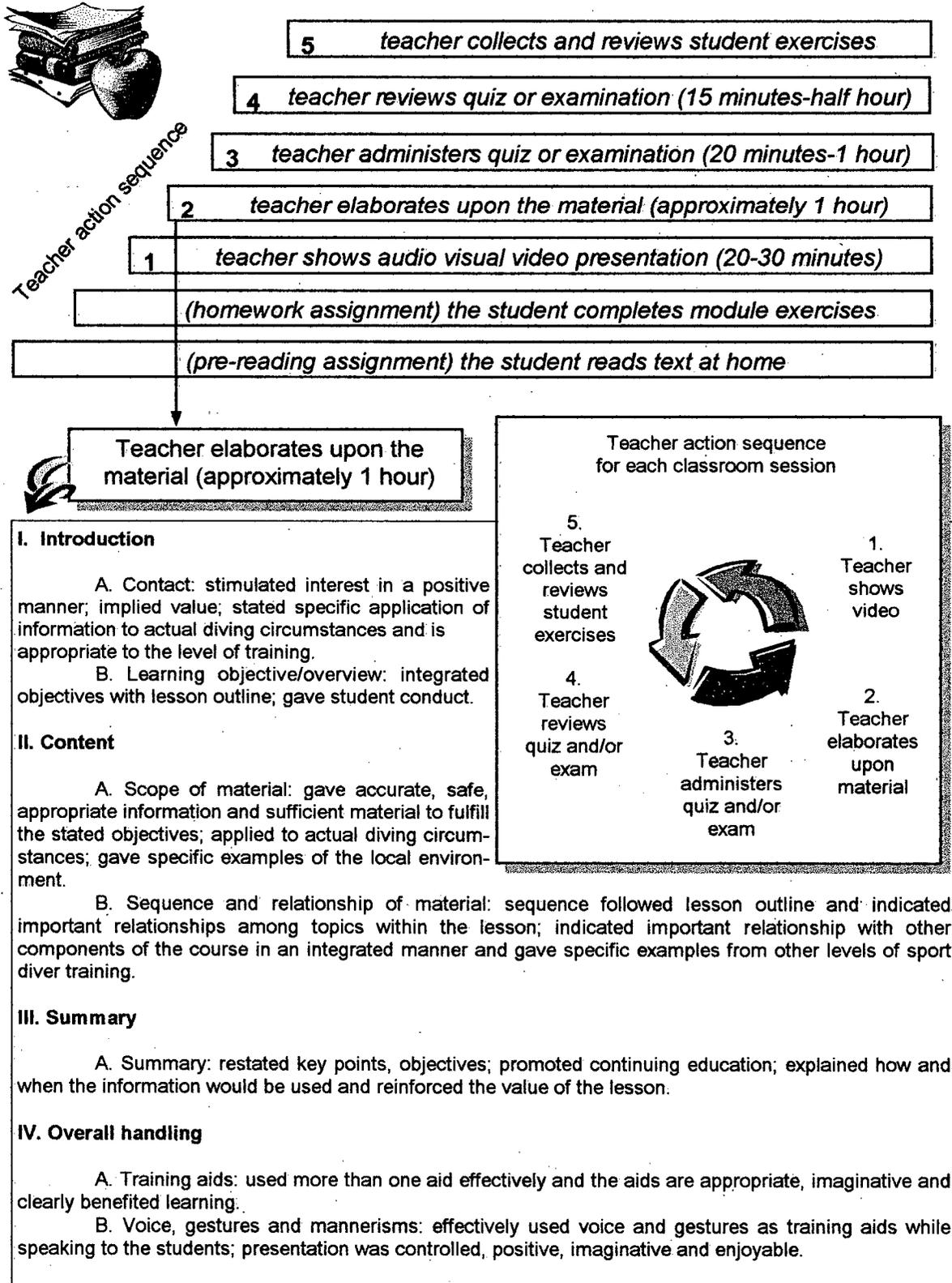
The classroom environment

Each two hour classroom session, as outlined in Figure 4, p. 48, began by the teacher showing a twenty to thirty minute audio-visual presentation of the course material to be covered that evening. This video segment of the course was prepared professionally by the certifying agency and provided a valuable visual overview of the material students had supposedly pre-read in their textbooks as well as the material to be discussed in class. At the conclusion of the audio-visual presentation the teacher elaborated upon the important aspects of the material presented by the video and the textbook. Each presentation started by way of a contact which situated the to-be-learned material with similar material of the students' past. The teacher presented objectives and value statements, gave overview topic headings, the conduct expected of the students, elaborated upon the important topics, implemented training aids to reinforce concepts, sequenced the material as to the relevancy to other modules in the course, used his voice and body gestures to emphasize his points, suggested continuing education avenues and succinctly summarized the presentations.

The teacher's approximately one hour elaboration was guided by a visual slide presentation which had been assembled professionally by the certifying agency. Following this phase of each classroom session was a twenty minute written quiz and following the final classroom session was a one hour summative examination. Once the quizzes or exam was completed by the students, the teacher reviewed the exam questions and answers during class time. At the completion of each classroom session the teacher collected student assignments which were read by the teacher and discussed with the students during their next session.

The real substance of the sport diving instruction evolved around the acquisition of essential diving skill. The classroom portion of the course only supported the need for the scope of skills involved in diving and its role was to provide the 'why' of diving whereas the confined water instruction provided the 'how' aspect of diving. Three sessions were conducted in the confined water (pool) environment and each session followed a similar pattern of events.

Figure 4. Teaching in the classroom environment.



The confined water (pool) environment

The students and teacher met briefly in the classroom environment to preview, by way of oral explanation and/or audio-visual presentation (professionally constructed by the certifying agency) of the skills to be covered that session. The teacher also had the students fill out their log books, which is not a requirement by standards but an effort on the part of the teacher to simulate as close as possible real-world procedures. This phase of the confined water session was completed in about half an hour. Students acquired their rental equipment and proceeded to the confined water setting to meet the teacher and his instructional assistants.

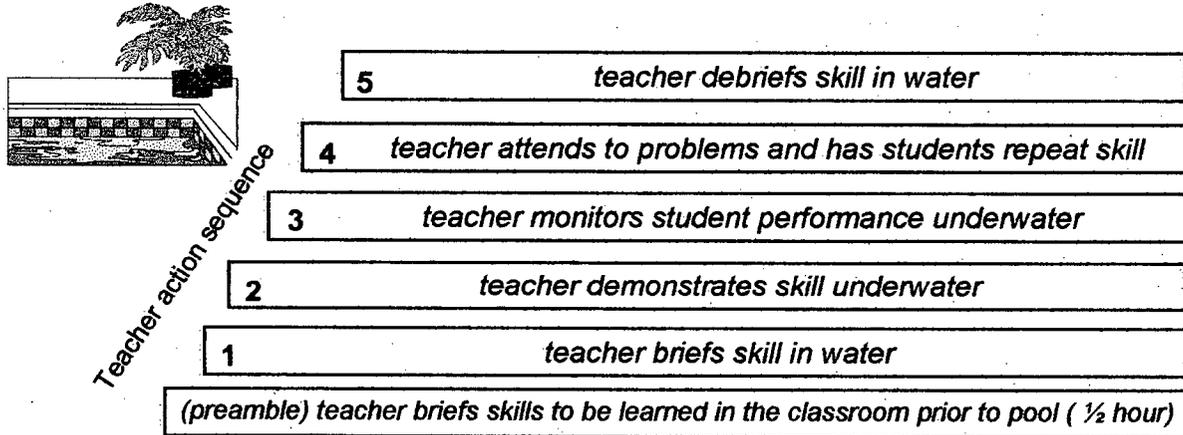
Each pool session followed a standard procedure, as depicted in Figure 5, p. 50, of the teacher briefing for each skill to be presented: the objective of the skill, the value, a thorough explanation of how to perform the skill, key points to remember about the skill, possible problems in executing the skill, an explanation of how the skill would be conducted underwater and the necessary hand signals needed to communicate underwater.

While underwater the teacher using the whole-part method demonstrated each skill for the students before requesting the student to perform the skill. The demonstrations were presented in a slow, exaggerated manner and the teacher's expertise and experience made the skills appear easy. Following the demonstration of the skill the teacher motioned for each student to perform the skill individually and directly in front of him so any problems encountered could be acted upon. After each student was given the opportunity to perform the skill for the teacher, all students were brought to the surface for debriefing.

In the debriefing procedure, the teacher included positive reinforcement, clarification of any problems that had arisen, suggestions as to preventing the problems from reoccurring, and a concluding statement emphasizing the objective and value of the skill.

This teaching procedure, which included a cycle of teacher briefing, teacher demonstration, student demonstration, teacher problem solving activities, student skill

Figure 5. Teaching in the confined water (pool) environment.



Teacher action sequence for each skill (approximately 20 minutes)

I. Briefing

Stated objective and value; adequately described the skill; gave surface demonstration of the skill if applicable; identified key points in the skill; pointed out possible difficulties; described how the skill will be conducted underwater and gave appropriate hand signals for communication.

II. Teacher underwater demonstration

Performed exercise correctly and slow enough to adequately exhibit or illustrate details of the skill; slowly with exaggerated movement and appears to look 'easy'.

III. Student performance and problem solving

Responded correctly and quickly to problems in a manner that reassured the student and benefited learning; had student repeat the skill correcting the identified problem.

IV. Teacher control and delivery

Organized, safe, used time effectively; used positive reinforcement and used assistants effectively.

V. Debriefing

Used appropriate reinforcement in mentioning something the students did well; identified student problems that had occurred; offered suggestions to prevent problems from reoccurring; restated the objective and value of the skill.

Teacher action sequence for each skill

repetition and teacher debriefing resulted in a teaching segment of approximately twenty minutes per skill. Each of the three confined water sessions covered a period of three hours.

The classroom sessions and the confined water sessions were conducted to provide maximum learning effectiveness for the student and to provide liability protection for the teacher. That is, the classroom sessions and confined water sessions were integrated and taught in the following order: classroom sessions one and two were followed by the first confined water session, students returned to the classroom for session three then back to the confined water for session two, students completed all their classroom sessions before completing their last confined water session. After the classroom and confined water sessions were completed the remainder of the course was conducted at the open water (ocean) location (see Table 2, p. 52).

Table 2. Integrated teaching sequence of lessons in the beginner course.

Session number	Course component designator	Course component	Time involved
Session 1	CR 1	Classroom lesson 1	2 Hrs.
Session 2	CR 2/3	Classroom lesson 2 and 3	2 Hrs.
Session 3	CW 1/2	Confined water (pool) lesson 1 and 2	3 Hrs.
Session 4	CR 4	Classroom lesson 4	2 Hrs.
Session 5	CW 3/4	Confined water (pool) lesson 3 and 4	3 Hrs.
Session 6	CR 5	Classroom lesson 5	2 Hrs.
Session 7	CW 5/6	Confined water (pool) lesson 5 and 6	3 Hrs.
Session 8	OW 1	Open water (ocean) dive 1	4 Hrs.
Session 9	OW 2	Open water (ocean) dive 2	4 Hrs.
Session 10	OW 4	Open water (ocean) dive 4	4 Hrs.
Session 11	OW 5	Open water (ocean) dive 5	3 Hrs.

Note: OW 3 (open water [ocean] snorkel experience 3) is optional and was not completed in the study.

The open water (ocean) environment

Four open water (ocean) dives were conducted over two days completing the beginner sport diving course and resulting in, for successful candidates, student certification. The teacher organized the first day of diving to take place in a gentle, relatively uninteresting open water setting while the second day was organized to challenge the students' abilities. Session three and four of the open water environment component had a difficult ocean entry, however, once submerged the students were able to view the many colors of the sea. The procedure for the open water sessions followed a set pattern.

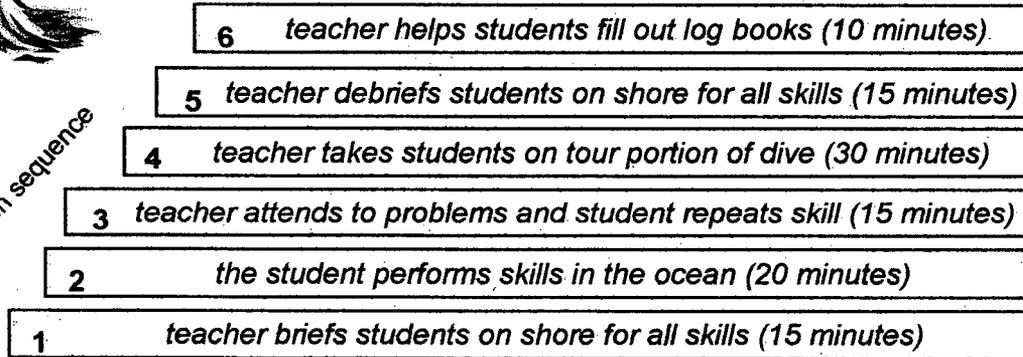
Before entering the water, the teacher briefed the students on land regarding the skills they were to perform. This briefing included the objectives and the value statements for the skills, a brief review of the skills and how they were to be conducted underwater, key points and problem solving procedures and finally the hand signals necessary for conducting a smooth, safe session underwater. Unlike the confined water (pool) sessions in which each skill was briefed and debriefed singularly, the context of the open water (ocean) environment required the teacher to brief and debrief all the skills to be conducted on one dive in an integrated manner.

The students performed the skills for the teacher in approximately twenty feet of water and the teacher addressed any problems evidenced by the students. Once each student had performed the skills adequately, the group completed the tour portion of the dive. On returning to shore the teacher debriefed the students summarizing the difficulties which had been encountered, offered suggestions of how to prevent these difficulties from reoccurring, reviewed the objectives and values of the skills and encouraged the students in a positive manner. Both the briefing and debriefing portion of the open water session required fifteen or so minutes. The teacher and students had actual underwater bottom times of forty-five to fifty minutes for each session. Each open water session concluded with the logging of the dive in the students' log book. Figure 6, p. 54, summarizes the teaching procedure for the open water (ocean) environment as outlined above.

Figure 6. Teaching in the open water (ocean) environment.



Teacher action sequence



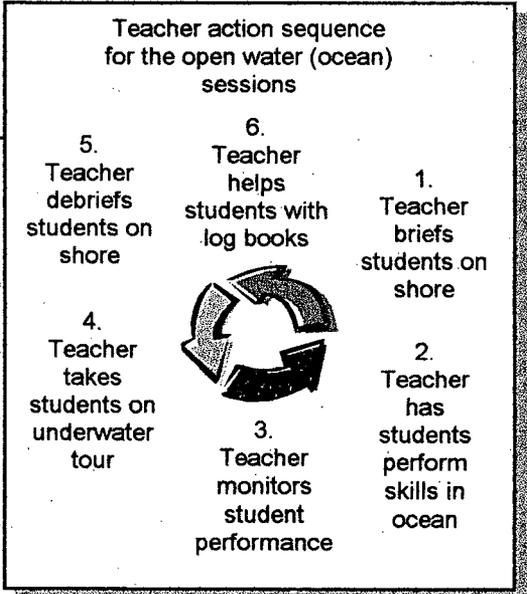
Teacher action sequence for each dive (approximately 2 hours)

I. Briefing
 Stated objectives and values; adequately described the skills and key points; indicated associated problems; explained how the skills were to be conducted underwater; gave appropriate hand signals for underwater communication.

II. Student performance and problem solving
 Responded correctly and quickly to problems in a manner that reassured the student and benefited learning; had student repeat the skill correcting the identified problem.

III. Teacher control and delivery
 Organized, safe, used time effectively; used positive reinforcement and used assistants effectively.

IV. Debriefing
 Used appropriate reinforcement in mentioning something the students did well; identified student problems that had occurred; offered suggestions to prevent problems from occurring; restated the objectives and values of the skills and helped students fill out log books.



Video taping the course

The sessions taught by Henri in each of the three environments were video taped by the researcher. To ensure that the presence of the video camera and the researcher was minimally disruptive to the class and to ensure fidelity to the project objectives, the researcher video taped the pilot study in the same settings as the major project was to be conducted. This enabled both the teacher and certified teaching assistants to become familiar with the presence of the camera and the researcher. During the classroom filming the camera, which had a highly sensitive microphone to record the audio portion of each session, was located at the back of the room. A wide-angle focus was maintained for recording most of the classroom sessions, with the narrow focus being used to capture notes, diagrams or dive table questions written on the white board.

The confined water sessions were video taped at/in the pool setting with a video camera secured in an underwater housing. Both the above water conversations and underwater instruction were video taped. Due to the water medium, the cumbersome nature of the video camera setup and the limited battery capacity as a power source, the researcher had to be selective in capturing the most salient features of teaching in this environment. As in the classroom sessions, a wide-angle lens was used for the majority of the filming. Occasionally the focus would be narrowed to capture the teacher's one-on-one interaction with the students. Unlike the classroom setting, the context of the pool environment did not allow for the camera to be positioned in one set secured position. The researcher maneuvered the camera to capture the teacher as a focus, to capture one-on-one interactions between the teacher and a student, and to capture instructional sequences and actions by moving from shallow water to deep water and from one end of the pool to the other.

The open water sessions were video taped at/in the ocean setting with the same video equipment used in the pool setting. In an effort to overcome the contextually different visual factors offered by the ocean environment, two strobe lights and a second battery source was secured to the video camera's underwater housing. Once again, both above water conversations and underwater instruction were video taped. The constant movement and limiting visibility of the ocean, the limited capacity of both power sources for the camera and lights (which were very sensitive to cold temperatures of the

ocean), and the extra weight of the strobe lights made it impossible to station the camera in one position. Once again, the researcher maneuvered the camera and was selective in capturing the most salient features of teaching in this environment. A wide-angle lens was used for the majority of the filming. The researcher captured the teacher as a focus. Using a narrower lens the researcher captured one-on-one and one-on-two teacher interactions with the students. Instructional sequences and actions were captured on film by moving from shallow water to deep water and from the surface to the bottom of the sea.

Stimulated recall sessions

Overlaid on each of the eleven sessions of the beginner sport diving course, which were conducted as described previously in three different learning environments, were a series of stimulated video recall sessions (Tuckwell, 1982). These sessions allowed both teacher and students to independently comment upon any and all instances that occurred during the course, which were significant to them. The agenda for stopping, starting and commenting upon sections in the video was set by the participants. Both the teacher's and the students' reflections were stimulated by their own surprise, curiosity or perplexity. Traditionally, the researcher, rather than participants, sets the agenda and asks the participants to recall their thoughts at the researcher's predetermined points in time.

The combination of the video and the video recall sessions consisted of an analysis of a combination of the teacher's reflection on general teaching practices and contexts, of the teacher's reflection-on-action and, of the teacher's reflection-on-'reflection-in-action'. This combination was tested in a pilot study and was found to be robust and successful in 'getting at' the nature of the teacher's reflective practice.

Data collection report

The data collection report, as illustrated in Table 3, p. 57, documented information on the successful completion, or otherwise, of the data collection. The report also indicates the method used in the indexing of the data on the video tapes, audio tapes and the transcript excerpts used in the analysis.

Table 3. Data collection report.

Video data collection table.			
Session number	Course component	Video tape number designation	Success
Session 1 (S1)	Classroom 1 (CR1)	Video tape 1 (V1)	Yes
Session 2 (S2)	Classroom 2 and 3 (CR2/3)	Video tape 1 (V1)	Yes
Session 3 (S3)	Confined water 1/2 (CW1/2)	Video tape 2 (V2)	Yes
Session 4 (S4)	Classroom 4 (CR4)	Video tape 1 (V1)	Yes
Session 5 (S5)	Confined water 3/4 (CW3/4)	Video tape 2 (V2)	Yes
Session 6 (S6)	Classroom 5 (CR5)	Video tape 1 (V1)	Yes
Session 7 (S7)	Confined water 5/6 (CW5/6)	Video tape 2 (V2)	Yes
Session 8 (S8)	Open water 1 (OW1)	Video tape 3 (V3)	Yes
Session 9 (S9)	Open water 2 (OW2)	Video tape 3 (V3)	Yes
Session 10 (S10)	Open water 4 (OW4)	Video tape 3 (V3)	Yes
Session 11 (S11)	Open water 5 (OW5)	Video tape 3 (V3)	Yes
Audio data collection table.			
Session number	Course component	Audio tape number designation	Success
Session 1 (S1)	Classroom 1 (CR1)	Audio tape 1A1B (A 1A1B)	Yes
Session 2 (S2)	Classroom 2 and 3 (CR2/3)	Audio tape 1B2A2B (A 1B2A2B)	Yes
Session 3 (S3)	Confined water 1/2 (CW1/2)	Audio tape 4A (A 4A)	Yes
Session 4 (S4)	Classroom 4 (CR4)	Audio tape 2B3A (A 2B3A)	Yes
Session 5 (S5)	Confined water 3/4 (CW3/4)	Audio tape 4A4B (A 4A4B)	Yes
Session 6 (S6)	Classroom 5 (CR5)	Audio tape 3A3B (A 3A3B)	Yes
Session 7 (S7)	Confined water 5/6 (CW5/6)	Audio tape 4B5A (A 4B5A)	Yes
Session 8 (S8)	Open water 1 (OW1)	Audio tape 5A (A 5A)	Yes
Session 9 (S9)	Open water 2 (OW2)	Audio tape 5A (A 5A)	Yes
Session 10 (S10)	Open water 4 (OW4)	Audio tape 5A (A 5A)	Yes
Session 11 (S11)	Open water 5 (OW5)	Audio tape 5A5B (A 5A5B)	Yes
Note: Open water (ocean) 3 optional, snorkeling experience not done in study.			

Data collection

The research required eleven video taped sessions; four sessions of the classroom environment, three sessions of the confined water (pool) environment and four sessions of the open water (ocean) environment. For each video taped teaching session there was an accompanying audio taped stimulated recall session completed by each subject. All sessions were conducted and completed as originally scheduled by the researcher.

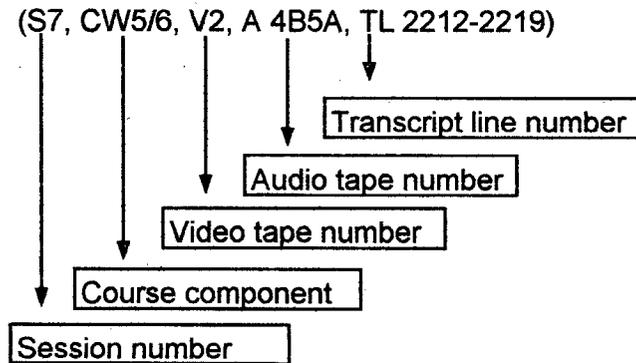
Video tape, audio tape and transcript designations

The video tapes of the beginner sport diving course were numbered one, two and three (one tape for each environment). The audio tapes, for the stimulated recall sessions, were numbered according to the audio tape number and side (1A and/or 1B). As the audio tapes were transcribed, each line was automatically individually numbered by a word processing programme.

Within the body of this document, the same designation has been used for transcript excerpts. Included in the designation of the excerpts is the session number and the course component from which the excerpt was taken. Figure 7, p. 59, provides an example of the transcript designation.

Figure 7. Sample transcript excerpt designation.

2212 **Henri:** One thing that ah, I've just thought about that, you know, perhaps after a
 2213 few years of teaching maybe I've gotten a little bit sloppy in the pool because of
 2214 it's, how to explain this. Like, I've got to remember that what you teach them in
 2215 the pool is going to, that's how they're going to do it in the ocean and ah, you
 7216 know, you've got to be careful because although the chances are so slim that
 2217 something could go wrong in the pool that could relate to what happens in the
 2218 ocean and I have always understood that but maybe have gotten a little bit
 2219 sloppy about that, I could, I've noticed.
 (S7, CW5/6, V2, A 4B5A, TL 2212-2219)



IV. Data analysis

The audio tapes from each of the video recall sessions for the teacher were fully transcribed and the constant comparative method (Glasser and Strauss, 1967; Lincoln and Guba, 1985) was used to analyze the data in which incidents and events were catalogued and grouped according to frequency of occurrence, common features and characteristics. Different trends emerged and were classified into categories. Some categories remained while others were collapsed or expanded into further categories.

Clarke (1992), citing MacKinnon (1989), warned that:

"Research of this kind...is afflicted by a struggle to make something of "the data". These polymorphous bodies of stirring and shifting things that will eventually be said to have particular shapes and regularities – indeed to account for something, to represent particular significances – seem at first glance to require identification and at another, fabrication" (p.47).

Thus, to minimize, if not eliminate, the pitfalls associated with this type of data analysis, an extensive bookkeeping verification system was firmly established and completed by performing four levels of documentation or 'transformation' (Novak and Gowin, 1984) with every level of analysis looking at each teaching environment independently.

Transformations

The first level of analysis was the verbatim transcription of the audio tapes made during the eleven reflective recall sessions.

The second level of transformation focused on the identification of the nature of teacher reflection about the individual elements or components (teaching strategies, environmental concerns, instructor laziness, etc.). Instances of reflective practice were flagged throughout the transcript. The dialogue which followed these elements or components was also examined for instances of framing and reframing or of reconstructing the situation. In some cases teacher reflection about individual elements or components led to framing and reframing the situation. As instances of reflection

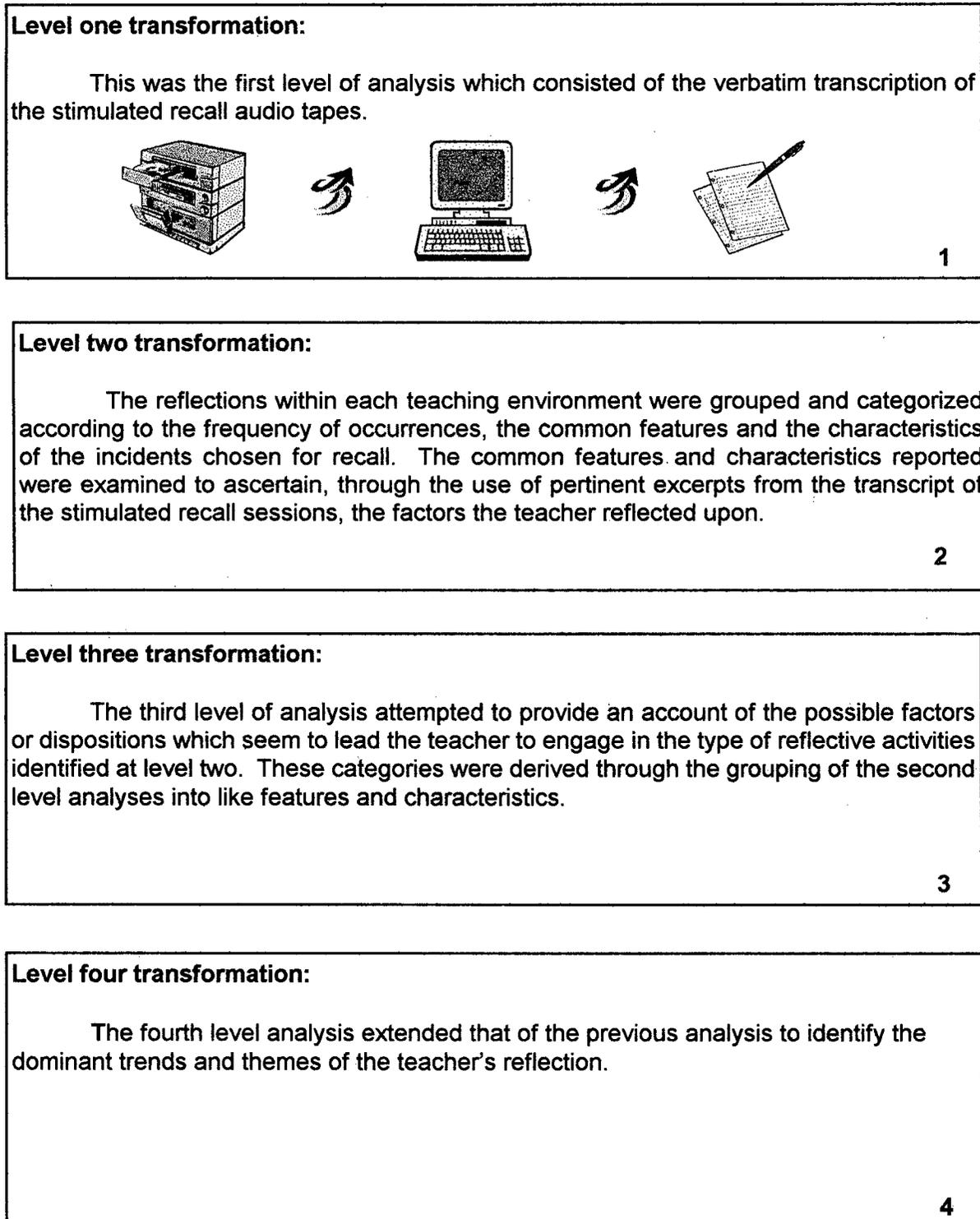
were identified, the circumstances in which they occurred were examined to identify the underlying factors and dispositions which elicited these events.

The third level attempted to provide an account (or analysis) of the possible factors or dispositions which seem to lead the teacher to engage in the type of reflective activities identified at level two. The second level of transformation brought together, into appropriate categories, the individual components and elements of reflection identified. Once the categorization was completed, incidents of framing and reframing were more closely considered, within the context of events that surrounded them, to determine the factors that seemed to result in the reflective process. Each category of second level elements and components was assigned a descriptor which represented, in most cases, the factors or dispositions which were conjectured to underlie the reflective activities.

Lastly, the fourth level extended the third level of analysis by identifying the dominant trends and themes that the teacher reflected upon. Each of the categories identified in the third level of transformation were reviewed and arranged into reflective themes. The transformations emerging from this level were the bases for the claims made from this study.

Three levels of transformation, as defined in Figure 8, p. 62, were collated for each teaching environment and reported in each of the three different teaching environment chapters (chapters four, five and six). As such, the study provided an overall picture of the nature of the teacher's reflective practice for each of the teaching environments. These chapters stand alone as examples of teacher reflection in teaching a beginner sport diving course. The independent nature of the three teaching environment chapters allows the reader to explore, in depth, one or more environments of interest. The review or omission of any of these chapters does not change the claims made. A recurring theme is reported in chapter seven by way of discussing a supervisory dialogue between the researcher and the teacher under study.

Figure 8. Levels of transformation in the data analysis of each of the three teaching environments.



V. The reflective process involved in the data review

An extensive bookkeeping verification system was used for the review of different phases of the data analysis throughout this study which included participant involvement and the documentation of the reflective process of the researcher in making sense of the data.

Participant involvement

An important part of the research method was the participant's involvement. The teacher under investigation received drafts of each chapter of the study as they were completed. Regular communication informed him of the progressive development of the study to ensure that all interpretations were accurate.

Although the study focused on the nature of teacher reflection two of the ten students involved in the course, Frank and Brock, accepted the invitation to participate in separate stimulated recall sessions. These sessions were audio taped and were concluded prior to the stimulated recall sessions conducted with the teacher. The involvement of these students allowed the researcher to gain further insight into the 'ongoings' of the practice/performance setting thus supplementing the stimulated recall sessions held later with the teacher. That is, these sessions provided the researcher with the students' understandings of some of the issues which were later reflected upon and discussed by the teacher and were used, therefore, to aid in strengthening and guiding the researcher's strategically interjected gentle probing supervisory dialogue. The students' stimulated recall sessions transcripts were not utilized for any other purpose in this study.

In the capacity of an instructor examiner for one of the certifying sport diving agencies, the researcher has traveled extensively throughout Canada and internationally to many different countries during the process of writing this document (South Africa, Kenya, England, The United States, Puerto Rico, and Tobago) and has had the opportunity to discuss the issues contained in this document extensively with other diving professionals (Divemasters, Instructors, Instructor Development Course Staff Instructors, Instructor Trainers, Master Instructors, Course Directors and Instructor Examiners). Their avid participation, interesting suggestions, differing perspectives and

cultural flavors has added to the thoroughness of the investigation, analysis and interpretations.

Researcher involvement

In the process of making sense of the data, an extensive bookkeeping verification procedure was maintained to ensure the data's integrity. The extensive bookkeeping verification procedure consisted of several steps and documentation.

First, the data on the audio tapes of the stimulated recall sessions were fully transcribed. The details of any relevant activities which were observed or occurred during the taping were noted. The researcher also made notes of ideas and issues which piqued her curiosity as she was producing the transcription.

Once the hard copy of the transcription was produced, the researcher, using a word processing programme, color coded the text for each of the eleven sessions for future use in the identification of the session(s), within a teaching environment, from which the supporting evidence was derived. The color coded transcription was then reviewed several times and the researcher made notations regarding elements and events. These elements and events were flagged according to frequency of occurrence, common features and characteristics.

Next, the segments (selected passages) of color coded text, which were flagged as significant elements and events, were cut and pasted onto index cards which were labeled according to the incident and/or event which made it significant. They were also labeled with a transcript excerpt designation code (see Figure 7, p. 59).

The researcher sorted the index cards to differentiate between the elements and events with each of the elements and events being accompanied by a number of cards documenting supportive evidence. The index cards for each environment were kept separate and all sessions within each environment were combined in this process. Therefore, each element and event was supported by excerpts from different sessions within that particular teaching environment.

The researcher then constructed a large 'flow chart', divided into three areas, one area for each teaching environment. Within each environment, a summary list of the significant elements and events was created and defined.

Through the process of problem setting, the researcher selected the significant elements and events of the transcribed stimulated recall sessions as the 'things' to which she was to attend and framed the context in which she would attend to them. The 'reframing' of the problem situation allowed the researcher to make sense of and use of her repertoire of examples, images, understandings, and action. Applying her past experience and knowledge, she developed a plan for integrating the information into the project.

The researcher's process of reframing yielded phenomena to be understood, the problem to be solved, and opportunities to be exploited, all of which produced unintended changes which gave the situation new meaning. It became clear, through 'seeing' new situations as some element of her repertoire, the researcher developed a new way of interpreting the data and new possibilities for acting on it. The significant elements and events pasted on the index cards and defined on the flow chart were, indeed, relevant to answering question three of the research questions. The analysis of the transcribed stimulated recall sessions, the elements and events which were catalogued and grouped according to frequency of occurrence, common features and characteristics revealed the nature (the essential character) of the teacher's reflection encountered in each of the three teaching environments.

The researcher, using the second level transformation, grouped elements and events which had similar features and each of these groupings were plotted independently on the flow chart for each environment. Further analysis identified these groupings as the underlying factors or dispositions which influenced the teacher's reflective activities. The common properties of each group made it possible to conjecture about the factors or dispositions which underlie the reflective activities in this project. The researcher made further connections, regarding the underlying factors or dispositions which influenced teacher reflection, by looking at all three environments and identifying those factors or dispositions which were similar between and across teaching environments.

Lastly, the fourth level of transformation utilized and extended the third level of transformation by identifying the dominant trends and themes upon which the teacher reflected upon. Once again this was documented on the flow chart. The flow chart, summarizing each level of transformation for each of the teaching environments, enabled the researcher to easily identify similarities and differences between and across the teaching environments.

In summary, the extensive bookkeeping verification procedure consisted of typing the original transcription, the word processor color coding of the transcript, the recording of all excerpts on separate index cards, and the development and arrangement of the triple sectioned flow chart documentation of the researcher's reflective practice in recording the nature of the teacher's reflective activities. Each procedure was carefully annotated with a code which indicated the origin of each of the elements. The extensive bookkeeping verification procedure ensured that the lines of inference from data to results were available for review and analysis at all times.

The progressive development of the data analysis was shared with the participants in the study, independent researchers, and other sport diving professionals. Each of these groups were surveyed for their comments and suggestions regarding the acceptance or rejection of elements, categories, underlying factors or dispositions and themes. Every attempt was made to ensure the transcript was fully explored and that the statements of inference from data to results were both reasonable and fully documented.

CHAPTER 4

Reflection as Reconstructing Experience in The Classroom Environment

The results and analysis of the data are presented in four chapters, one chapter for each of the teaching environments: the classroom environment (chapter four), the confined water (pool) environment (chapter five), the open water (ocean) environment (chapter six) and one chapter identifying and discussing a recurring reflective theme across the three environments (chapter seven). Three levels of data transformations are reported in each chapter and provide an overall analysis of the teacher's reconstruction of his experiences in each of the teaching environments as reflection on general teaching practices and contexts, reflection-on-action, and reflection-on-'reflection-in-action'.

Chapters four through six follow a common structure. Initially, the essential elements identified within the data of each teaching environment in terms of the nature of teacher reflection, were grouped and categorized according to the frequency of occurrence, the common features and the characteristics of the incidents chosen for recall by the teacher. The common features and characteristics reported were examined in detail through the use of pertinent excerpts from the transcript of the stimulated recall sessions. Secondly, each chapter describes the synthesis of the individual features and characteristics involved in the identification of the nature of teacher reflection into larger, more global, categories. These categories were derived through the grouping of the second level analyses according to like features and characteristics and provided an account of the possible factors or dispositions which seem to have led the teacher to engage in the type of reflective activities identified at level two. Thirdly, each chapter identifies the critical factors upon which the sport diving practitioner reflected. The fourth level analysis extended that of the previous level to identify the dominant trends and themes upon which the teacher reflected. Finally, each chapter includes summary tables and figures outlining the salient points resulting from the four levels of analysis.

I. Introduction

Chapter four is devoted to the analysis of the experiences in the classroom environment where each session began with a presentation which situated the to-be-learned material with similar material of the students' past. The teacher presented objectives and value statements, gave overview topic headings, the conduct expected of the students, elaborated upon the important topics, implemented training aids to reinforce concepts, sequenced the material as to the relevancy to other modules in the course, used his voice and body gestures to emphasize his points, suggested continuing education avenues and succinctly summarized the presentations (see Figure 4, p. 48).

The teacher's elaboration was guided by a visual slide presentation. Following this phase of the classroom session was a written quiz. When the classroom sessions were completed the students were given a final exam covering the entire course material. After the quiz and/or exam were completed the teacher reviewed the questions and answers during the remaining class time. At the completion of the classroom session the teacher collected student assignments which were to be discussed with the students during their next session.

II. Analysis of reflection in the classroom environment

Transcription

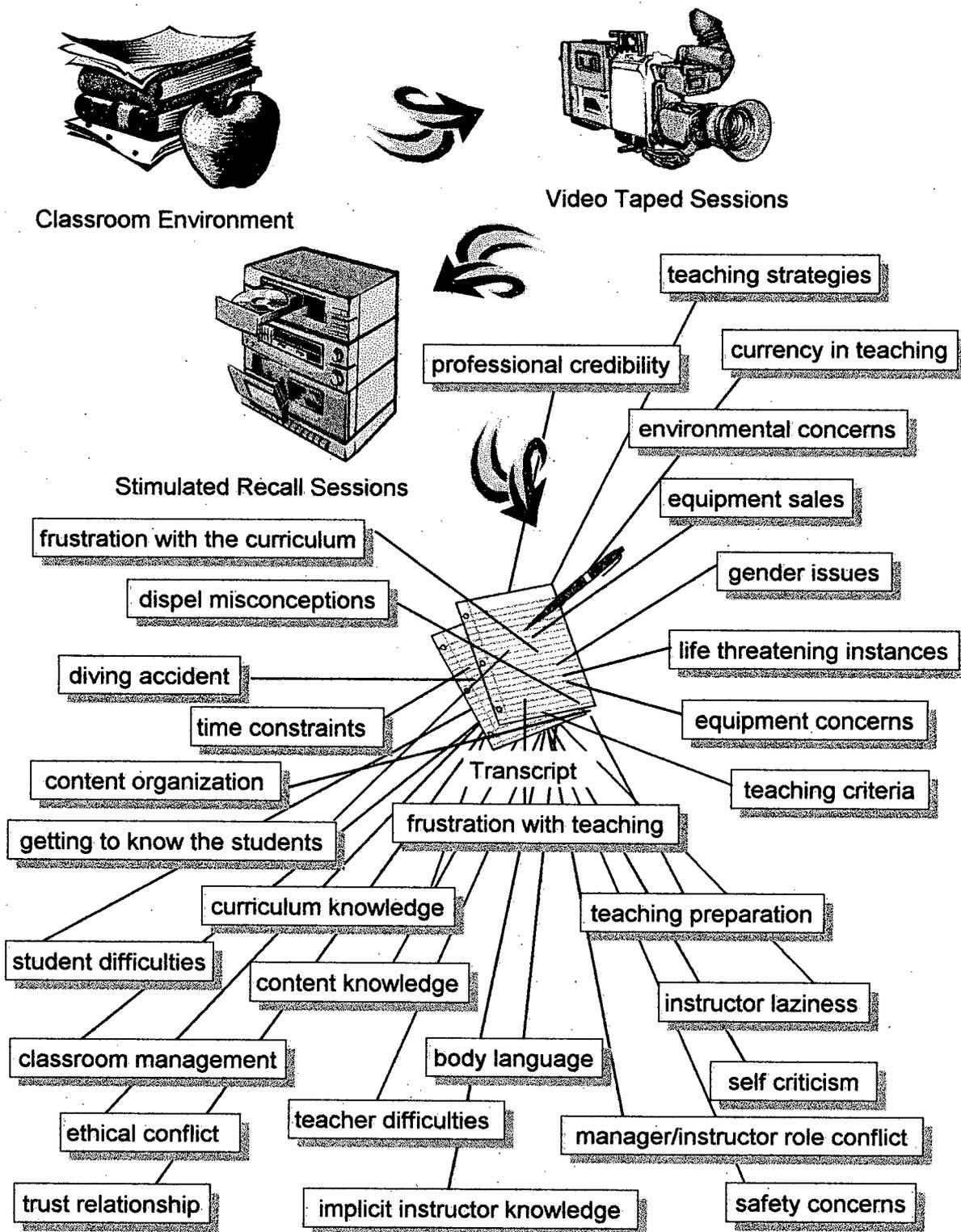
The first level of analysis involved the verbatim transcription of the stimulated recall audio tapes.

Significant elements or events

Thirty significant elements or events of teacher reflection were identified during the second level of analysis. The nature of these significant elements or events, in which the teacher chose to reflect upon as he reconstructed his experiences in the classroom environment via the stimulated recall sessions, are presented here along with an accompanying operational definition, transcript excerpts as evidence and a tally of the frequency with which the teacher reflected upon these aspects of his practice. Once a recurring element and/or event was identified by the researcher, it was named and each similar element and/or event thereafter became additional evidence of its

occurrence. Figure 9, p. 70, provides an overview of the second level analysis of the classroom environment. (An ellipse in the transcript excerpts indicates a slight pause, not an omission).

Figure 9. Reflection in the classroom environment: significant elements and events.



The first significant element resulting from Henri's reflective processes regarding his practice highlighted his *teaching strategies* which were the techniques used in the classroom environment to help to maintain control, to prepare the learners to receive the theory and knowledge of sport diving or, in some cases, to aid Henri in his delivery of the material. Generally speaking, the element of teaching strategies consisted of significant incidents of positive teaching techniques Henri felt he demonstrated well in the classroom setting. Henri chose to reflect upon and reconstruct his practice in the classroom environment through twelve instances which focused upon teaching strategies. The following transcript excerpt is an example of his reflection upon his use of analogies in his teaching:

374 Henri: Um.... How do, I think that went across? They the question you always
375 seem to get early on, and, and ah... I don't know if I got it,... I just answered it, is
376 they always want to know how long does that last underwater? And I try and do
377 as best I can to... um.. ... sort of relate it to something that they would know
378 about. I think that that works. Understanding that if you took all that air out of the
379 phone booth and compressed it into a bottle it would last the same amount of
380 time.

381

382 Lesley: So you try to use a lot of analogies?

383

384 Henri: Ya....Ya....I like analogies, I think that if, if it helps me understand things
385 so I just assume it would help other people.

(S1, CR1, V1, A 1A1B, TL 374-385)

Professional credibility was identified as a quality Henri wanted to establish with his students as soon as possible. Henri remarked that in some way the quality of instruction in sport diving is inferred by one's professional credentials. He felt it important to advise his students of his, the course's, and the training facility's credentials before they start learning to dive as he wanted the students to know he was fully qualified to take care of them. This was a strategy on Henri's part to encourage the students to feel comfortable and confident in him, the structure of the course and the training facility. Henri's own experience in learning to dive instilled in him, the need to know the instructor's ability before placing his life in the instructor's hands. Henri's

reflection-on-action identified three significant instances in which he tried to advance his notion of establishing professional credibility in his classroom practice. He talked about professional credibility in the following passage:

72 Henri: Yes, I never used to introduce the store since I started teaching I used to
 73 always start right off introducing myself and I think that's... when I take a course I
 74 can't stand it when someone starts to teach and I know nothing about them I
 75 know nothing about their credentials it's sort of like I imagine when I took my
 76 course I'm sitting back here and someone just starts teaching me. I mean why are
 77 you teaching me? How did you get there? How did you... you know what are
 78 your credentials? How did you become an instructor and on the same note I
 79 hate.... I don't like talking about myself too much I find it uncomfortable I'm not
 80 the type that can, you know, talk about how great I am but...

(S1, CR1, V1, A 1A1B, TL 71-80)

Currency in teaching was the third element focused upon for reflection. Keeping current in the industry and with the instructional materials distributed by the certifying agency was an issue for Henri. He is an advocate for the certifying agency and of the instructional system in which he teaches as he respects the agency's theoretical knowledge and the educational protocol which underlies the development of instructional materials. He does not challenge their credibility or professionalism. In a sense, Henri's thoughts of remaining up to date and 'in the know' reassures his own safety while diving. He found it difficult to comprehend that many instructors do not maintain a firm policy of remaining current as this lack of professionalism jeopardizes the safety of the instructors themselves, the safety of the students who they teach and hence the safety of the industry of sport diving in general. Henri talked about being on the cutting edge of instructional technology:

1145 Henri: No. And I'm just, the reason I use them is because I'm a believer and I
 1146 don't want to be an old hack instructor. If, if **** has come out with new
 1147 materials I want to be using them. I want to be on the cutting edge and use the
 1148 new stuff. Like, I've always felt, like, that I don't want to be, be, if they've made a
 1149 change, they've got people that are you know, a lot more educated than I am in
 1150 how people learn and, and you know if, if they're, if they've got this stuff out then

1151 there must, they must have it out for a reason, right?

(S1, CR1, V1, A 1A1B, TL 1145-1151)

(**** used to protect the anonymity of the certifying agency)

Environmental concerns, the fourth element, were reflective comments made about the different environments. According to Henri, different environments require different equipment and therefore different skills to be learned. For safety, he suggested it to be prudent of the industry to acknowledge one's environmental training and experience on the certification card. Henri's concern emanated from his personal experiences with inexperienced sport divers who assume diving in cold water is no different than diving in warm water. He cautioned that cold water environments change quickly and require a significant difference in diving equipment, training and skill. Henri made three statements similar to the following regarding this topic:

1710 **Lesley** : The environment changes quite quickly?

1711

1712 **Henri**: Ya, no absolutely. Ya, you know, an instructor in other parts of the world

1713 doesn't have to consider this because there's always 80 foot plus visibility

1714 and.... one day I'd like to try teaching a class there.... [laughter]....

1715

1716 **Lesley**:[laughter]....so for us here the environment is always a big concern?

1717

1718 **Henri**: Absolutely, I feel personally if we had 60 foot visibility all the time you

1719 know a, um.... maybe a little warmer, that we would have more people diving in

1720 this part of the world, I mean, we'd be doing a better business here.

1721

1722 **Lesley**: So we've actually spent a considerable amount of time here talking

1723 about different possibilities and the changing environment....

1724

1725 **Henri**: Exactly.

1726

1727 **Lesley**:and the changing visibility....

1728

1729 **Henri**: Ya.

- 1731 **Lesley:**to try and alert them to the fact that they're going to have to be
 1732 very cautious....
 1733
 1734 **Henri:** Ya.
 1735
 1736 **Lesley:**and aware of these....
 1737
 1738 **Henri:** These difficulties.
 1739
 1740 **Lesley:**these complexities.
 1741
 1742 **Henri:** Absolutely, and ah.... hopefully that they will be patent with them too, if
 1743 they're not great they'll get another chance. I have spent a lot of time on this
 1744 that's for sure.
 (S2, CR2/3, V1, A 1B2A2B, TL 1710-1744)

Equipment sales are one of the responsibilities each instructor has when teaching a course at any level and Henri felt that an instructor's job is comprised of teaching diving, selling proper, safe, equipment and excursions and concluded that if any one of these components are missing, the instructor isn't doing her/his job and the industry of sport diving will diminish in popularity. If an instructor teaches only the theory of diving and neglects to sell the equipment and experiences, s/he is out of a position quickly as there will be a limited number of students who continue in the sport of diving unless they own equipment or have diving vacation plans. Henri chose to reflect upon incidences referring to this topic on five different occasions. Most of his reflective comments on this issue referred to his goal of selling the sport of diving and diving equipment:

- 4679 **Henri:** Well, ultimately my goal would be to sell them that equipment, selling
 4680 them equipment is going to keep them diving, it's going to get them to dive more.
 4681 One thing that I didn't do and I don't know why, normally I would pass the
 4682 computers around, get them to touch them, feel them, but ah.... I don't ah, again
 4683 I mean, deep down even though I'm the manager of a dive store I don't feel that
 4684 I'm up there just to teach them, just to sell them equipment, I mean, I'm, I'm

4685 there, I believe that I'm selling them diving, that's where it starts. And then if you
 4686 sell them diving the rest should fall into place.
 (S6, CR5, V1, A 3A3B, TL 4679-4686)

Henri's reflection on his general teaching practices identified three instances in which *gender* was an issue. He questioned himself as to the appropriateness of his teaching:

1556 Henri: Ya. I don't know if that's appropriate. You know, a few years ago it was,
 1557 but demonstrating a skill, "ferry over head", you know, I mean, if any of these
 1558 guys are Homo-sexual, they might take offence to that?

1559

1560 Lesley: Right, you were talking about the actual "ferry" at Horseshoe Bay....

1561

1562 Henri: Ya, The B.C. Ferries....

1563

1564 Lesley:could come around the corner...?

1565

1566 Henri: ... overhead, you know, you go limp wrist and that's, it might not be
 1567 appropriate.

(S2, CR2/3, V1, A 1B2A2B, TL 1556-1567)

Henri also remarked on how the issue of gender affected his teaching practice:

399 Lesley: Maybe you could comment about this class happening to be an all male
 400 class? Is that typical, does that change your teaching?

401

402 Henri: Um....personally I don't like it. I like, I'd like, a fifty, fifty split in every
 403 class. Um I can't remember what the latest statistics are, I think it's something
 404 like 60 percent - 65 percent male sport. Does it change my style of teaching?
 405 No....but you know there maybe some comments that I would make in an all
 406 male class that I wouldn't in a mixed class because it's you know, a bunch of
 407 guys together, sort of boys club now because there's no girls in it. Um ... one
 408 thing for sure though I've, you know....this is probably something for the pool and

409 the ocean but I find ... women, most women, um....you know what you're going to
410 get from them in the ocean and pool environment. What I mean by that
411 is....guys if they're uncomfortable, they don't feel right about something, they're
412 not sure they understand you know. ...their testosterone, their egos will not allow
413 them to, they won't, they will just continue on. Right?

414

415 **Lesley:** They won't ask questions?

416

417 **Henri:** Ya....they may not ask questions. You know....um.. .they may not tell you
418 that they're uncomfortable, where as I've had, you know, women thatseems
419 to me most women will tell you if they're uncomfortable and I just sort of think that
420 that's sort of a male ego type thing.

421

422 **Lesley:** So with the male student, if they don't talk to you verbally, then how is it
423 that you determine....?

424

425 **Henri:** I have some concerns that I, if a male is not talking much....um ... you
426 know....they appear to be nervous, they're the ones that you've really got to
427 watch in the pool and the ocean, because ah....you know ... they may
428 unexpectedly try to bolt from the deep end or something.... you just don't know
429 that. You know.

430

431 **Lesley:** So with the um... male students you have to look for other.... indications?

432

433 **Henri:** Ya....body language, gestures,....ya other indications that they're not
434 comfortable. I mean, it's not always the case I just feel that it in most cases guys
435 tend to hide their, you know, their fears.

(S1, CR1, V1, A 1A1B, TL 399-435)

Life threatening issues were identified as a salient feature of reflection as he reflected on four occasions as to how the misunderstanding of theoretical concepts by the students may lead to life threatening situations. Henri felt that it was important for students to understand the relationship between theory and practice (understanding pressure, volume, and density relationships should transfer to preventing life threatening

lung over expansion injuries), however, he recognized that this theory practice interface must be taught in a sensitive and delicate manner. His comments were typical to what follows:

- 832 Henri: I want them to....I want then to... I'm trying to make
 833 sure that they understand pressure volume relationships and how they affect you
 834 when you're descending and ascending in the water. And it's ah....
 835
 836 Lesley: Without, without making them ah....afraid?
 837
 838 Henri: Ya, exactly because obviously it can be a major problem if someone
 839 ascends, it can be life threatening, if, if they're holding their breath, so, I try not to
 840 make them afraid and understand that they understand. And make sure that,
 841 well, I want them to understand that this is, it's serious, right you can't, you got to
 842 understand what's happening to your lungs underwater.
 (S1, CR1, V1, A 1A1B, TL 832-842)

The eighth common feature of Henri's reflection was his continual *frustration with the curriculum*. For the most part, these incidences were misunderstandings that he had regarding the certifying agency's intended implementation of the curriculum and produced seventeen occasions where he remarked about the mismatch between what needed to be taught to the students and the available curriculum materials he had as tools to complete the task. He suggested the lack of instructional material to implement the new system being introduced by the certifying agency had led many instructors to abandon the new 'up-to-date' instructional system and default to what works, the old way. Several of his remarks mirrored the following comment:

- 259 Henri: Ok....this is where I have a bit of problem with the new system.
 260 The, the new, the new **** MLGs that I'm using correlate with nothing, they
 261 don't correlate with the book, they don't correlate with the system we have going
 262 in the store here, they definitely don't correlate with the training completion form
 263 because....those are based on the old MLGs ...,and ah ... it's a bit of a frustration
 264 I have with the **** system is that they've introduced this new set of MLGs and
 265 it doesn't seem that every body's using them.

(S1, CR1, V1, A 1A1B, TL 259-265)

(**** used to protect the anonymity of the certifying agency)

(MGL is an acronym for modular lesson guide)

Henri's reflection of his classroom practice as a frustration with the curriculum, is further exemplified with comments regarding the certifying agency, via the new system, omitting important information from the curriculum of the beginner sport diving course. He commented:

1127 Henri: Um...well, that again this new system, the new **** MLGs don't
 1128 correlate to the manual and the video um....the old ones talk about diving
 1129 equipment which is covered in the new ones, um ... mechanics of pressure which
 1130 is covered in a different way in the new ones through comfortable descents and
 1131 ascents and bouyancy is covered, but the new ones don't say anything about the
 1132 buddy system and that's a key and in the old system, the buddy system in the old
 1133 MLGs, the buddy system is, an overview point and the buddy system is not
 1134 something that is different in an environment. I mean, there are, there may be
 1135 some variances but it's important wherever you're diving, the buddy system. And
 1136 they've left that out in the new MLGs and, and I like the new MLGs because, like
 1137 I said, at the beginning they're, they're, they cut the stuff that the student does
 1138 not need to know in his environment and you can add it if you want or you don't
 1139 have to talk about it. But the, in my opinion, is critical, talking about the buddy
 1140 system.

(S1, CR1, V1, A 1A1B, TL 1127-1140)

(**** used to protect the anonymity of the certifying agency)

(MLG is an acronym for modular lesson guide)

Henri's reflection activities led to four instances where he tried to *dispel misconceptions* as he was concerned about the fact that a lot of the students come to class with misinformation. He felt this misinformation and these misconceptions stem from the media, specifically, the movie industry and from those instructors who have not kept themselves current with the new technology and theory of diving. He stated that, before he starts to teach new material he always has to visit and dispel misconceptions

associated with old outdated material. Henri's comments on some of the most misunderstood concepts follow:

334 Henri: Ah....trying to dispel some of these misinterpretations that they have
 335 about scuba diving ... right? Um we usually also talk about miss and, and
 336 misinterpretations they have.... About.... diving you know, sharks, dark waters,
 337 nothing to see.... that's.....
 338 something that I've, I've always included in my teaching.

(S1, CR1, V1, A 1A1B, TL 334-338)

In the sport diving industry, it appears that there is always a person in every beginner sport diving course who is acquainted with, and quite verbal about, a *diving accident*. In most cases the diving misfortune occurred at a time just prior to the commencement of the course. This was the case in Henri's experience in teaching this course, consequently his comments incorporated eleven instances which involved some sort of reference to a diving accident. In this situation, the media had recently reported an incident where inexperience with the equipment, inexperience with the environment and diving beyond their capabilities resulted in the loss of three people's lives. In most instances, Henri's reflection on his practice centered around his concerns about answering correctly the students' questions about the accident:

556 Henri: Um....when the question came to me....first thing I said was "ok here it is,
 557 its finally come", you know, I was waiting for it and... um....I knew that every one
 558 of them knew about it, they're taking a course, they've read about it in the paper.
 559 So I felt I needed to, I wasn't hiding anything, because with this accident, I mean,
 560 it was pretty straight forward you know, as simple as somebody going skiing,
 561 skiing out of bounds in an area they have never been in....um....I was really
 562 nervous though that I need to make sure that I answered that question properly.
 563 so I was, I was uncomfortable with the question because.... I was concerned that
 564 I wouldn't answer it properly. I needed to answer that question right.

(S1, CR1, V1, A 1A1B, TL 556-564)

The eleventh element reflected upon in his practice of teaching in the classroom environment was *content organization*. This element was significant to Henri as he felt

he organized the content of the classroom discussions in an effective manner and comments about the first classroom session were indicative of his feelings about his ability to organize the content:

201 **Henri:** um ... on the podium um, I like to, on all, every class I like to write the name
 202 of the course, my name, I like to ah...write down my, all of the um, overview
 203 points that are going to be discussed tonight so that on the first night it would be
 204 the introduction, you know, the course structure, introduction, course structure,
 205 um....then the video then all the overviews right out of the the MLGs right out
 206 of the **** instructor manual. And then just in front there I have a sort of a
 207 welcome to the course with the....the point, the questions during the introduction
 208 that I, that they can answer. And I don't.... I do that.... I don't know when I started
 209 doing that and... and I don't even know if it was my instructor that did it, I can't
 210 remember. But ah.... I don't know it sort of gives an agenda for the evening....
 211 you know ... and although a lot of instructors will talk about it at the beginning....
 212 the student may forget that ... and then they can look up there and say oh...."ok
 213 after we watch the video or after we talked about buoyancy we're going to take a
 214 break and I got, to go pee so I'll wait 'till then".

(S1, CR1, V1, A 1A1B, TL 201-214)

(**** used to protect the anonymity of the certifying agency)

Henri reflected upon *equipment concerns* as the sport of diving is an equipment intensive sport and in most cases the selection of diving equipment is a very personal one and for enjoyment and safety, each piece of equipment has to fit as comfortably as one's underwear. The technology and materials used in equipment production today enhances the fit, and of special concern is the fit of the mask. Most students have difficulty recognizing that since each person's facial structure is different each person requires their own personal mask and many students prefer to borrow a friend's equipment. Unfortunately, the friend's equipment fits the friend and in most cases causes difficulty for the borrower. Henri expressed concern about students who were having difficulty with their equipment as they may face further difficulty when trying to perform a skill:

307 **Henri:** 'Cause they need, they need that for the next, for the first pool session

308 and it's also important that they have their own so that they canso that they
 309 will so that it will fit comfortably um...'cause if they don't have a mask that fits
 310 them properly... nothing, they're not going to learn anything, cause it's flooding all
 311 the time and um.... I shouldn't say they are not going to learn anything but it's a
 312 major distraction.

(S1, CR1, V1, A 1A1B, TL 307-312)

The thirteenth element which Henri reflected upon in his classroom practice was *getting to know the students* as he felt that knowing his students, that is, their names, ambitions, their reasons for learning to dive, hobbies and what they do in their professional life adds to his understanding of how to best present the sport diving material. He also felt that if the students see that he is making a real effort in getting to know them, he must care about them. This leads to the development of a teacher student relationship involving mutual respect and confidence. There were eight significant incidences in which Henri's reflection-on-action flagged the importance of caring for and knowing his students:

166 Henri: I care... ya I want to care about them and know them as a friend, ya, ya. I
 167 also try, and when they go around talking about themselves, I don't just go "ok
 168 next person, ok next or next". I ask them a question or two. Like, if they say they
 169 have been snorkeling in the Bahamas I say "Oh how, how was that?", you know
 170 and just...why do I do that though? Um.... maybe get a little more information,
 171 maybe to again build more of a relationship with myself and them, yes.

(S1, CR1, V1, A 1A1B, TL 165-171)

On three occasions Henri reflected upon the *teaching criteria* required by the certifying agency as he made a conscious effort to include all of the elements of a well prepared presentation in each classroom session. The academic teaching sequence, as prepared and designed by the certifying agency, has been firmly adopted and is well executed by Henri and he wanted to ensure that his teaching practice continued to achieve the required standard:

710 Henri: I'm going back to ya, my IDC and am I hitting all the, you know, the key,
 711 the, the, the all those scoring criteria that **** uses. I mean....

(S1, CR1, V1, A 1A1B, TL 710-711)

(**** have been used to protect the anonymity of the certifying agency)

(IDC is an acronym for Instructor Development Course)

Henri reflected upon the amount of time he needed to put his presentations together. He has been teaching the sport diving beginner course for the last eight years and although he used, and has some difficulty implementing, the certifying agency's new system of teaching the beginner course, he felt confident in his ability to quickly review and assemble all the materials to be included for each classroom session. He remarked that, over the years he had created a set format for the presentation of the material and now he required a little more preparation to incorporate the new system into the set format. Henri tried to vary his presentations by using different contacts at the beginning of his lessons and by integrating different examples from his past experiences as a diver. He explained, when teaching higher levels of sport diving instruction he required more preparation time. He commented about *teaching preparation*:

2743 Henri: Um....I find that I'm...doing more preparation, I did more preparation
2744 on this class because again it's trying to get this new system working for me and
2745 ah....you know, because I knew I was being taped too, probably.... [laughter]....no.
2746

2747 Lesley: On, on the average for, for all the different classroom presentations....
2748

2749 Henri: Ya.

2750

2751 Lesley:on the average ... how much time did, do you think....

2752

2753 Henri: On, on average for classroom presentations? Half an hour.

2754

2755 Lesley: Half an hour you prepared?

2756

2757 Henri: Half an hour preparing I mean, I've done this, enough times that I think

2758 that's all I need. If I was teaching a, a divemaster course or a rescue which I

2759 don't teach as much I would take more time to prepare.

(S4, CR4, V1, A 2B3A, TL 2743-2759)

The sixteenth significant identifiable element in Henri's reflection on his practice was *curriculum knowledge*. Henri's knowledge of the curriculum was evident in his ability to be fluent with his sequencing of material within the classroom environment sessions as well as integrating material to be covered in other environments such as the confined water (pool) environment and the open water (ocean) environment. Henri was eager to show he understood the mechanics of a presentation and the sequencing for the entire course:

269 Henri: A MLG is a section of the um....the course curriculum ... um....an MLG
 270 would be a topic....you know, in a module in a chapter....um....so, you know, if
 271 we're talking about bouyancy or if we're talking about the mechanics of pressure
 272 that would be an MLG, a modular lesson guide, which is the topic. Ya....

(S1, CR1, V1, A 1A1B, TL 269-272)

(MLG is an acronym for modular lesson guide)

Incidents showing Henri's *content knowledge* were highlighted. Seven significant events were reflected upon including his ability to know the sport diving material inside out and in doing so, he has a feeling of comfort in teaching it. Henri tried to keep the information simple. He reflected upon incidences in his own high school education where he had difficulty with some aspects of physics. Having experienced this difficulty himself, he felt he was more able to understand the difficulties of others and was able to help them through their problems.

797 Henri: Years ago, that um ... I was..... but, just over the years of understanding it
 798 better myself and although, you know, it just has become more comfortable. I
 799 don't exactly know why. I know though, that I think, like, a lot of people do have
 800 troubles with physics, you know, there is no question about it. You know, I mean,
 801 I hated physics in high school, it's sort of scary for a lot of people so um....I try
 802 and keep this as simple as I can so that they'll understand it.

(S1, CR1, V1, A 1A1B, TL 797-803)

He also pointed out how he was able to sequence the content and in so doing enhanced the students' ability to connect and apply concepts effectively:

806 Henri: Um....I think the importance of the dis... I think this all ties in with, this will
 807 if they can understand what's happening here with pressure and volume
 808 um ... they can understand more about the concepts of bouyancy control, you
 809 know ... why is it that we don't fill up our BCD when we surface? And why is it
 810 that we add air when we descend? So, for bouyancy um ... and also for, you
 811 know, the ah, the concept of having to equalize, I mean, it ties into this as well,
 812 with the volume change and breathing under water. Right? Hopefully it would
 813 um.... you know, also this sort of discussion should, they should be able to see
 814 that you know why you need to keep breathing on scuba, you know, what the
 815 consequences would be if you were to hold your breath on scuba and surface.
 (S1, CR1, V1, A 1A1B, TL 806-815)

(BCD is an acronym for bouyancy compensating device).

Henri reflected upon nine incidences of what he termed *instructor laziness*. These were incidences where he showed a lack of enthusiasm, or a lack of being prepared for class or situations in which he cut comers without jeopardizing the students safety. Henri acknowledged that these situations are avoidable and having reflected upon his action via a video tape capture, he realized how damaging they are to his credibility as an instructor. One instance in particular was a discussion he had with the class regarding the class dates for the various sessions of the course. Henri remarked:

283 Henri: That's pretty bad. I should have had them write down exact dates....that
 284 shows a bit of laziness.
 (S1, CR1, V1, A 1A1B, TL 283-284)

Henri highlighted other examples of instructor laziness in the teaching of the dive tables:

3530 Henri: Exactly. I mean, from this, from when I teach again, I'm not going to be as
 3531 lazy I'm always going to check it. Rather than saying, right, you know. I guess I
 3532 got lazy, I've been lazy in the past and, and if everyone says, if everyone got the
 3533 same answer then it, its like, assuming it's right. And in this case it was but then
 3534 it came back on me because she didn't get it.
 (S4, CR4, V1, A 2B3A, TL 3530-3534)

Henri's lack of preparation shows in the following excerpt:

2999 Henri:.....this is..... bad..... I,
 3000 have, I have two of these charts I made up a long time ago with signs and
 3001 symptoms and I've, I didn't get them out ahead of time and lost the one with
 3002 symptoms so ah I'm not being prepared this time.

(S4, CR4, V1, A 2B3A, TL 2999-3002)

Henri's references to lack of enthusiasm, which he stated did not happen regularly, is exemplified in the following passage:

3441 Henri: Um,...easy for me to teach but ah....sometimes there's lack of, you know
 3442 I've taught it before with more energy and probably taught it a little better some
 3443 nights. But I consider it fairly easy to teach. You know there're always things
 3444 again though that I say I'm going to do and I've just never have, like making
 3445 example questions and having them ready and....

(S4, CR4, V1, A 2B3A, TL 3441-3445)

The nineteenth significant incident of teacher reflection, identified by the researcher, was that of *body language*. Henri flagged five events in which body language was identified as the common factor. Henri is tall, has an athletic build, and is a very enthusiastic, ambitious young man and his enthusiasm for his love of teaching sport diving pours over onto his students. For Henri, his ability to encourage others is through his use of body language communication skills. He used hand gestures and body language in his classroom practice as a tool to captivate and involve his students in the lesson material. Henri discussed his use of hand gestures:

216 Henri: One of ...[laughter]....my mom and.....
 215 my sister always tease me about when I talk, how I use hand gestures so
 216 much.... but I just ignore them and I, I always think that that's important to use
 217 when you talk, it helps in communicating. I think [laughter]....

(S1, CR1, V1, A 1A1B, TL 214-217)

The element of *self criticism* was a frequently documented characteristic of Henri's reflection-on-action process as he chose to identify eighteen incidents where he made general remarks about how he could have done a better job of something. In one such incidence, Henri remarked about his inadequate use of the white board:

4473 Henri: [laughter]... Ya, Ya that's, I try not to face the board too much but as
 4474 you can see there I'm, not even looking at the friggen class. For about five
 4475 minutes.[laughter]..... God, what a baffoon!
 (S6, CR5, V1, A 3A3B, TL 4473-4475)

In other instances Henri caught himself delivering a discussion in mellow tones:

1547 Henri: At times I find I'm too quiet there tonight. I don't want to yell but my tone
 1548 of voice is. too mellowing in certain sections here. It is there, ya.
 (S2, CR2/3, V1, A 1B2A2B, TL 1547-1548)

Henri also reflected upon instances in which he found himself doing a poor job of teaching and, in this case, also a poor job of selling sport diving equipment:

3595 Henri: Well ya, I mean, that's one of the things I preach that an instructor's job is
 3596 to sell diving and sell equipment and in watching myself I'm not doing a very
 3597 good job of that tonight. I mean, this is a great night to sell lights and knives and
 3598 goodie bags and slates and stuff and I'm not doing that and it's because I got
 3599 myself in a situation where I went on and on about tables and something delayed
 3600 me and it's 9:15 or 9 o'clock and they haven't written their quiz.
 (S4, CR4, V1, A 2B3A, TL 3595-3600)

Henri identified and reflected upon four significant incidents of *manager/instructor role conflict*. These were incidents in which Henri identified himself as lacking enthusiasm in his teaching due to the dual roles he plays within his facility. Most instructors in the sport diving industry work full time in the facility in which they teach. Often they find themselves pulling double duty, that is, working an eight hour shift as a sales person or diving in the capacity of a divemaster followed by another four hours of

teaching. In Henri's case he is the store manager as well as an instructor. Henri conceded he was tired when he was teaching the second classroom session:

1316 Henri: No, Ok um.... this class, was it this one or.... module....I was definitely
 1317 tired this, this night and actually something I was going to say um.... last on
 1318 module one was that I think that ah... for a store and as a manager.... ideally you
 1319 want an instructor to be teaching who is full time because there's a few reasons I
 1320 mean, someone who works full time is probably more, usually more
 1321 knowledgeable on equipment, you know he is in the store all the time, But
 1322 definitely my position now, I mean, working a 50 hour week, you know a 40 or 50
 1323 hour a week in diving even though I'm not, I'm not burned out because I haven't
 1324 taught it in a little while. I came into this class after a, either a hard day with the
 1325 owner or something, of this, I'm just tired and frustrated with something in the
 1326 store and you know I believe in selling diving. You've got to transfer enthusiasm
 1327 in any selling and I just came into this class with the feeling of really having to
 1328 fake it and put it on, put on that enthusiasm and happy face. So that's how I felt.
 (S2, CR2/3, V1, A 1B2A2B, TL 1316-1328)

Three incidents of *ethical conflict* were significant. The researcher identified that ethical conflict occurred for Henri when he was to present a particular portion of the course material in a less than realistic light in order to maintain the students' interest in the sport. One such topic was that of visibility. Rather than teaching the actuality of the experience the students were soon to have, Henri had to present the topic in a more positive fashion to maintain the excitement and enthusiasm of his students. However, he supplied foreshadowing examples of diving excursions, allowed the students to read between the lines, and realize the realities lying ahead:

1683 Lesley:that we you know... "if for some reason we don't have this
 1684 awesome dive and you only see this and that ah....give it another chance" So
 1685 are you kind of trying to foreshadow what might happen?
 1686
 1687 Henri: Well, ya, I mean, it's you know, we get a weekend where it's raining, cool
 1688 you know the visibility is bad, they see nothing, maybe a star fish or a cucumber,
 1689 they have,that happens and, and unfortunately those people that experience

1690 that when they take diving lessons and that's what they remember and they
 1691 never do it again. And they've got to understand, somehow that it's not always
 1692 like that and we can get 60 to 70 foot vis at Whytecliff and see tons of marine life
 1693 and have an awesome dive. Like I did in April, I was talking about a dive
 1694 um....you know, and you can always have that on the Island, so ya I was fore-
 1695 shadowing what their dives might be like and I know damn well it would probably
 1696 be crappy um...

(S2, CR2/3, V1, A 1B2A2B, TL 1683-1696)

Implicit instructor knowledge, an element of Henri's reflective activity, as identified by the researcher, is the knowledge Henri possesses but does not explicitly articulate to the students. Henri flagged an instance where the instructors were evaluating the conditions for diving and he commented that these evaluation procedures, implicit to the instructor's practice, should be made explicitly obvious to the students:

1777 **Henri:** Well, yes and the thing is too is that a lot of the time it might, might
 1778 happen it, a lot of it is basic training, I mean, these are considerations that the
 1779 instructors are making, these considerations, currents, weather, um.... visibility
 1780 we're all, you know, before they dive on Saturday and Sunday, we are
 1781 determining if the conditions are right. And you need to talk about it, and they
 1782 need to know that that's what you're doing because they can go out and dive on
 1783 their own, they now have to do this and where as in the open water class they
 1784 should, they should be doing it with the instructor but they don't have to because
 1785 the instructor team is doing that.

(S2, CR2/3, V1, A 1B2A2B, TL 1777-1785)

The *concern for safety*, the twenty-fourth element in the analysis of the nature of Henri's reflection of his classroom practice, was revealed in four safety incidences and his concern for reducing the risk factor for those involved in the sport of diving. Henri pointed out how it is prudent to be prepared for the unexpected. In the direct experience Henri used the analogy of a flight crew preparing for take off and how their discussion of flight safety to their passengers is a prudent measure to take for those highly unlikely events of emergency:

1909 Henri: What is it that's going through my mind? Um...I don't know if I can sum it
 1910 up in one sort of sentence, but I guess what's going through my mind is that I
 1911 want them to understand that a problem in scuba diving can be dealt with in a
 1912 calm controlled fashion. There's no need to panic and that problems are rare
 1913 um if you follow the proper, safe guidelines, but on the same sense, you know,
 1914 we need to know how to deal with them, just, just like this contact here, which
 1915 I've never used before, another instructor gave me this idea, this card is exactly
 1916 when you go flying, I mean, you're never gonna, in fact I know I heard a statistic
 1917 that, you know, if you were to fly every, every day for the next two thousand
 1918 years the chances of you being in a plane crash are so slim, but you need to
 1919 know what to do if it does happen. So that's what I'm trying to convey to them.
 (S2, CR2/3, V1, A 1B2A2B, TL 1909-1919)

The twenty-fifth issue Henri's reflection exposed was that of *time constraints* which became an issue from two perspectives. First, the students are involved with learning to dive as a recreational activity and do not want to spend more time than is necessary doing so. On the other hand, running over time can cost dearly in fees required to rent the classroom and/or the confined water (pool) facilities. Since Henri is a store manager, time and timing effects the efficiency of the operation and hence 'the bottom line'. Time constraints were reflected upon on five different occasions and in most cases the lack of time was the issue. The element of time determines what can and can not be pursued in a particular session:

2686 Henri: See the thing is too I remember in the pool, I briefed, I talked about it in
 2687 the class and then we went to the pool, we did all the skills and it was the last
 2688 skill of the night. It's hard to remember I guess, I, I should have done a brief, an
 2689 other briefing on the skill at the swimming pool and I didn't. It was almost, I, and
 2690 I, I normally would of but again it was this time, thing. I just felt like I was running
 2691 off my feet I think I spent to much time on something also, I don't know.
 (S2, CR2/3, V1, A 1B2A2B, TL 2686-2691)

Henri identified eight significant incidences where he felt *frustration with teaching*, that is, with his difficulty of understanding why some students are able to grasp concepts while other students are not. He was frustrated as he felt that the lack of student

comprehension was evidence there was something missing from his teaching and this elevated his frustration as he does not know how to rectify the problem. Henri's frustration with teaching is illustrated by an incident regarding teaching low and out-of-air situations, specifically, the controlled emergency swimming ascent wherein Frank, having received numerous discussions and physical repetitions of the controlled emergency swimming ascent, still has problems with understanding the application of the skill:

2187 **Henri:** Yes, particularly one skill, that's the controlled ESA. I remember Frank
 2188 had troubles with that in the ocean and in the pool and on his exam. By the time
 2189 he wrote his exam, his final exam, we had, he had read about it, watched it on
 2190 TV, talked about it in class and done a quiz and.... have, have done them most of
 2191 them in the pool, yahe would of done all of them in the pool at that point, yet
 2192 still on his final exam he couldn't get the order down.

(S2, CR2/3, V1, A 1B2A2B, TL 2187-2192)

(ESA in an acronym for controlled emergency swimming ascent)

Student difficulties, the problems students had experienced and Henri had been unable to prevent, were two significant instances of reflection:

2695 **Lesley:** Ok, so at the beginning of classroom four here we go over ah.. the
 2696 emergency swimming ascent. Todd says that he didn't understand what he
 2697 was supposed to do at the pool....

2698

2699 **Henri:** The pool, ya.

2700

2701 **Lesley:** ... and you went over it again....one thing that I noticed though that you
 2702 do um... when you went over it there you're telling them that their hand goes up,
 2703 they look up, they're exhaling through the mouth, their reg. stays in, the weight
 2704 belt stays on, and they start kicking and they go up and as they go up, up they let,
 2705 they deflate their BC.

2706

2707 **Henri:** Aha, ya, not a...

2708

2709 **Lesley:** Now, you're a student and the way that I just explained it there,.... I
 2710 would be deflating my BC right away.

2711

2712 **Henri:** Ya.

2713

2714 **Lesley:** So,...

2715

2716 **Henri:** In actual fact you start kicking initially, and as you, as you, as you're
 2717 ascending you would start to deflate your BCD to slow yourself down.

2718

2719 **Lesley:** You would only deflate your BC if you start to travel faster than the
 2720 normal ascent rate.

2721

2722 **Henri:** Right. To keep it in control, ya.

2723

2724 **Lesley:** So, it may have been construed by the students that before they start
 2725 their swim they let air out of their BC.

2726

2727 **Henri:** And that's with Frank, I mean he wasn't going anywhere....

(S4, CR4, V1, A 2B3A, TL 2695-2712)

(BC and BCD are acronyms for bouyancy compensator device)

There were six occasions in which Henri reflected upon *teacher difficulties* during the stimulated recall sessions. The following passage presents two examples of his teacher difficulties. First, the concept of breathing air at depth has been left out of the new system modular lesson guides which resulted in Henri's omission of breathing air at depth from his classroom discussion and his discovery, later, to find students not understanding it. Second, Henri pondered whether or not students 'really' understood that which they have missed on a quiz. The following excerpt outlines the teaching difficulties:

3608 **Henri:** See there, people got that one wrong, breathing air at depth wasn't talked
 3609 about, I mean they've read about it and watched it in the video. I did though
 3610 mention at one point that it's 20% oxygen and 80% nitrogen, so.... It's funny,

3611 when I was putting their exams in their files on the weekend or whenever, I just
 3612 was making sure the score was clear on their exam I was thinking about that like
 3613 how do I know that when there're doing it that they really do understand, they've
 3614 signed and dated here that covers my ass as far as liability but how do I really
 3615 know that they understand, the ones they got wrong.

(S4, CR4, V1, A 2B3A, TL 3608-3615)

Henri went on to question why he is teaching a minimum surface interval as his difficulty in teaching the minimum surface interval is not in understanding the concept itself, but in not understanding why it is a valuable concept for beginner divers to understand. He has problems with this concept as, in essence, it is a counterintuitive measure. The dive tables, if used correctly and conservatively by the sport diver allows safe participation in the adventure. However, shortening the surface interval between dives in order to accomplish both in a limited time is not, according to Henri, a conservative measure. His difficulty in teaching minimum surface intervals stems from not being able to apply the concept in his diving environment. He does not see the utility of it and reflected upon this moment as one of his teaching difficulties. After some discussion Henri is able to clarify why the concept may be valuable to beginner sport divers:

4237 **Lesley:** If you said that to the students then maybe you'd feel more comfortable
 4238 about teaching the topic making them realize that this isn't a usual procedure but
 4239 if we needed to know the procedure this would be how we'd go about it.

4240

4241 **Henri:** Ya. Why would you need to know the procedure though? You know, I
 4242 can't really give a good example. Why would you?

4243

4244 **Lesley:** You're on an exotic holiday, you're going to have two dives and you've
 4245 only got a set amount of time on this very expensive boat um ... and you're never
 4246 going to be able to visit this place again ... um.... we can do two dives safely and
 4247 in order to do it safely we need to know what our time on the surface would be.

4248

4249 **Henri:** Would be, ya. You know if our minimum surface is an hour and 35 maybe
 4250 we'll be a little bit extra conservative and take a little longer or something. Ya, I
 4251 don't know But that's, that's good I, I, never thought of that one.

(S6, CR5, V1, A 3A3B, TL 4237-4251)

The twenty-ninth element Henri chose to reflect upon was *classroom management*. On four different occasions he commented about the physical limitations of the classroom and made suggestions of how students could be made more comfortable if some things could be changed. Henri felt that, if the students were comfortable it was much easier to control the class, the presentation and the time. Henri demonstrated, through his teaching, that he was able to work around some of the limitations. The following is typical of his remarks:

1487 **Henri:** Ya, it's not set up, I mean, this classroom has improved a lot over the
 1488 years but um ...I don't like having the students lined up in front of me and then the
 1489 slide projector that I'm using off to one side. I don't like that. Because if
 1490 someone is sitting right under it, you know, not that they need to follow it, but it
 1491 be ideal if I could have it behind me, the slide projector.

(S2, CR2/3, V1, A 1B2A2B, TL 1487-1491)

The final element of Henri's reflection of his practice in the classroom setting was his concern for developing a *trust relationship* with his students. Henri believed the most important quality between an instructor and a student is trust and started the conversation regarding the trust relationship by saying:

5104 **Henri:** ..um I, I, think that ah....I find it a bit, like
 5105 my experience in the last six months that if, you know, the students, it helps you
 5106 if you know them previously. If you have a bit of a relationship with them it helps
 5107 you in the pool and the ocean. If you go to the pool or the ocean and you've
 5108 never met them before that's a bit of a weakness um ... that you have to deal with
 5109 'cause you, you don't know what they're like, I mean....

5110

5111 **Lesley:** Now when you say relationship....

5112

5113 **Henri:** Ya.

(S6, CR5, V1, A 3A3B, TL 5104-5113)

Henri went on to name the relationship:

5120 Henri: A trust in you. Just develop a trusting relationship, that they trust me.

(S6, CR5, V1, A 3A3B, TL 5120)

The nature of this teacher's reflection in the classroom environment has been illustrated through the identification of thirty significant elements or events. Through the analysis of pertinent transcript excerpts from Henri's reconstruction of his classroom practice, a detailed examination of the common features and the characteristics of the incidents chosen for recall was completed. Table 4, 95, provides a summary of the second level analysis, in terms of the events reflected upon and their frequency of occurrence.

Table 4. Reflection in the classroom environment: frequency of significant elements and events.

Element and/or event	Frequency of occurrence	Element and/or event	Frequency of occurrence
1. teaching strategies	12	16. curriculum knowledge	2
2. professional credibility	3	17. content knowledge	7
3. currency in teaching	1	18. instructor laziness	9
4. environmental concerns	3	19. body language	5
5. equipment sales	5	20. self criticism	18
6. gender issues	3	21. manager/instructor role conflict	4
7. life threatening instances	4	22. ethical conflict	3
8. frustration with curriculum	17	23. implicit instructor knowledge	1
9. dispel misconceptions	5	24. safety concerns	3
10. diving accident	11	25. time constraints	5
11. content organization	1	26. frustration with teaching	8
12. equipment concerns	2	27. student difficulties	2
13. getting to know the students	8	28. teacher difficulties	6
14. teaching criteria	3	29. classroom management	4
15. teaching preparation	1	30. trust relationship	1

Factors and dispositions influencing reflective activities

This section of the chapter presents the third level analysis, that is, the re-analysis and grouping of the individual features and characteristics, identified at the previous level, into larger categories evidenced by shared commonalities. Nine groupings or categories, (see Figure 10, p. 99), of teacher reflection were identified during the analysis. From these groupings the factors or dispositions, that is, the common significant factors found within the elements of the teacher's practice which were conjectured to underlie the reflective activities were identified. It was found, that within each group, the influencing factors or dispositions were of a personal and emotional nature.

The researcher identified, in the first grouping, the reflective elements of 'a trust relationship' and 'professional credibility'. The reflections in this category were influenced by Henri's *need for control*. He believed that his personal accomplishments as a sport diving teacher, the training facility's reputation and the educational validity of the materials comprising the course, all foster professional credibility and create the foundation for developing a trust relationship between he and his students. For learning to occur in a sport diving context, students must place trust in their instructor and this trust affords Henri an element of control in that the student performs tasks as directed, and in so doing, does so safely. The need for control in the classroom environment is not as vital as in the water environments, however, it must be established early in this setting in order for it to be continued in the unforgiving learning environments which follow.

The second grouping was comprised of the reflective elements of 'getting to know the students' and 'gender issue'. The reflection in this category was influenced by Henri's *desire to comfort*. Henri believed that the development of the cognitive and emotional domains of students is fundamental to attaining optimum physical performance and, therefore, tried to encourage students to feel at home in their new undertaking. In so doing, he was sensitive to the 'situatedness' of their lives and allowed them to position themselves in their new environment.

The third grouping of reflective elements dealt with 'life threatening instances', 'equipment concerns', 'environmental concerns', and 'safety concerns'. The reflection in

this category was influenced by Henri's *need to express the lack of control in an unforgiving learning environment*. These elements were brought together by the commonality of their inherent uncertainties which can present unanticipated, surprising and problematic situations. Henri was well aware of the fact that his students have limited resources to enable them to make sense of and to gain a level of understanding of these events and therefore felt that he needed to explicitly articulate the lack of control one has in an unforgiving environment.

The fourth grouping consisted of the reflective elements of 'diving accidents' and 'dispelling misconceptions'. The reflection in this category was influenced by Henri's *desire for correct interpretation*. All too often learning is stunted due to previous misinformation and in an attempt to commence instruction without this barrier Henri 'put the record straight'.

The next grouping associated the elements of 'teaching criteria', 'ethical conflict', 'time constraints', 'manager/instructor role conflict', 'equipment sales' and 'instructor laziness'. Henri's *repression of natural feelings* was the influencing disposition for reflection in this category. The composition of these elements entail factors of conflict, constraint and challenges to Henri's practice of teaching and these burdens and obligations confined him to teach to someone else's agenda and repressed his natural flow in teaching the sport of diving.

The sixth grouping included the elements of 'self criticism', 'student difficulties' and 'teacher difficulties'. The reflection in this category was influenced by Henri's *internal dissonance resulting from his non or incorrect action and his beliefs and understandings*. The focus in this category was on Henri's problems within his practice as they caused him perplexity and internal turmoil because he was aware of the actions and understandings which characterize appropriate teaching practice yet he fell short of this goal and hence, fell short of his beliefs of teaching practice.

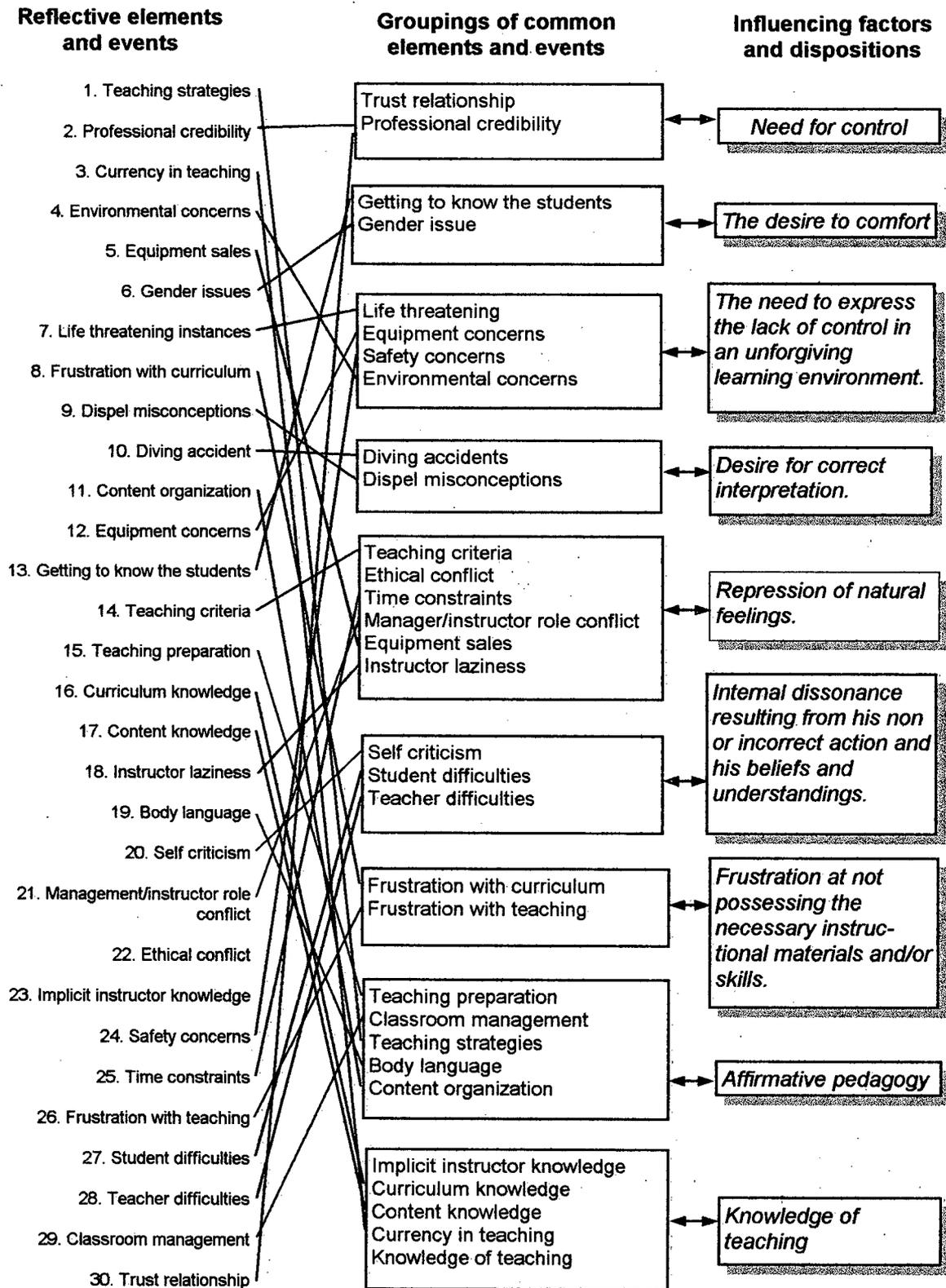
The elements of 'frustration with curriculum' and 'frustration with teaching' comprised the seventh category which was influenced by Henri's *frustration at not possessing the necessary instructional materials and/or skills*. These two elements were correlating factors in that Henri's frustration with the curriculum, coupled with the fact

that the appropriate teaching materials had not been provided by the certifying agency, led to his frustration within his practice of teaching.

The eighth grouping of reflective elements included the elements of 'teaching preparation', 'classroom management', 'teaching strategies', 'body language', and 'content organization'. The reflection in this category was influenced by Henri's *affirmative pedagogy*. These elements exemplified the positive teaching components within his practice which highlighted his ability to teach an interesting and informative lesson.

The ninth and final category resulted from the grouping of the elements of 'implicit instructor knowledge', 'curriculum knowledge', 'content knowledge' and 'currency in teaching'. The reflection in this category was influenced by Henri's *knowledge of teaching*. These elements provided the fundamental understandings in his teaching practice and were found to be typical components of the repertoire of all professionals regardless of interest area.

Figure 10. Reflection in the classroom environment: factors and dispositions influencing reflective activity.



Dominant themes

This section of the chapter reports the fourth and final level of analysis which extended the third level by identifying the dominant trends and themes of the teacher's reflection in his reconstruction of experiences in the classroom environment via the stimulated recall sessions. The elements and events identified in the second level analysis, and the categories found in the third level analysis, in conjunction with their accompanying reflective underlying element, were analyzed to reveal six dominant trends and or themes which identified the focus of the teacher's reflection in the classroom environment. These dominant trends and or themes follow and are summarized in Figure 11, p. 102:

The first theme identified by the researcher was *trust*. Included under this theme were the factors of 'trust relationship' and 'getting to know the students'. The transcript excerpts pertaining to these two elements highlighted a recurring theme of trust. Learning the sport of diving, involving uncertainty, variability, contextual and individual uniqueness, is dependant upon trusting the teacher, trusting the equipment and trusting oneself as trust is the only factor that can be predetermined.

The second dominant theme throughout the teacher's reflection of his classroom practice was the issue of *control*. The issue of control was stressed in each of the instances Henri chose to reflect upon within the elements of 'professional credibility' and issues regarding 'gender'. Fundamental to survival underwater, is control, that is, controlling for as many factors as possible. Student respect and adherence to direction are foundational attributes of control and were developed through Henri's ability to exhibit sensitivity towards his students and through his superior skill and judgement.

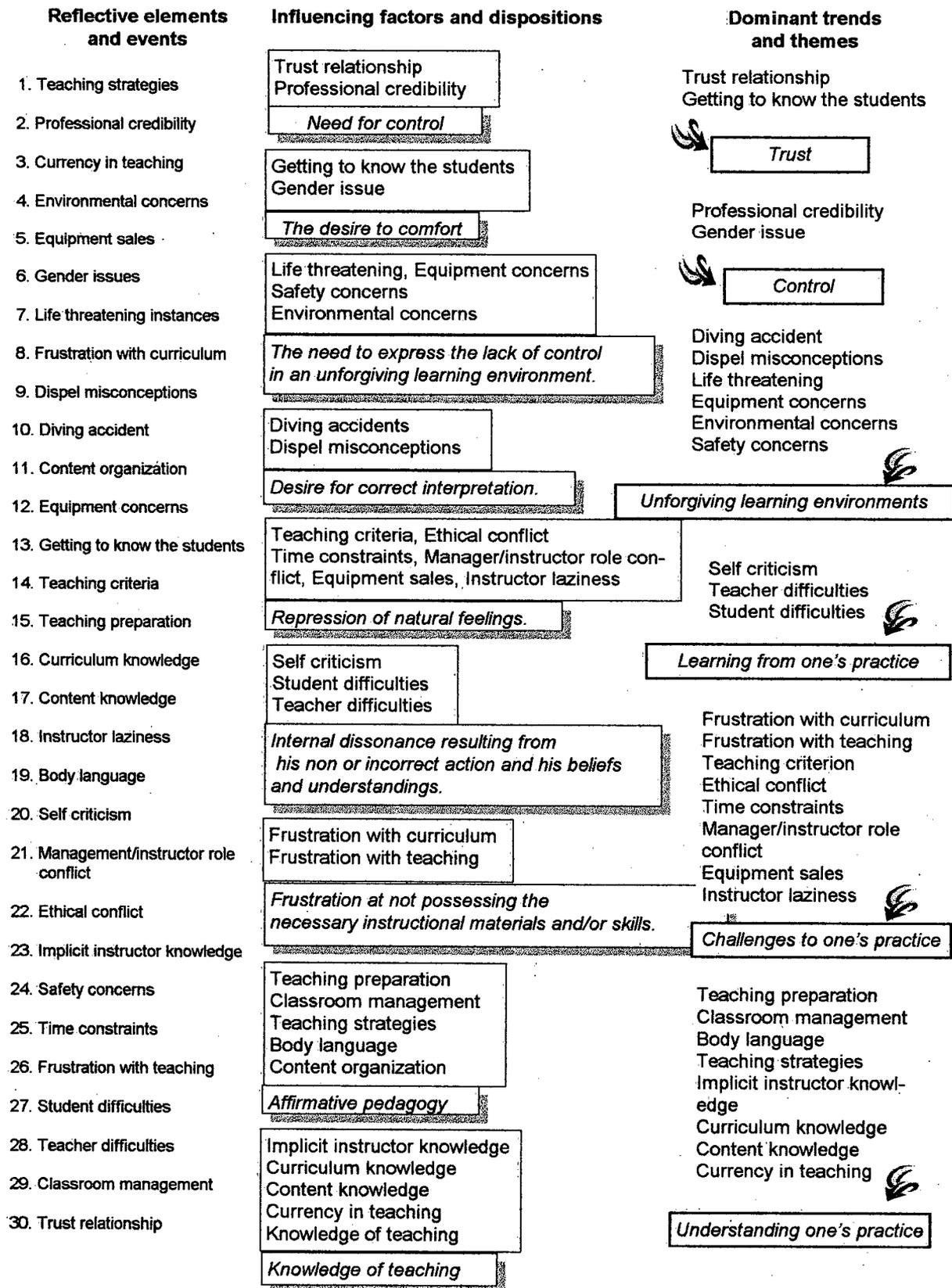
Thirdly, the researcher organized the factors of 'diving accident', 'dispelling misconceptions', 'life threatening' issues, 'equipment concerns', and 'safety concerns' under the theme of *the unforgiving learning environment*. Deep-seated in each of these elements is the unknown. It is the unknown which makes the sport of diving and the environment in which it takes place, intriguing. The unknown can become a misfortune in an unforgiving learning environment.

The fourth dominant theme throughout the teacher's reflection of his classroom setting was the issue of *learning from one's practice* and included the factors of 'self criticism', 'teacher difficulties', and 'student difficulties'. Each of the excerpts, from which these elements were derived, revealed to Henri, something or some aspect of his teaching practice which needed work. These instances led him to visualize, frame and reframe the difficulties in pursuit of resolutions and hence allowed Henri to learn from his own practice.

The fifth theme of Henri's reflective process was identified as *challenges to one's practice* and encompassed the factors of 'frustration with the curriculum', 'frustration with teaching', 'teaching criteria', 'ethical conflict', 'equipment sales', and 'instructor laziness'. The consistent ingredient which made each of these elements significant was conflict. Unable to resolve the conflict, Henri became frustrated and felt his practice was inhibited by these challenges. Burdened by the obligations situated in someone else's teaching agenda he found his teaching practice extremely hindered.

The sixth and final dominant theme, was identified as that of *understanding one's practice*. This trend in Henri's reflective process incorporated the remaining factors of 'teaching preparation', 'classroom management', 'body language', 'content organization', 'teaching strategies', 'implicit instructor knowledge', 'curriculum knowledge', 'content knowledge', and 'currency in teaching'. This grouping of elements highlight the positive components from which Henri drew his strength in teaching and it was these understandings which provided him with the foundational knowledge necessary to teach.

Figure 11. Reflection in the classroom environment: dominant themes.



III. Summary

The transformation of the data collected in the classroom environment was accomplished through four levels of analysis. The initial level of analysis involved the verbatim transcription of the stimulated recall audio tapes. The second level of the analysis specified the characteristics of the incidents chosen for recall and chronicled their frequency of occurrence. This procedure resulted in the identification of thirty significant incidents or events of teacher reflection. The nature of these significant events, upon which the teacher chose to reflect as he reconstructed his experiences in the classroom environment via the stimulated recall sessions, has been presented and operationally defined with transcript excerpts presented in evidence supporting the researcher's analysis. This component of the analysis emphasized the meaningfulness of these incidents and elements as the sport diving practitioner proceeded with his framing and reframing of the issues encountered in the classroom teaching setting.

The third level of analysis resulted in the identification of nine groupings or categories of teacher reflection with each category based upon an underlying driving factor or disposition which influenced the teacher's reflective processes as he reconstructed his experiences. The factors or dispositions which were conjectured to underlie the reflective activities were associated with factors of a personal and emotional nature.

The final level of analysis extended the previous levels by identifying six dominant themes that emerged from the process of framing and reframing in which the practitioner engaged as he reflected upon issues of control, equipment concerns, problems, safety, etc., encountered in the classroom setting.

CHAPTER 5

Reflection as Reconstructing Experience in The Confined Water (Pool) Environment

The structure of chapter five is identical to that of chapter four. Initially, the data collected in the confined water (pool) environment, in terms of the nature of teacher reflection, was grouped and categorized according to the frequency of occurrence, the common features and the characteristics of the incidents chosen for recall. The common features and characteristics reported were first examined in detail through the use of pertinent excerpts from the transcript of the stimulated recall sessions. Secondly, the chapter describes the synthesis of the individual features and characteristics involved in the identification of the nature of teacher reflection into larger more global categories. These categories were derived through the grouping of the second level analyses into like features and characteristics and provided an account of the possible factors or dispositions which seem to have led the teacher to engage in the type of reflective activities identified in level two. Thirdly, the chapter identifies the critical factors upon which sport diving practitioners reflect. The fourth level analysis extended that of the previous to identify the dominant trends and themes of the teacher's reflection. Finally, this chapter includes summary tables and figures outlining the salient points resulting from the four levels of analysis.

I. Introduction

Chapter five is focused upon the confined water (pool) environment experiences. Prior to each lesson on the pool deck, the students and teacher met briefly in the classroom environment where the teacher previewed, by way of oral explanation and/or by an audio-visual presentation, the skills to be covered in that session. The students were required to make the appropriate entries in their log books which was an effort on the part of the teacher to simulate as close as possible real-world diving procedures. The students then acquired their rental equipment and proceeded to the confined water setting to meet the teacher and his instructional assistants.

Each confined water (pool) session followed a standard procedure where the teacher gave a briefing for each skill which included aspects such as: the objective of the

skill, the value, a thorough explanation of how to do the skill, key points to remember about the skill, possible problems in performing the skill, an explanation of how the skill would be conducted and the necessary hand signals needed to communicate underwater (see Figure 5, p. 50).

While underwater, the teacher always demonstrated the skill for the students before requesting a student to perform the skill. Each demonstration broke the skill down into easily manageable components. Following the demonstration of the skill the teacher motioned for each student to perform the skill individually and directly in front of him so he could act upon any problems that a student may have encountered. After each student was given the opportunity to perform the skill, the students were brought to the surface for debriefing which included positive reinforcement, clarification of any problems that had arisen, suggestions as to preventing the problems from reoccurring, and a concluding statement emphasizing the objective and value of the skill.

II. Analysis of reflection in the confined water (pool) environment

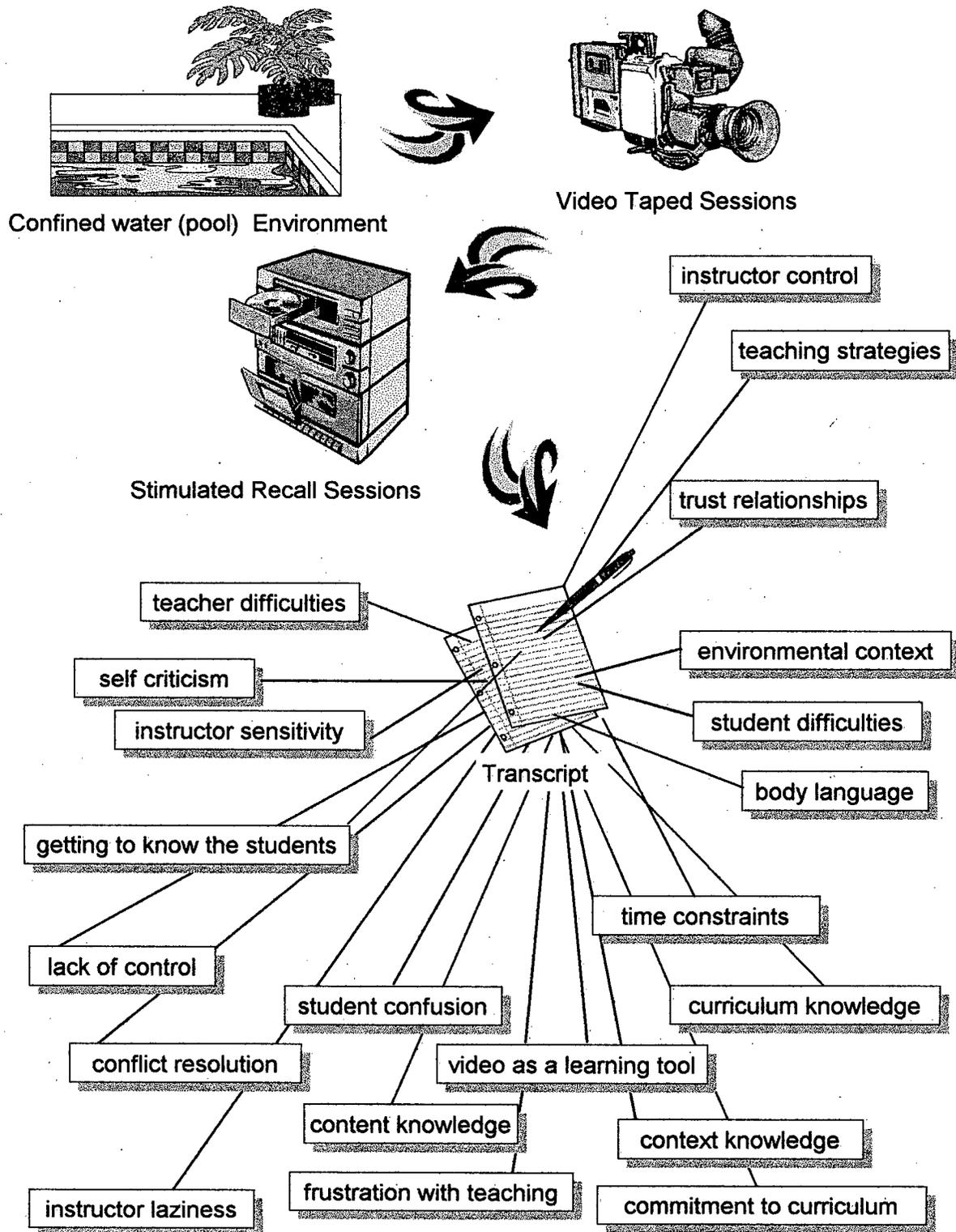
Transcription

The data transformation proceeded through the same levels of analysis outlined in chapter four. Level one consisted of the preparation of the transcript of the three stimulated recall sessions.

Significant elements or events

The second level analysis was conducted and twenty-one significant elements or events of teacher reflection were identified. The nature of these significant elements or events, upon which the teacher chose to reflect as he reconstructed his experiences in the confined water (pool) environment via the stimulated recall sessions, are presented here along with an accompanying operational definition, transcript excerpts as evidence and a tally of the frequency in which the teacher reflected upon these aspects of his practice. Once a recurring element and/or event was identified by the researcher it was named and each similar element and/or event thereafter became evidence of the frequency of its occurrence. Figure 12, p. 106, provides an overview of the second level analysis of the confined water environment. (An ellipse in the transcript excerpts indicates a slight pause, not an omission).

Figure 12. Reflection in the confined water (pool) environment: significant elements and events.



The first significant element resulting from Henri's reflective processes regarding his practice highlighted his *instructor control*. Henri flagged these instances as significant as he felt that the most important quality an instructor can master in teaching in the confined water setting is control. He chose to reflect upon eleven incidences in which, in most cases, he exercised complete underwater control of the class. His discussion of the concept specified five different forms of control: managerial control, physical control, emotional control, equipment control and role model control. Initially, he focused on having control in a managerial sense:

72 **Henri:**One thing that I like to, I've always
 73 um....tried to do in the pool at the very beginning and throughout the course is let
 74 them know that I'm in control of them and, and keep control of them by keeping
 75 them lined up. Positioned on the wall with their backs to the wall either in a
 76 straight line or, or in a "V". And I think, I feel that's important because right away
 77 you're, you're giving them the impression that you need to, "I need to have
 78 control of you".

(S3, CW1/2, V2, A 4A, TL 73-78)

Henri secondly discussed the use of control in a physical way:

418 **Henri:** Um... I, I mean.... I, I, got to admit though that there are times where in a
 419 class you do go and, and grab onto a student and, and they almost wonder
 421 what's, "what are you doing?" I, I, have had that from time to time, like they look
 421 at you sort of funny um when we brief the skill I tell them that we're going to be
 422 right there in front of them when they do the skill although sometimes I don't tell
 423 them that we're gonna actually physically grab onto their equipment, so....

424

425 **Lesley:** And how is it that you determine the distance between you and the
 426 student?

427

428 **Henri:** Um ... well generally, just, we're both kneeling on the bottom, I just extend
 429 my arm, hold onto them so that I give myself enough, just enough distance so
 430 that I don't interfere with their skill that they're conducting, you know, in the case
 431 of an arm a reg. re, re and re using an arm sweep you've got to give them a foot,

432 you know, maybe two feet. But, if they're really having trouble with a skill I might
 433 even tighten it up, get in there a little closer.
 (S3, CW1/2, V2, A 4A, TL 418-433)

The third type of control Henri referred to was a form of instructor control involving students' emotions. Students are usually very eager to get on with the act of diving. This eagerness and curiosity can result in students progressing ahead of the instructor and performing skills incorrectly. In an effort to prevent any discomfort from occurring to the students, as a result of their anticipation and excitement, Henri used a form of emotional control in which he delicately slowed them down:

112 Henri: Um....most of the time, well this, this class too, they, they look ah....I'd
 113 have to in a couple of words, they a lot of them are, are very eager they want to
 114 like get going right away. They want to try this, they want to get down under
 115 water. You know they are anxiously waiting for us to actually try this stuff and,
 116 and often too they're, I find that they're going ahead of you a little bit, you know,
 117 checking out pockets and stuff and, and you know putting alternate air sources in
 118 their mouth and trying that so you try to I try to keep that under control and just
 119 get them to go along with me.

120

121 Lesley: When they're searching themselves for the things is that distracting to
 122 you as a teacher?

123

124 Henri: Um....yes it is because....you know, they, they, if they're, if I'm showing
 125 them where their pressure gauge is located and they're trying to find their
 126 regulator and breath off it, we're going to do that in a few minutes so it is, I do
 127 find it distracting and, and try and get them in sort of a nice way just tell them to
 128 ah, you know, ah, "stay with me and, and we'll get to that in just a couple of
 129 minutes".

(S3, CW1/2, V2, A 4A, TL 112-129)

Yet another instance of control, significant for Henri, was associated with the use of equipment and how he manipulated the students via their equipment to maintain control of the class in proceeding safely and expediently to the pool bottom:

872 Henri: Oh, this is, I always find it a bit of a scramble at first, you, you tell them on
 873 the surface, you brief them a little bit about how we want to position them with
 874 their backs towards the deep end kneeling on the bottom and it seems to take a
 875 lot of time actually getting people, them to do that. Now this is only their second
 876 time in the pool so they're still not comfortable with the equipment but you literally
 877 I feel you've got to, a lot of the times pick them up and put them where you want
 878 them, getting them evenly spaced sort of where you want them.
 (S5, CW3/4, V2, A 4A4B, TL 872-878)

Finally, Henri referred to control as a way of exhibiting role model qualities for students to emulate, a sort of 'follow me' use of control. Students are unfamiliar with their equipment, their capabilities as divers, the application of theoretical concepts into a practical context and the weightlessness of the water environment. Consequently, students find themselves awkward in this setting, for the most part. Henri commented, his follow me role modeling is not only an example of how one should travel through the water as a diver but also, in a way, an assurance to students that it is possible to exert some form of control in this environment:

2139 I have to portray a role model, sort of be a role model diver.
 2140 Making sure that everything I say I'm doing and come across as someone who's
 2141 calm, controlled, smooth, confident, ah, you know, a real high ability and not
 2142 being sloppy.
 (S7, CW5/6, V2, A 4B5A, TL 2139-2142)

As in the classroom environment, Henri flagged *teaching strategies* as significant incidences of reflection. Teaching strategies were techniques, used in the confined water environment, which helped to maintain control, prepared the learners to receive the skills of sport diving or in some cases aided Henri in his demonstration of skills. Generally speaking, the teaching strategies were significant incidents of positive teaching techniques Henri felt he demonstrated well in the confined water setting. Henri chose seven instances to reflect upon and in the following transcript excerpt he discussed his technique of demonstrating new skills to students underwater:

283 Henri: Um my intent is to when I demonstrate it, any skill, is to demonstrate it

284 in a smooth, a really smooth um... the word is methodical type of demonstration
 285 where my movements are, are slow and really sort of streamline movements
 286 and I'm looking at the class. I do ah.... I do a visual sort of sweep with my, my,
 287 my head so that if I've got ten students, at all times, or when I'm demonstrating
 288 any skill they can see my face and make sure that they can all see the demo, you
 289 know, it's important that you have them positioned properly but....just the skill
 290 keeping it slow, steady, smooth, methodical. Make sure that I point out any sort
 291 of important parts, emphasize anything that's important like blowing bubbles.

(S3, CW1/2, V2, A 4A, TL 283-291)

Henri reflected upon a teaching strategy that introduced students to one of the hardest skills to achieve in the beginner sport diving course, breathing underwater without a mask. Henri had found this strategy to be very successful in getting the most nervous student underwater, breathing without a mask, before s/he was aware of it:

164 **Henri:** Um....this is something
 165 I've, I have played around with a little bit. In some classes I've taught, right away
 166 we've put the masks on and, and um....done some initial skills, reg. clearing
 167 and just waited a little while before we got into breathing without a mask under
 168 water. But I find, I think that for a lot of students breathing without a mask on
 169 scuba is the, for a lot of them they find that the hardest skill, so if you can
 170 introduce it at the beginning you know, "hang onto the edge of the pool", talk
 171 about blowing bubbles with their nose and make it sound really simple later on
 172 they don't have troubles with it.

(S3, CW1/2, V2, A 4A, TL 164-172)

According to Henri, one of the best strategies for teaching underwater incorporates the 'follow me' model which he previously identified in the reflective element of instructor control within which he attempted to get students to solve their own difficulties. The following excerpt deals with Henri's use of the follow me strategy when instructing a student to deflate his bouyancy compensator device:

260 **Henri:** Ya, ya I mean we're in the, we're only in four feet of water and what I
 261 would do at that point is um....get him, get his attention and, and get him to

262 watch the way I'm deflating my BCD or get an assistant to do that. I think that's
263 the best way to deal with that. Um ... so now ...
(S3, CW1/2, V2, A 4A, TL 260-263)
(BCD is an acronym for bouyancy compensator device)

Henri elaborated upon four different instances in which his ability to perform a smooth demonstration, formed the basis of a *trust relationship* with his students. A trust relationship, the third element of reflection was a significant factor for Henri from the very first confined water session, as he remarked that learning does not occur unless the students have complete trust in the teacher, trust in the equipment and trust in themselves. Henri acknowledged that a trust relationship with his students was acquired through the students' appreciation and respect for his personal competence as a diver and he elaborated upon the development of trust:

301 **Henri:** Aha, absolutely um...you're gaining confidence, they're getting confident
302 in you and trust in you. They see how you know that you have a really advanced
303 level of, of diving ability and they see that. So I think from a first pool session
304 their trust and confidence in you builds.
(S3, CW1/2, V2, A 4A, TL 301-304)

Henri added that the development of the trust relationship is enhanced and expedited by the proximity of his control underwater:

401 **Lesley:** Now you comment about being right in front of them....
402
403 **Henri:** Aha.
404
405 **Lesley:**and looking them right in the eyes....
406
407 **Henri:** Yup.
408
409 **Lesley:**what does this do?
410
411 **Henri:** It ah ... to me... it assures, it would give them a, a better, it would give them

412 a feeling of ah ... you know that I'm, I'm, there I'm, I'm, they've gained at this point
 413 trust in me and that if they're, if they do have a problem, I mean, I'm there to help
 414 and help them deal with the problem.

(S3, CW1/2, V2, A 4A, TL 401-414)

As noted in the classroom environment, Henri chose to reflect upon instances of *teacher difficulties* and identified twice as many instances in the confined water environment as he noted in the classroom environment. There were thirteen occasions in the stimulated recall sessions where he reflected upon his struggle with teaching during the direct experience. The following instance, in which Henri pretended to be the diver who donated his octopus regulator in an out-of-air situation to a buddy, was a typical example of his difficulty. In an attempt to simulate the real situation, Henri had not observed that the student diver placed the octopus regulator in his mouth upside down - ultimately resulting in an out-of-air and uncomfortable situation for the student.

1138 **Henri:** Ya, could, he just put it in, he just about put it in upside down and
 1139 ah.... hum. Now you see, I had my head turned away from him because I was
 1140 pretending that, you know, I, I'm the diver and he was my buddy and he taps me
 1141 on the shoulder and, and I didn't see that he's putting it in upside down so..

(S5, CW3/4, V2, A 4A4B, TL 1138-1141)

Underwater communication is vital in the sport of diving and difficulties usually occur because instructors use poor hand signaling procedures. Henri, who was accustomed to using hand gestures in his regular speech, found himself having difficulties communicating his intent to the students in a situation in which he wanted the class to situate themselves in a particular location and manner on the bottom of the pool:

880 **Lesley:** So you feel that you emphasized on the, on the shore how it is that you
 881 want them to be under water but it's still difficult for them to. . . . ?

882

883 **Henri:** Ya, well.... it may need to be more specific. I mean, it's "against the wall
 884 on the bottom, with your backs towards the wall on the bottom of the pool".

885

886 **Lesley:** What does the bottom of the pool look like?

887

888 **Henri:** It's a flat bottom and then it sort of angles up, flat bottom with ah, sort of,
889 then it starts to angle up on about a 45 degree angle before it sort of goes up, it
890 goes straight up.

891

892 **Lesley:** So could there have been some mis..... ?

893

894 **Henri:** There can be some confusion some of them might... may ah, think that I
895 wanted them on that actual angled part or something, I mean, I guess you could
896 call that the bottom technically, ya.

(S5, CW3/4, V2, A 4A4B, TL 880-896)

Henri reflected on the difficulty he had teaching the controlled emergency swimming ascent, a skill that he had indicated as difficult to present in the classroom environment. Unlike the classroom situation, however, the setting of the confined water allowed Henri to demonstrate the skill for the students. After the demonstration he had the students perform the skill, one at a time, in front of him. For some reason he had difficulty getting the students to understand what it was he wanted them to do. He engaged in several discussions concerning his difficulty with this particular skill, one of which included reconstructing his difficulty as follows:

1211 **Lesley:** Ya. So let's just talk a little bit more about the controlled emergency
1212 swimming ascent

1213

1214 **Henri:** Ya.

1215

1216 **Lesley:** You um...you had them along the back, you had them along the back
1217 wall....

1218

1219 **Henri:** Ya.

1220

1221 **Lesley:**and then you went....

1222

1223 **Henri:** In front of them.

1224

1225 **Lesley:**in front of them horizontally....

1226

1227 **Henri:** That's right

1228

1229 **Lesley:**now when you got them to do the skill how did they do the skill.

1230

1231 **Henri:** They did the skill from the back wall....

1232

1233 **Lesley:** The back wall....

1234

1235 **Henri:**diagonally up to the shallow end,

1236

1237 **Lesley:**diagonally?

1238

1239 **Henri:** Ya, towards the surface.

1240

1241 **Lesley:** So, can you think of, when you did the demonstration, if you were

1242 the student what would you'd be seeing....?

1243

1244 **Henri:** Ya, that that is I think a bit confusing however, um....I would think that they

1245 should be able to understand the other parts of the skill, how my hands up, how

1246 my inflator is positioned, ah I'm exhaling and all of them did other than the hand

1247 positioning did seem to understand the exhaling and the kicking.

(S5, CW3/4, V2, A 4A4B, TL 1211-1247)

Henri concluded from his direct experience of teaching the controlled emergency swimming ascent that:

1378 **Henri:** Um, well one thing that I will never do again and this is not the only time

1379 but the ESA I can not ever be in the position where I'm rushed to do the skill um,

1380 and if I, if I could go back and do this again I wouldn't have done the ESA that

1381 night, I would have done it the first skill the next night. And taken more time and

1382 not been so rushed and that is something new that I've learned in positioning, I

1383 would position the class totally different and go back to what I've always done

1384 and that's a fin pivot

(S5, CW3/4, V2, A 4A4B, TL 1378-1384)

(ESA is an acronym for emergency swimming ascent)

The fifth element in the nature of Henri's reflection is one of *environmental context*. Henri commented on five different occasions about how the experiences in the confined water environment related to and prepared the student for the open water environment. The following excerpt was typical of Henri's comments about skills in the confined water emulating the real world experience:

860 Henri: Ya, their scuba equipment They've done a giant stride we've set the float,

861 in the deep end and then they have to descend in buddy pairs down the line

862 emphasizing that they needed to hang onto the line but they didn't all, do that.

863

864 Lesley: Is this a useful.

865

866 Henri: Well it's, it's ah, it's time consuming, taking two down the line at a time but

867 it's, that is the way we descend with them the first time in the ocean so I think you

868 need to introduce it to them in the pool at some point.

(S5, CW3/4, V2, A 4A4B, TL 860-868)

Henri identified eight incidences of *student difficulties*, an element that was also identified in the classroom environment. Student difficulties consisted of problems students had experienced in the direct experience and were difficulties which Henri had been unable to prevent. These instances were more perplexing for Henri in the confined water environment and he identified four times as many student difficulties in the pool setting than in the classroom. Henri commented about Frank's problem with balance:

250 Henri: Is that Frank on the end there? He seems to be frailing a little bit trying to

251 get himself positioned on the, on the bottom properly. On the top we'd

252 mentioned deflating the BCD before we go down on one knee or two knees and

253 often students, the first few pool sessions and even the first couple of ocean

254 dives have trouble positioning their inflator properly and he may not have gotten

255 all the air out of his BCD.

(S3, CW1/2, V2, A 4A, TL 250-255)

(BCD is an acronym for bouyancy control device)

The seventh significant incident emerged, as it did in the classroom environment, as reflection about several events in which body language was identified as the common factor. As would be expected Henri reflected upon more incidences (seven) of body language in the confined water setting as he discussed his use of body language as a teaching tool:

314 **Henri:** You know, when I, when I look at them um....one thing I try and do under
 315 water is make sure that anything I do is I'm emphasizing that I'm very relaxed
 316 and, and slow and, and I'm very calm, my movements are not I try not to make
 317 fast jerky movements because diving is, you're supposed to be calm, cool, collected
 318 and relaxed at all times and you know you enjoy your diving more. So I try and
 319 do that and, and look and I do try and look at them like my eyes in a nice relaxed
 321 example if the student's having troubles one thing that I'll do is they're, they're
 322 just moving too fast they, they're getting a little anxious, I'll get them to stop and I
 323 look at them right in the eye and I sort of close my eyes a little, little bit sort of
 324 flutter my eyes like I'm sort of really relaxed and I use my hand to sort of simulate
 325 slow inhalations and exhalations. So....

(S3, CW1/2, V2, A 4A, TL 314-325)

Henri not only talked about his own body language as a teacher but identified the relevance of the students' body language as he targeted their body language as indicators to him of student comfort or lack thereof underwater:

2204 **Henri:** Ya, there, when I look at a student, is, is their movement in the water, their
 2205 eye language, their gestures and that tells me how comfortable they are and
 2206 when they're having problems, like, I can tell by looking into someone's eyes or
 2207 how they move and it was a good example was Frank how he was having
 2208 troubles doing up a simple buckle. So that really...

(S7, CW5/6, V2, A 4B5A, TL 2204-2208)

The eighth element identified, presented the issue of *time constraints* which was selected for reflection on five different occasions - the same number of incidences were noted in the classroom environment. Generally, the incidents of time constraints, identified in the pool, were indicative of lack of time. In this environment, the element of time determines what can and can not be pursued, how many repetitions of a skill can be accomplished, and the cost of renting the pool facility. Henri remarked:

1104 Henri: If I did that in the ocean I would ah, I would shoot myself, which, it's not in
 1105 the ocean. You should treat the pool environment the same because that's what
 1106 you're preparing for but there may be times where again, it's this time thing and
 1107 in the ocean I have all the time I want but in the pool, I, I've got to be out of there
 1108 by nine so I might cut the odd corner, nothing that would in my mind would put a
 1109 student in, in jeopardy.

(S5, CW3/4, A 4A4B, TL 1104-1109)

Curriculum knowledge was identified as a significant concern by Henri's recall comments. An understanding of the criteria for judging the adequacy or inadequacy of a students' performance is important for the sport diving instructor. There were three incidents of relevance, half the number that were identified in the classroom environment, to which Henri attended. He talked about what constituted a successful performance:

478 Henri: I'm shaking his hand acknowledging that he has completed the skill, he's
 479 done it. As long as, as far as I understand the **** system, that as long as they
 480 complete the skill for you, they do the skill, it doesn't matter how good it is as
 481 long as it's done, you can acknowledge that and then get an assistant to come
 482 around for remedial practice with the student. If they screw up and you don't feel
 483 it's done properly you need to get them to re-do it.

(S3, CW1/2, V2, A 4A, TL 478-483)

(****used to protect the anonymity of the certifying agency)

Getting to know the students was identified as another significant incidence for Henri. This element was not as salient as in the classroom environment probably due to

the fact Henri already knew the students. There were two instances of getting to know the students which Henri chose to highlight:

788 **Henri:** Ya, what I try and do in the change room is not, I've now, I've now spent a,
 789 fair amount of time talking and so now in the change room I try and let them talk
 790 a lot and, and ask me questions about diving and listen to what they're talking
 791 about and just sort of get an idea of how they felt the first night went and...
 (S3, CW1/2, V2, A 4A, TL 788-791)

Five incidences of *instructor sensitivity*, occasions where Henri empathized with the students' frustration or nervousness were identified. Henri talked about how he used 'touch' to help students calm down:

2169 **Henri:**One thing
 2170 that I've done for students that are having troubles with a skill and ah, you know
 2171 they've three or four attempts and they just can't do it and they're really freaked
 2172 out is I'll actually put my hand on their shoulder and I have actually patted them
 2173 on the shoulder a couple of times during the skill. Um...and that's worked for me
 2174 in the ocean with mask removal and replacement is having my hand there.
 2175 Um....you know.... [laughter] ... you've got to be careful with this obviously with
 2176 some guys that they don't think I'm queer or anything but it does work.
 (S7, CW5/6, V2, A 4B5A, TL 2169-2176)

Another significant incident, regarding instructor sensitivity, was evidenced by Henri's keen sense in identifying that some students were uncomfortable with performing some skills due to hygiene issues. Consequently, he changed the top side demonstration and student practice of both the alternate air source and the buddy breathing skills. In this passage Henri shows his sensitivity to socially acceptable behavior:

969 **Henri:**shoulders, ya, ya. So now we're on the um alternate air source skill.
 970 So I'm using another instructor and we're um, demonstrating it on the surface first
 971 of all. And then we will demo it under water. It's funny, when I first started
 972 teaching, we had students do dry runs of this skill on the surface and ah, you
 973 know, in buddy breathing and, and it wasn't until like a couple of years ago where

974 we realized at our store here, that perhaps when we're on the surface, in the
 975 interest of the students, we should be dipping that regulator in the water um, it's
 976 you know, it might bother, well it would both me, it probably would bother
 977 students putting in ah, someone else's mouth piece like that.

978

979 **Lesley:** You mean when you were demonstrating an out-of-air situation....

980

981 **Henri:** Ya, on the surface.

982

983 **Lesley:**you're going.... right, to a, a, mouth a regulator mouth piece when
 984 another person had just had it in their mouth....

985

986 **Henri:** Ya, exactly.

987

988 **Lesley:** without putting it in....?

989

990 **Henri:** Exactly, but now we, in the last few years we, we always make sure we
 991 dip it in the water first. So now we're demonstrating the skill under water. I'm just
 992 telling the students who will be the person who is out-of-air and make sure they
 993 understand that.

(S5, CW3/4, V2, A 4A4B, TL 969-993)

The element of *self criticism*, was identified in eleven incidents in which Henri had made general remarks about how he could have done a better job of something. In one such incident, Henri criticized his inadequate demonstration of the no mask breathing skill and he commented on his error of not identifying an equipment problem:

765 **Henri:** ...there were two mistakes that I see

766 that I made and that was demonstrating a skill there exhaling out of the, the nose
 767 and that and not knowing, seeing a student's snorkel, I mean, they're, they're not
 768 bad mistakes but those could have been done a little bit better.

(S3, CW1/2, V2, A 4A, TL 765-768)

There were other incidents in which he was most critical of his performance. In the following example Henri stated that he just forgot:

554 **Henri:** I remember one with this class I went
 555 through this I, I think I went through the partial mask flood and the first time we
 556 put water into the mask and I did not ask anyone if they were wearing contacts, I
 557 remember that from this class. That is something I always do and, and it's
 558 important because if someone's wearing contacts, they've, they open their eyes
 559 with that water in there their contacts are gone so it's something that I missed
 560 that I shouldn't have.

(S3, CW1/2, A 4A, TL 554-560)

There were other comments of self criticism regarding his positioning underwater. He noted that he was out of position and hence should have taken the time to reposition himself before allowing the students to continue to demonstrate the skill of buddy breathing:

1056 **Henri:** Um...ok, so he, Frank put his regulator into Ken's mouth....ya, you
 1057 see.... that didn't, that, that wasn't right, I should have turned them around like I
 1058 do in the ocean there because also I couldn't, I had to reach over Ken to grab his
 1059 regulator. Again, it's probably one of the things in the pool I just got a little lazy in
 1060 the interest of time.

(S5, CW3/4, V2, A 4A4B, TL 1056-1060)

The thirteenth element of Henri's reflective process was identified as a *lack of control*. Henri identified three instances where he had made a mistake in his positioning underwater reducing his control and thus exposing the students to unnecessary risk:

1141 **Henri:** .. so
 1142 now we're in the deep end and we're doing the same skill except this time we're
 1142 making an ascent. Again, I'm on the wrong side.

(S5, CW3/4, V2, A 4A4B, TL 1141-1142)

Student confusion, was the label applied to three situations in which students were totally confused about that which was expected of them. Henri talked about the student confusion involved in the alternate air source skill. The certifying agency leaves it to the discretion of each instructor to choose and teach a method of alternate air source breathing that is compatible with the diving setting, the diving equipment available and the learners. Henri was in a situation in which he needed to teach two different sequences of the skill. He commented:

1126 Henri: Ya, um.... [lag in tape] So he's just, with the octopus really, you can grab
 1127 it, put it in your mouth and then signal but ...he instead tapped me on the shoulder
 1128 signaled and then grabbed it. No one else did that but he may have been a
 1129 little confused between the two different methods because they are different.
 (S5, CW3/4, V2, A 4A4B, TL 1126-1129)

On another occasion, Henri reflected upon the student confusion and frustration that resulted from not understanding the value of performing a required skill:

1397 Henri: Ah.... I can say that I think Frank was frustrated and Richard, Frank and
 1398 Richard were frustrated. And Richard was frustrated because Richard asked if we
 1399 could take him to the pool one on one, and with Richard it was the fin pivots. He
 1400 was totally confused about the fin pivots. He didn't understand why we do them
 1401 and ah, I mean, he was able to do it, he had major problems with the orally
 1402 inflating one but....
 (S5, CW3/4, V2, A 4A4B, TL 1397-1402)

The fifteenth element to emerge from Henri's reflection was *context knowledge*. This is the knowledge an instructor considers when deciding upon the choice of a particular technique for a demonstration of a skill. Henri used his context knowledge in the selection of a technique of weight belt removal and replacement which was satisfactory for use while kneeling on the bottom of the pool as well as satisfactory for remaining at the surface. This technique was adopted by Henri because it was also a technique he had tried and had found to be successful in the open water environment. Henri explained:

1888 **Henri:** This is why I demo this skill this way under water too because I like to do
 1889 them, do it the same way under water as I do it on the surface, like....
 (S7, CW5/6, V2, A 4B5A, TL 1888-1889)

Henri did not reflect upon the sixteenth element, *content knowledge*, in the confined water environment as often as he did in the classroom environment probably because he was fluent with the objectives and values and was capable of demonstrating all the skills to be taught in the sport diving curriculum. When asked about a particular skill Henri was quick to reply:

1194 **Lesley:** And what should happen at the end of the skill?

1195

1196 **Henri:** They should orally inflate their BCD at the end of the skill.

(S5, CW3/4, V2, A 4A4B, TL 1194-1196)

(BCD is an acronym for bouyancy compensator devise)

Henri is *committed to the curriculum* as he acknowledged both in the classroom environment and again in the confined water setting, that he is quite comfortable with incorporating curricular changes, even though he may not completely understand the reasoning behind them:

1756 **Henri:** Um ... I thought about it but never stewed on it, just probably said "well
 1757 **** knows best, you know, they pay people quite a bit of money to think about
 1758 that [laughter]....

(S7, CW5/6, A 4B5A, TL 1756-1758)

(****used to protect the anonymity of the certifying agency)

Henri acknowledged some sloppiness in the confined water on his part which was labeled *instructor laziness* which consisted of not attending adequately to how skills were taught. Henri remarked that how things are accomplished in the confined water determines how things will be realized in the open water environment:

2212 **Henri:** One thing that ah, I've just thought about that, you know, perhaps after a
 2213 few years of teaching maybe I've gotten a little bit sloppy in the pool because of,

2214 it's, how to explain this. Like, I've got to remember that what you teach them in
 2215 the pool is going to, that's how they're going to do it in the ocean and ah, you
 2216 know, you've got to be careful because although the chances are so slim that
 2217 something could go wrong in the pool that could relate to what happens in the
 2218 ocean and I have always understood that but maybe have gotten a little bit
 2219 sloppy about that, I could, I've noticed.

(S7, CW5/6, V2, A 4B5A, TL 2212-2219)

The researcher identified *frustration with teaching* as the nineteenth element resulting from Henri's stimulated recall sessions in which he reflected upon six instances. He had difficulty understanding why some students were able to demonstrate their proficiency in some skills and not in others and was frustrated as he searched for other ways of presenting the skills. An example of Henri's frustration with teaching, once again, centered around the controlled emergency swimming ascent (ESA). He was perplexed that Frank still had problems with understanding the application of this skill:

1412 Henri: Ah... well, it's, it definitely bothers you, I mean, it's, you want them to be
 1413 happy all the time, right, and having a good time. I think they may have been
 1414 having a good time but it's, it make's you think about what could have been done
 1415 better and what do I need to do for these students,

1416

1417 Lesley: Ah, when you notice that um, they were frustrated were you able to talk
 1418 to them that night or talk to them before the next night or.... ?

1419

1420 Henri: I was able to I talk to Richard extensively on the phone and ah, Frank,
 1421 no, I don't think I. I don't think I was able to give him any time.

(S5, CW3/4, V2, A 4A4B, TL 1412-1421)

Another frustration with teaching in the pool was associated with the students' inadequate implementation of buddy system procedures. The classroom procedure overlooked the buddy system and as a result the students had not considered it necessary to work with and rely on a buddy when donning their equipment:

1444 Henri: One thing that I find frustrating teaching diving is

1445 that you, you, you ah, tell them the importance of, and guys are worse at this in
1446 my experience, that using a buddy to put your gear on and you show them a
1447 technique and you tell them that you know this is the best technique that that this
1448 is what works best, we've tried so many different methods and you know putting
1449 on the fins and they just don't, they seem to tune you out like.

1450

1451 **Lesley:** Was there a lot of mention on a specific way of putting your gear
1452 together and on before you entered the water?

1453

1454 **Henri:** Yes.

1455

1456 **Lesley:** Was it demonstrated?

1457

1458 **Henri:** Yes, it was demonstrated. Shirley and Cynthia demonstrated it um,
1459 we demonstrated it the night before.

1460

1461 **Lesley:** Because it, it does seem like everybody's got their own routine here.

1462

1463 **Henri:** Ya, and even by the time we got to the ocean we still had to remind them
1464 that, you know, they need to be, they need to pick up all of their fins and, and one
1465 buddy holds onto the three fins while the other puts one fin on using the, you
1466 know, the leg cross method and, and ah, you know, I can remember even my last
1467 ocean dive someone coming in and taking the, gear off by themselves, taking
1468 their fins off by themselves.

(S7, CW5/6, V2, A 4B5A, TL 1445-1468)

The twentieth significant element identified was Henri's concern to help students when they were consumed in problematic situations. In *conflict resolution* Henri used different methods of encouraging the students to rethink what they were trying to accomplish. In the following excerpt Henri showed Frank an alternate method of removing and replacing the weight belt while stationary on the bottom of the pool. Interestingly enough, Frank found this method easier than the original method demonstrated to the class. Henri commented on Franks weight belt removal skill:

1806 **Henri:** Ya. I had problems with Frank on this one. Um.... on, everyone else was
 1807 fine. I don't know if maybe he has a problem he just couldn't get his legs out in
 1808 front of him. He couldn't sit on the bottom of the pool, he had just watched three
 1809 people do it. Um....at that point I just demonstrated another method. The easier
 1810 method. I don't ah, keep I, I, with the weight belt re and re I, I practiced a couple
 1811 of methods in the ocean, in our environment with a 30 pound belt and used the
 1812 one I think is easiest. But clearly here Frank found another method easier in the
 1813 pool again, "as long as you get the damn thing on that's all that matters". He has
 1814 to be able to take the belt off and put it on and that's what he did, but ah, I like
 1815 to ah....

(S7, CW5/6, V2, A 4B5A, TL 1806-1815)

Henri described how he tried to help Frank overcome his difficulty with the controlled emergency swimming ascent skill:

1184 **Henri:** What I did is put my regulator to his ear and, and took a breath and made
 1185 the ahhh sound so that he could hear what I was doing there. And then I asked
 1186 him to watch, I think I'm with Todd here. I always think that if, if the instructor
 1187 demos it and, and you're, you know, you're the last student to do it that you
 1188 should see what every, you should be able to watch everyone.

(S5, CW3/4, V2, A 4A4B, TL 1184-1188)

The final significant element identified by Henri was the use of *the video tape as a valuable learning tool*. He specifically referenced how the video taping of his teaching, within the three different teaching environments, had added to his understanding of his practice. He stated:

2246 **Henri:** I've never watched myself teach before, I've never watched myself teach.
 2247

2248 **Lesley:** Now, what if I, what if I just kind of said "well ok, Henri I want to sit down
 2249 and talk about how you did this skill, and I think you should probably do it this
 2250 way because it would simulate more like the ocean", that would probably not be
 2251 as enhancing as a learning tool than seeing yourself actually doing it?

2252

2253 Henri: No way, ya. Absolutely not. This is the best learning tool. I think.

(S7, CW5/6, V2, A 4B5A, TL 2246-2253)

The nature of teacher reflection in the confined water (pool) environment has been illustrated through twenty-one significant elements or events. The use of pertinent transcript excerpts, from Henri's reconstruction of his confined water practice, allowed a detailed examination of the common features and the characteristics of the incidents chosen for recall. Table 5 provides a summary of the frequency of occurrence, for the elements and events reflected upon by Henri, for the second level analysis.

Table 5. Reflection in the confined water (pool) environment: frequency of significant elements and events.

Element and/or event	Frequency of occurrence	Element and/or event	Frequency of occurrence
1. instructor control	11	12. self criticism.	11
2. teaching strategies	7	13. lack of control	3
3. trust relationship	4	14. student confusion	2
4. teacher difficulties	13	15. context knowledge	2
5. environmental context	5	16. content knowledge	2
6. student difficulties	8	17. commitment to the curriculum	1
7. body language	7	18. instructor laziness	1
8. time constraints	5	19. frustration with teaching	6
9. curriculum knowledge	3	20. conflict resolution	4
10. getting to know the students	2	21. video as a valuable teaching tool	1
11. instructor sensitivity	5		

Factors and dispositions influencing reflective activities

This section of the chapter presents the third level analysis, that is, where the compilation of the individual features and characteristics involved in the identification of the nature of teacher reflection in the second level analysis, were re-analyzed and grouped into larger categories according to the like features and characteristics which became evident. From these groupings the factors or dispositions, that is, the common significant factors found within the elements of the teacher's practice which were conjectured to underlie the reflective activities were identified.

Eight groupings or categories of teacher reflection were identified during the analysis. Each category has an assigned descriptor which influenced the teacher's reflective processes as he reconstructed his experiences in the confined water (pool) environment via the stimulated recall sessions. These groupings or categories are presented here and in Figure 13, p. 130. Secondly, close examination of these categories facilitated the identification of the factors or dispositions which influenced teacher reflection of each category's common features and characteristics. It was found, that within each group, the influencing factor or disposition was of a personal and emotional nature.

The researcher included in the first cluster, the reflective elements of 'instructor control' and 'instructor sensitivity'. The instructor reflection which produced this category was influenced by Henri's *need for control*. The confined water (pool) environment is the first opportunity for students to experience breathing underwater. The unfamiliarity of the cumbersome equipment coupled with the new feeling of weightlessness may place students in awkward positions and potentially dangerous situations which are prevented by the prudent use of various instructor control measures.

The second grouping was comprised of the reflective elements of 'getting to know the students' and 'trust relationship'. The reflection which resulted in this category was influenced by Henri's *desire to comfort*. As evidenced in the classroom environment, Henri believed the development of the cognitive and emotional domains of students is fundamental to attaining optimum physical performance and therefore, tried to encourage students to feel at home in a new undertaking. In doing so, he was

sensitive to the students clumsiness in the water and he attempted to reduce student anxiety by making sure that the students knew he was there for them.

The third grouping of reflective elements consisted of 'student confusion', 'lack of control', 'instructor laziness', and 'time constraints'. The reflection in this category was influenced by Henri's *dismay at finding himself not up to speed*. For the most part, student confusion is generated by instructor miscommunication and having viewed the videos of the pool sessions Henri was amazed at the number of times he found himself either out of position, not communicating effectively underwater and/or cutting corners.

The fourth grouping consisted of the reflective elements of 'self criticism' and 'teacher difficulties'. The reflection in this category was influenced by Henri's *internal dissonance resulting from his non or incorrect action and his beliefs and understandings*. Consistent with reflections in the classroom environment, this grouping focused upon Henri's problems within his practice which caused him perplexity and internal turmoil as he was aware of the actions and understandings which characterize appropriate teaching practice in the pool, yet he fell short of this goal and hence, fell short of his beliefs of effective confined water teaching practices.

The next grouping consisted of two elements identified in the second level of analysis. They were 'frustration with teaching' and 'frustration with curriculum'. Henri's reflection in this category was influenced by his *frustration at not possessing the necessary instructional materials and/or skills*. Confined water sessions run smoothly when instructors can effectively demonstrate underwater, without the help of verbal communication, the required exercises in such a manner that the students are totally aware of what is expected of them. Henri was frustrated by his inability to demonstrate satisfactorily (underwater control and a clear taxonomic break down of skills) some of the required skills. Henri felt he had the diving skill and experience but lacked the methodology of presenting the skill in a fashion that was easily understood and easily replicated correctly by the student.

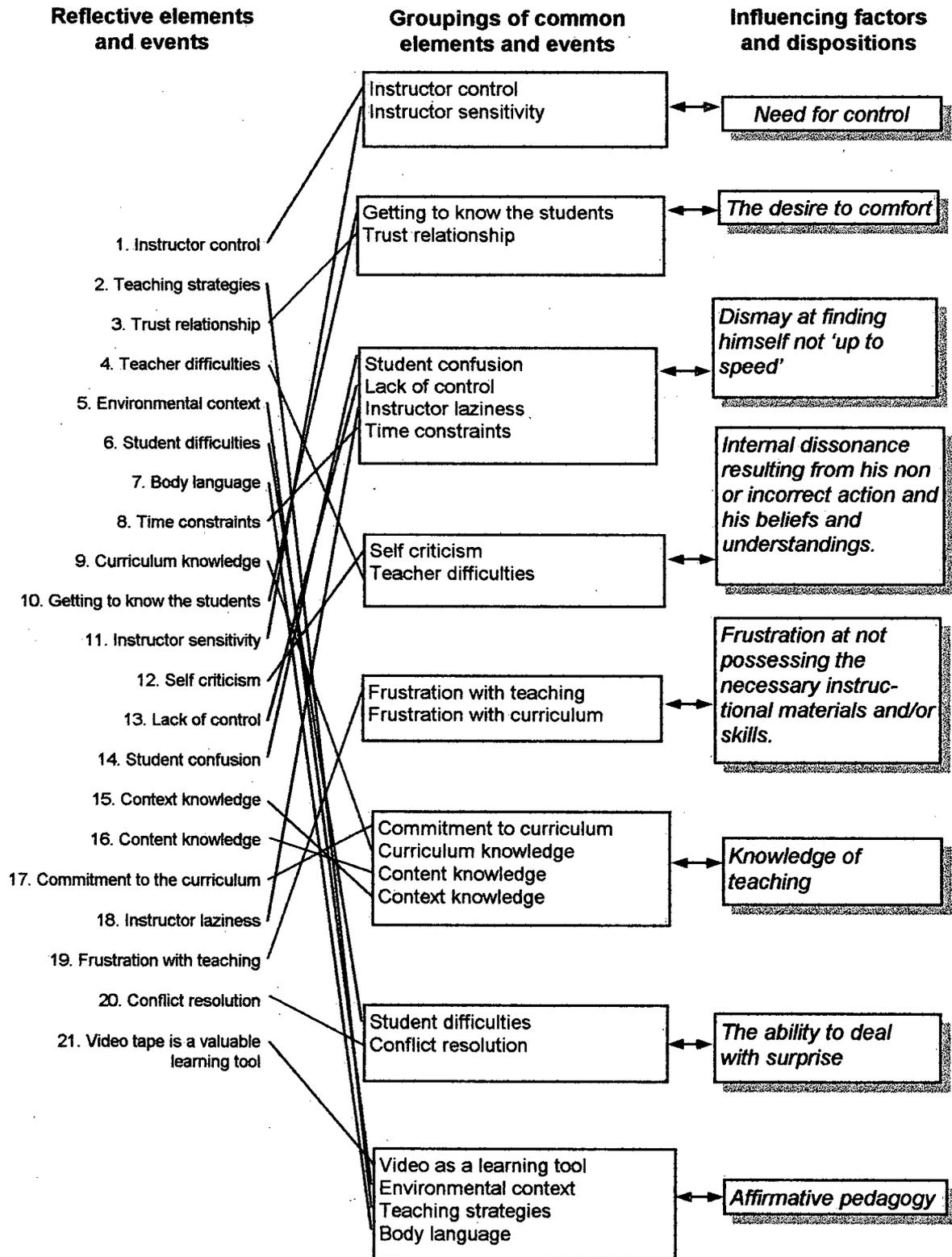
The sixth grouping of reflective elements included the elements of 'commitment to curriculum', 'curriculum knowledge', 'content knowledge' and 'context knowledge'. The reflection in this category was influenced by Henri's *knowledge of teaching* which

was found to have typical components of the repertoire of all professionals regardless of interest area.

The reflective elements of 'student difficulties' and 'conflict resolution' comprised the seventh category. The reflection in this category was influenced by Henri's *ability to deal with surprise*. The confined water setting is the environment which bridges the theory of the classroom to the practical application of diving skills within the environment one wishes to dive and as such, is a 'place' where instructors encounter unbelievable student performance. Unbelievable, in that, students perform skills in such a way that one can not describe. Regardless of how much control the instructor exercises and regardless of how well demonstrations are provided, students always have to try it 'their way'. Therefore, the ability to deal with surprise, that is, make prudent decisions and judgements quickly, is a fundamental critical attribute of an instructor.

The eighth grouping of reflective elements included the four elements of 'video as a learning tool', 'environmental context', 'teaching strategies', and 'body language'. The reflection in this category was influenced by Henri's *affirmative pedagogy*. These elements consisted of positive teaching components within his practice which highlighted his ability to effectively and safely teach the confined water (pool) sessions.

Figure 13. Reflection in the confined water (pool) environment: factors and dispositions influencing reflective activity.



Dominant themes

This section of the chapter reports the fourth and final level analysis which extended the third level by identifying the dominant trends and themes of the teacher's reflection in his reconstruction of experiences in the confined water (pool) environment via the stimulated recall sessions. The elements and events identified in the second level analysis, and the categories found in the third level analysis, in conjunction with their accompanying reflective underlying element, were analyzed to reveal five dominant trends and or themes which identified the focus of the teacher's reflection in the confined water (pool) environment. These dominant trends and or themes are summarized in Figure 14, p. 133:

The first theme identified by the researcher was *control*. Included under this theme were the factors of 'instructor control' and 'instructor sensitivity'. This issue of control was stressed in each of the transcript excerpts pertaining to these two elements. The confined water environment is the first opportunity for students to breath underwater and to experience weightlessness and in doing so, they generally find themselves holding their breath and very clumsy in their attempts to maneuver through the water. The instructor is sensitive to the students' awkwardness and through measures of control he afforded students, from the first pool experience, the physical and emotional support needed to control their bodies which helped them to develop, to a certain extent, an awareness of their equipment location and function.

The second dominant theme throughout the teacher's reflection of his confined water practice was the issue of *trust*. This theme included the two factors of 'trust relationship' and 'getting to know the student'. Henri nurtured a trusting relationship between he and his students initially in the classroom and bolstered the relationship in the pool setting by demonstrating to his students his grace and expertise of moving through the water. The students' uncertainty of whether the equipment would provide enough air underwater, their clumsy use of the equipment, the difficulty they had in communicating with hand signals and body gestures underwater, the newness of the sounds while breathing from the regulator and the sense of struggling through the water, all factored together to cause the students to become unsure of their ability. Henri needed to have a deep understanding of each students' idiosyncrasies in order that he

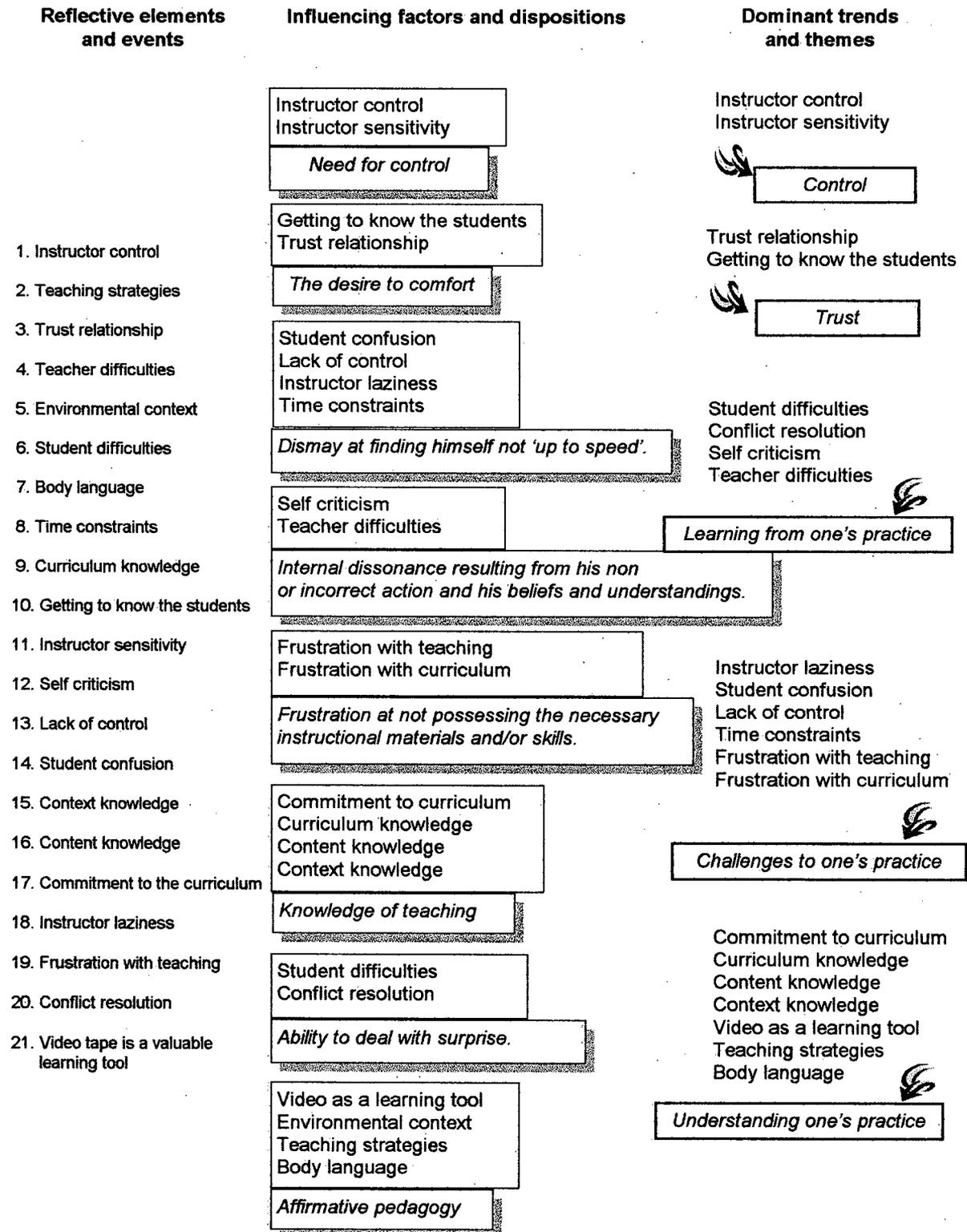
help compensate for their discomfort and turn the difficulties into an enjoyable learning experience.

Thirdly, the researcher organized the factors of 'conflict resolution', 'student difficulties', 'self criticism', and 'teacher difficulties' under the theme of *learning from one's practice*. The excerpts, from which this theme was derived, reported the difficulties Henri had with his teaching practice in the pool setting and in each case he framed the problem through the process of problem setting, reframed the problem, applied the perceived response and evaluated the consequences. This internal dialogue aided Henri in learning from his practice.

The fourth dominant theme throughout the teacher's reflection of his confined water setting was *the challenges to one's practice*. This theme included factors such as 'instructor laziness', 'student confusion', 'lack of control', 'time constraints', 'frustration with teaching', and 'frustration with the curriculum'. Each of these elements caused conflict and frustration for Henri and it was not until he viewed the video was he able to accept that some of these conflicts were his own doing.

The fifth and final dominant theme, identified by the research from Henri's reflective action, was that of *understanding one's practice*. This trend in Henri's reflective process included factors such as 'commitment to curriculum', 'curriculum knowledge', 'content knowledge', 'context knowledge', 'video as a learning tool', 'environmental context', 'teaching strategies', and 'body language'. This grouping of elements highlight the positive components from which Henri draws his strength in teaching in the confined water (pool) environment.

Figure 14. Reflection in the confined water (pool) environment: dominant themes.



III. Summary

The data transformation was accomplished through four levels of analysis. Initially, the first level of analysis involved the verbatim transcription of the stimulated recall audio tapes. The second level of the analysis grouped and categorized, according to the frequency of occurrences, the common features and the characteristics of the incidents chosen for recall. This procedure permitted an analysis which resulted in the identification of twenty-one significant elements or events of teacher reflection. The nature of these significant elements or events, upon which the teacher chose to reflect as he reconstructed his experiences in the confined water (pool) environment via the stimulated recall sessions, has been presented. The elements and events have been operationally defined and transcript excerpts have been presented in an attempt to unfold the evidence supporting the researcher's analysis. This component of the analysis determined the meaningfulness of these incidents and elements as the sport diving practitioner proceeded with his framing and reframing of the issues encountered in the confined water (pool) setting.

The third level of analysis resulted in the identification of eight groupings or categories of teacher reflection with each category based upon an underlying driving factor or disposition which influenced the teacher's reflective processes as he reconstructed his experiences. The factors or dispositions which were conjectured to underlie the reflective activities were associated with factors of a personal and emotional nature.

The final level of analysis extended the previous levels by identifying five dominant themes that emerged from the process of framing and reframing in which the practitioner engaged as he reflected upon issues of control, equipment concerns, problems, safety, etc., encountered in the confined water (pool) environment.

CHAPTER 6

Reflection as Reconstructing Experience in The Open Water (Ocean) Environment

The structure of chapter six is identical to that of the previous two chapters. Initially, the data collected in the open water (ocean) environment, in terms of the nature of teacher reflection, were grouped and categorized according to the frequency of occurrence, the common features and characteristics of the incidents chosen for recall by the teacher. The common features and the characteristics reported were examined in detail through the use of pertinent excerpts from the transcript of the stimulated recall sessions. Secondly, the chapter describes the synthesis of the individual features and characteristics involved in the identification of the nature of teacher reflection into larger more global categories. These categories were derived through the grouping of the second level analyses into like features and characteristics and provided an account of the possible factors or dispositions which seem to have led the teacher to engage in the type of reflective activities identified in level two. Thirdly, the chapter identifies the critical factors upon which sport diving practitioners reflected. The fourth level analysis extended that of the previous level to identify the dominant trends and themes of the teacher's reflection. Finally, this chapter includes summary tables and figures outlining the salient points resulting from the four levels of analysis.

I. Introduction

Chapter six is focused upon the open water (ocean) environment experiences. Four open water (ocean) dives were conducted over two days completing the beginner sport diving course and resulting in, for successful candidates, student certification. The procedure for the open water sessions followed a set pattern.

Before entering the water, the teacher briefed the students on land regarding the skills they were to perform. This briefing included the objectives and the value statements for the skills, a brief review of the skills and how they were to be conducted underwater, key points and problem solving procedures and finally the hand signals necessary for conducting a smooth, safe session underwater. The context of the open

water (ocean) environment required the teacher to brief and debrief all the skills to be conducted on one dive in an integrated manner (see Figure 6, p. 54).

The students performed the skills for the teacher in approximately twenty feet of water and the teacher addressed any problems evidenced by the students. Once each student had performed the skills adequately, the group completed the tour portion of the dive. On returning to shore the teacher debriefed the students summarizing the difficulties which had been encountered, offered suggestions of how to prevent these difficulties from reoccurring, reviewed the objectives and values of the skills and encouraged the students in a positive manner. Each open water session concluded with the logging of the dive in the students' log book.

II. Analysis of reflection in the open water (ocean) environment

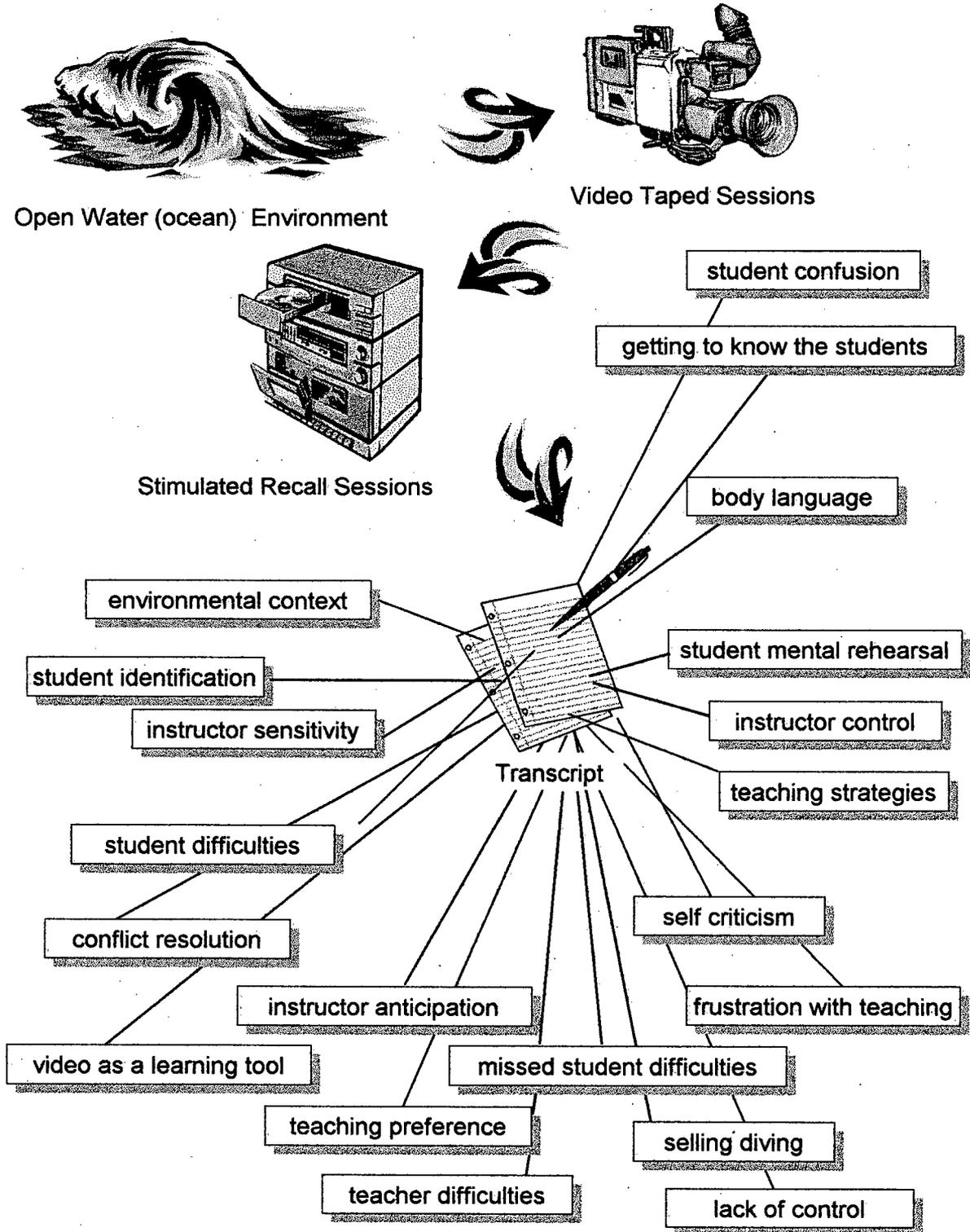
Transcription

The data transformation proceeded through the same level of analysis outlined in chapters four and five. Level one consisted of the preparation of the transcript of the four stimulated recall sessions.

Significant elements or events

The second level analysis was conducted and twenty significant elements or events of teacher reflection were identified. The nature of these significant elements or events, in which the teacher chose to reflect upon as he reconstructed his experiences in the open water (ocean) environment via the stimulated recall sessions, are presented here along with an accompanying operational definition, transcript excerpts as evidence and a tally of the frequency in which the teacher reflected upon these aspects of his practice. Once a recurring element and/or event was identified by the researcher it was named and each similar element and/or event thereafter became evidence of the frequency of its occurrence. Figure 15, p. 137, provides an overview of the second level analysis of the open water environment. (An ellipse in the transcript excerpts indicates a slight pause, not an omission).

Figure 15. Reflection in the open water (ocean) environment: significant elements and events.



The first significant element resulting from Henri's reflective processes regarding his practice highlighted *student confusion*. Student confusion, instances in which students were totally confused about what was expected of them, were identified by Henri on four different occasions. Henri discussed how confused Frank was on the first day of diving. Frank, the weakest student in the group, had caused himself to be 'stressed out'. He had placed a lot of pressure on himself to complete the course with his group even though a few more confined water sessions would probably have made things a little easier for him. He was so determined to accomplish his goals that he really wasn't thinking clearly and locked his keys in his car. Henri remarked:

25 Henri: Frank is ah, it just, it wasn't, it was the worst thing that could have
 26 happened to a student like him. Locking his keys in the car that day, I mean, that
 27 just started the day off stressed for something that he, he didn't need that. You
 28 know, I mean, he had, he was probably one of the weaker students of the course
 29 and that did not help.

(S8, OW1, V3, A 5A, TL 25-29)

Henri also commented about the confusion Frank had in understanding what was expected of him underwater. Henri highlighted Frank's confusion, on the first dive, regarding the correct use of the bouyancy compensator device's inflate and deflate buttons:

295 Henri: He didn't seem to understand what I was trying to tell him. I had to tell
 296 him on shore after that dive what I was doing there, why I was doing that.

297

298 Lesley: And you showed it to him twice.

299

300 Henri: Ya. [lag in tape]

301

302 Lesley: Oh, three times.

303

304 Henri: Ya.

(S8, OW1, V3, A 5A, TL 295-304)

Once again, *getting to know your students*, was a prominent element. Henri focused upon this element in both the classroom and confined water environment. On three different occasions he explained the importance of knowing one's students. Since Henri had worked with the same students in the classroom and the confined water environments he started to recognize a pattern of behavior. He analyzed each student's personality in the following excerpt:

358 **Henri:** Frank seems really

359 focused on my right now and in all the briefings. Brock's sort of casual and
360 Todd is or Richard seems to be like and in all the briefings sort of like, like "let's
361 just get on with it" you know.[laughter]....It's funny 'cause of, like, they're,
362 they're total, all three of them are the, you know, Brock's the best student you
363 know, the, the cool collective one. Tom's on the other end of the scale and
364 Frank's down the other end.

366 **Lesley:** Does that tell you how to sort of work with them in the water?

367

368 **Henri:** Does that? Ya, ya it does help me for sure. I mean, it ah, um, people like
369 Tom you've still got to worry, you, they're not as, how do I explain this?

370 They're....

371

372 **Lesley:** They're not as attentive?

373

374 **Henri:** Ya, and I mean, they may all of the sudden decide that, you know, "I don't
375 need you" or something and you've got to watch them too.

(S8, OW1, V3, A 5A, TL 359-375)

The third significant incident of teacher reflection was that of *body language*. As in the classroom and confined water environments Henri flagged several events in which body language was identified as the common factor. Henri reflected upon a similar number of incidences of body language in the open water environment as he did in the confined water setting. There were six events in all. Henri discussed how the students' body language stood out during his briefing on the surface:

778 **Henri:** Ya, ya, I noticed the same....[laughter]....in every briefing they're the same,
 779 they, they're all seem to be giving their, their, their typical expressions. We'll see
 780 if ah, Frank gives us a little, if he does us the mask re and re on the surface here.
 (S11, OW5, V3, A 5A5B, TL 778-780)

Henri commented that from their expressions he received indications of how comfortable or uncomfortable they were:

69 **Lesley:** Now do you think Frank is really listening to you here?
 70
 71 **Henri:** Um....well, he's, his facial expressions, he does look a little bit nervous.
 72 He's watching me, he's asking me a question now.
 (S8, OW1, V3, A 5A, TL 69-72)

Henri explained that body language can be used as an instructional tool in the open water as it was used in the confined water, however, it was a little more difficult of a task:

437 **Henri:** Um, with hand signals, eye contact is a little tougher though because of
 438 the limited visibility but it still works, you just have to sometimes get your mask a
 439 little closer to their mask and I do, do that.
 (S9, OW2, V3, A 5A, TL 437-439)

Henri reflected upon one student's attempt to mentally rehearse each skill before having to perform it in the open water environment. Of particular interest to Henri was Frank's attempt to physically go through the motions of each skill during the briefings. At first, Henri didn't comment on Frank's top side gestures. After a time Henri realized what it was Frank was doing and from that point on Henri commented upon student *mental rehearsal* on four occasions. Each comment was typical of the following:

494 **Lesley:** What are you laughing at?
 495
 496 **Henri:** No, just Frank's doing every, every little movement of every skill. He's
 497 doing it on land, it's good though.
 (S10, OW4, A 5A, TL 494-497)

As noticed by Henri, mental rehearsal was not confined to the briefing stage of the dive, but was also evident in the debriefing as suggested in the following excerpt:

347 **Henri:** I was just talking about what I was doing with them under there trying to
 348 find his air two so he's trying it now on the surface with his left hand.
 (S8, OW1, V3, A 5A, TL 347-348)

The fifth significant element of Henri's reflective practice accented his *instructor control*. As in the confined water environment, Henri flagged these instances as significant as he felt that the most important quality an instructor can master in teaching in the open water setting is control. He chose to reflect upon nine incidences in which, in most cases, he exercised complete control of the class in the open water. In discussing the concept of control Henri talked about five different forms of it. He focused on having control in a managerial sense in planning the underwater tour portion of the dive:

657 **Henri:** I was able to, on the second dive and third dive, send Tom with Adam so I
 658 had ah, Frank and Brock as a buddy group behind me. Um and I usually
 659 position my fins sort of to one side so that they're not really behind me. I move
 660 through the water sort of side ways is what I try and do. So that I can look to my
 661 right and see them, or look sometimes, I may have to look between my legs to
 662 see them. But there's and then I just set up usually do like a circle pattern from
 663 our float I sort of went in a circle over to the rocks and then sort of into shore.
 (S10, OW4, V3, A 5A, TL 657-663)

As he did in the confined water environment, Henri commented upon the physical contact which was necessary for good control. Henri distinguished between general all around physical control and specific physical control for differing skills. He commented about holding on to the students as a general measure of control:

423 **Lesley:** Can you comment about how you are holding your students under
 424 water?
 425
 426 **Henri:** Ah, very similar to the pool just hold onto their BCD usually with my right
 427 hand um ... close to the inflator and then my left hand.... I think it varies actually

428 that one hand is hanging onto the BCD and the, and the other sometimes near
429 their mask or then moving from their mask to the regulator.

(S9, OW2, V3, A 5A, TL 423-429)

(BCD is an acronym for bouyancy compensator device)

He went on to select some important examples of skill specific control in his comments about physical control. One example in particular discussed his control in the hovering skill:

200 **Lesley:** What are you holding onto?

201

202 **Henri:** Um, their high pressure console.

203

204 **Lesley:** Why?

205

206 **Henri:** Ah, if they put too much air in then I've got control of them I can pull them
207 down and either they'll deflate or I'll deflate it for them.

(S8, OW1, V3, A 5A, TL 200-207)

Henri selected incidents of using instructor control to calm the students underwater. He felt that if the students knew the instructor was right there and in total control of a particular skill, they would feel more confident in their abilities to perform the skill. One such example was where Henri pointed out that he was helping Frank control the amount of water entering his mask while performing the partial mask clear skill:

98 **Henri:**ya, so we're just going over the mask re and re now and I'm

99 just telling them, telling Frank about how to flood it slow and that my hand would

100 be above to slow the, the flood down and....

(S8, OW1, V3, A 5A, TL 98-100)

Henri selected a significant incident to explain control in which he used equipment to maintain control. Henri regarded the descent line as a form of instructor control. While engaged in the conduct of the controlled emergency swimming ascent skill, the descent line was the only means of controlling the ascent. Henri noted that this skill would be

potentially dangerous for the student if the skill was not implemented and controlled correctly by the instructor. The skill required the student to imagine s/he is out of air, take one breath and swim vertically, exhaling through the regulator, continuously to the surface. In so doing, the student must remember to exhale the entire ascent to prevent a lung expansion injury. If the student starts to travel too fast or holds their breath the instructor uses the descent line for support in order to stop the ascent. Henri commented about his positioning on the line:

533 Henri: Um, just getting my leg positioned around the line for this ascent, for
534 control, you should have your leg rapped around the line, you need to have that.
535 It's also um, a training standard that you have your leg around the line.

536

537 Lesley: And why?

538

539 Henri: So that at any point you could stop the ascent with your leg.

(S10, OW4, V3, A 5A, TL 533-539)

Finally, Henri identified a significant element of instructor control, the use of a certified assistant, by talking about using his divemaster to help look after a student or two while he was working with another student:

214 Henri: Am I, I always try and stay right next to the float, sometimes I'll rap my leg
215 around it in bad conditions or I'll have the student, like Brock right now is
216 hanging onto the line and I'm right next to the line so I won't loose Brock. I
217 mean, I have a divemaster down there with me right now but....

218

219 Lesley: So Adam....divemaster....

220

221 Henri: Adam.

222

223 Lesley:is sitting with Brock?

224

225 Henri: He's sitting with Brock and on the first dive with Tom as well and they're
226 right next to the line. Adam is hopefully showing them star fish and maybe a

227 cucumber or something while I'm doing a skill.

(S8, OW1, V3, A 5A, TL 214-227)

As in both the classroom and confined water environments, Henri flagged *teaching strategies* as significant incidences in his reflection-on-action process. Teaching strategies were techniques used in the open water environment which helped to maintain control, review the skills, prepared the learners to perform the skills, to identify students underwater, help identify problems and keep and promote the students enthusiasm for sport diving. Generally speaking, the teaching strategies were significant incidents of positive teaching techniques Henri felt he used well in the open water setting. Henri chose to reflect upon and reconstruct his practice in the open water environment through twelve instances of teaching strategies. Henri chose more teaching strategies in the open water to discuss than in either the classroom or confined water environments. In the following transcript excerpt Henri discussed the teaching strategy he used to maintain control in the skill of mask removal and replacement:

803 Henri: Tom, ya, he's doing a bit of a hover. [lag in tape] So now we're doing the
804 mask re and re. I've always, for this one, I don't know who taught me it or
805 another instructor did it. I take my glove off, I just ah, I don't know if it distracts
806 the student, it might, they look at it like "why is he not wearing his glove", but I
807 find it helps me with, to fix their hoods, I just have troubles fixing their hood with
808 my glove on.

809

810 Lesley: And you do that all year around?

811

812 Henri: Um.... ya.

(S11, OW5, V3, A 5A5B, TL 797-812)

Henri talked about using the surface and the surface float in practicing dry runs of a skill. He discussed how this procedure prepared the students for their performance underwater:

142 Henri: So now we're practicing just a dry run on the surface of the alternate air
143 source stationary. Just sort of a, as last minute.

(S8, OW1, V3, A 5A, TL 142-143)

A strategy Henri indicated was key for him and for Frank, a timid student, was that of allowing other students to perform the skills first. Henri commented this strategy allowed Frank to have a little time to get ready and it provided a good review of what he was expected to perform next. Henri also remarked how choosing the strong student to go first developed confidence within the other students. A sort of 'if he can do it, I can do it attitude':

169 **Henri:** Brock. I remember, one thing I did with all the skills is, I, we're down
170 there in twos and on some of them, the first couple of dives any ways, I never
171 had Frank do the skill first. I always had Brock do it.

172

173 **Lesley:** Why is that?

174

175 **Henri:** Just with Brock's comfort level and it would give Frank a chance to
176 remember the skill by watching someone else do it.

(S8, OW1, V3, A 5A, TL 169-176)

The limited visibility in the open water provoked Henri to talk about the difficulties of student identification. He disclosed his teaching strategy for identifying students:

178 **Lesley:** What do you use to identify your students?

179

180 **Henri:** Mostly masks, um face, their face and the color of their fins, because
181 they're all wearing the same suits and just, also their, the way they move through
182 the water you can sort of tell who's who eventually.

(S8, OW1, V3, A 5A, TL 178-182)

The seventh element in the nature of Henri's reflection was that of *environmental context*. Henri commented on seven different occasions on how the experiences in the open water environment were different to those in the confined water, due to the environment itself. These comments focused on the environmental conditions making things difficult and unforgiving for him and the students. Henri also commented on how

some of the skills may be performed differently in the ocean than in the pool due to the conditions and due to the extra equipment worn in an effort to keep warm. He was concerned and discussed on a few occasions how the context of the environment affected the beginner diver's perception of what diving was 'really' like. First, an excerpt regarding how Henri has tightened up on his control:

207 Henri: Now I didn't do that in the
 208 pool, but again this is, this is a different environment, different visibility, like I say.
 209 I mean, he could drift back slightly and I could lose him in, in five foot visibility
 210 so....
 (S8, OW1, V3, A 5A, TL 208-210)

Several significant incidences were highlighted because of the bad visibility. This excerpt is typical of the comments Henri made regarding the conditions:

501 Henri: I thought it was worse at Whytecliff than it was at Cates Park. I mean, we
 502 may have had five foot visibility at times and we did go a little bit deeper, we went
 503 to 45, between 45 and 50 feet on the first dive and it cleared up but it got dark
 504 and cold too, colder. The vis looks ok on the camera
 505 and on the tours it was awful in places.
 (S10, OW4, V3, A 5A, TL 501-505)

Henri wondered what the students thought about the sport of diving, when they were diving in such limited conditions:

253 Henri: I always wonder, in our environment, what is this doing for the
 254 student you know, five foot visibility their first time maybe they're expecting it you
 255 know, like a Jacques Cousteau movie with crystal clear water if it's a, if it's a let
 256 down even though when we talked about this, even though I've maybe
 257 pre foreshadowed that it may not be great conditions.
 (S8, OW1, V3, A 5A, TL 253-257)

Henri explained there was a difference between performing the skills in the confined water environment and performing them in the context of the open water environment:

885 Henri: In thehovering? Well, my, um hovering criteria is that they hover
886 motionless for thirty seconds. I don't care what position, you know. I mean, in
887 the pool crossing the legs, we do that but you know, and it realistically, when
888 you're diving in the ocean that's not how you're going to be positioned. You're
889 going to be positioned with your legs out and your hands sort of over by your side
890 so. Um they were able to stay suspended not hitting the bottom and not going up
891 so to me that's adequate hovering.

(S11, OW5, V3, A 5A5B, TL 885-891)

The most significant episode Henri chose to talk about in his reflection process in the area of environmental context was the incident of losing his students due to the poor visibility. This was a devastating incident for Henri as a sport diver and an embarrassing moment as an instructor. He commented:

700 Henri: I'm sure that they, the thing that they're probably doing is making sure that
701 they um, I would say the worst thing for them maybe would be to lose the
702 instructor, you know, and ah, it happened in fifteen feet and I'm telling you that
703 sometimes in our waters it just happens and you can be as close to them as you
704 possibly can but when some buddy stirs it up and there's no vis you can't see a
705 foot in front of you and you can lose them. You've got to really be careful of
706 that.

(S10, OW4, V3, A 5A, TL 700-706)

One of the things Henri identified as a huge problem for instructors, especially in the open water environment was, *student identification*. Henri indicated:

186 Lesley: So you can actually see their faces other than just you know the colors
187 of the mask....

188

189 Henri: Ya.

190

191 Lesley:and also the history of the pool you would say....

192

193 Henri: That helps, you can, their movement and balance in the water just the
194 way they look.

(S8, OW1, V3, A 5A, TL 186-194)

The ninth element, identified by the researcher, which Henri chose as significant was that of *instructor sensitivity*. Six instances were flagged by Henri. As in the confined water environment, instructor sensitivity were occasions Henri empathized with the students frustration or nervousness. The following is a typical excerpt demonstrating Henri's feelings for the students:

548 Henri: So this is Frank and dropped down. Just got him to check his air pressure
549 just sort of, so he could take a couple of minutes to relax. He's frailling a lot with
550 his arms. Having problems with balance but it wasn't, there may have been a
551 little bit of current, I mean, you can sort of see some scatter moving through the
552 screen but it's nothing significant and he's having more problems than the other
553 guys with his balance but, I mean, he was in the pool as well so.

(S10, OW4, A 5A, TL 548-553)

Five instances of *student difficulties* were highlighted by Henri. As defined in the classroom and confined water environments, student difficulties were the problems students had experienced in the direct experience and were difficulties which Henri had been unable to prevent. Student difficulties perplexed Henri as much in the open water environment as in the confined water environment. Henri commented about Frank's problem with locating his air two device:

279 Henri: So now we're doing an alternate air source with Frank and, and ah,
280 Brock.... a lot of students when you, in the ocean and even in the pool when
281 they, the skill, when you tell them that you want them to do it they locate their air
282 two first. They make sure that they know where that is when they give their
283 buddy the alternate. Now Frank had,

284, had problems locating his air two and I was trying to convey to him
285 how you just take your left hand and place it on your heart and you'll find your air
286 two. I had a bit of troubles with that.

(S8, OW1, V3, A 5A, TL 279-286)

Once again, the element of *self criticism* was a well documented reflective factor. As in both the classroom and confined water environments Henri chose to identify many incidents where he had made general remarks about how he could have done a better job of something. Henri's remarks regarding self criticism was least commented upon in the open water environment, in particular, there were six comments. In one such incidence Henri remarked about his inadequate identification of an equipment problem:

387 Henri: This is me just reviewing before we go down, the fin pivot orally inflating
 388 the BCD. Now we have problems on this dive with Brock's mask strap under
 389 water and I've just noticed earlier that, that could have been corrected in the pool
 390 because it did happen once there. I stirred up the bottom a little bit.
 391 It was on his mask flood that the strap just came unthreaded.

(S9, OW2, V3, A 5A, TL 387-391)

Once again Henri commented upon his lack of enthusiasm:

960 Henri: Um, what
 961 else, I felt hindered Sunday because I could have, I was not enthusiastic on the
 962 Sunday at all. I didn't want to be there and you know, it didn't put the students in
 963 jeopardy but it may have jeopardized their coming back, I don't know, maybe, ya.

(S11, OW5, V3, A 5A5B, TL 960-963)

The twelfth significant element, identified by the researcher, was Henri's ability to help students out of their problems. In *conflict resolution* Henri used different methods of getting the student to rethink what they were trying to do in accomplishing the skill as easily as possible. As in the confined water environment, Henri identified four significant conflict resolution incidents. In the following excerpt Henri tried to show Frank that he needed to kick his feet to successfully complete the controlled emergency swimming ascent. Finally, Henri used other measures to help Frank with this skill:

619 Henri: Um....right now, what was I thinking then, at that point I was trying to
 620 decide what am I going to, try this one more time, you know, and I, I, got my
 621 hands to sort of try and simulate my legs with "kick, kick" and he and I was trying
 622 to decide well maybe I should just take him to the surface and re-brief, you

623 know, explain yet another time. And I think that's what I ended up doing after
624 three attempts. We ah, surfaced.

625

626 Lesley: Is that what you're signaling there?

627

628 Henri: Ya, just stop and let's go up, ya. So we went up the line and I explained it
629 to him on the surface, he went down and the, the fourth time he did it satisfactory
630 but it wasn't, it wasn't as smooth as Brock or Tom but he did do the skill.

(S10, OW4, V3, A 5A, TL 619-630)

During the stimulated recall sessions Henri realized, via viewing his teaching practice in the open water setting, that Frank in particular, is physically walking himself through the skills during the shore briefings of each dive. This is something Henri commented about with the researcher. The researcher identified the thirteen element *video as a learning tool*. As in the confined water sessions Henri was amazed at what he saw for the first time on video:

481 Henri: that's amazing, Frank, how, I, I never would of
482 thought of that how he's doing that. With every skill his, he's doing it standing
483 there.

484

485 Lesley: And you never noticed that before.

486

487 Henri: No, didn't, didn't notice it at the site.

(S10, OW4, V3, A 5A, TL 482-487)

There were instances in which Henri commented about problems students had in the direct experience which he had missed. The researcher classified these instances as *missed student difficulties*. As Henri watched Frank attempt to clear his mask he detected something was not quite right, but, was unable to identify what the problem was:

568 Henri: Looks like ah, he just can't seem to clear it out he's not, I don't know if that
569 skirt on his hood would have had anything to do with it, it might of. It was over

570 top of the hood there somehow.

571

572 **Lesley:** Let's just rewind it, ok,

573

574 **Henri:** Ya.

575

576 **Lesley:**there, right there is good.

577

578 **Henri:** Well I don't know if he's putting enough pressure on his mask, ya, and,

579 and tilting his head back, ya, there you go.

(S10, OW4, V3, A 5A, TL 568-579)

There were occasions in which Henri reflected upon his ability to anticipate. Henri mused about what problems students may have with a particular skill as they were in the process of performing. The researcher identified this element as *teacher anticipation*. Two such instances of teacher anticipation follow. The first instance Henri discussed Franks attempt to remove and replace his mask:

895 **Henri:** Um, well again, this is a skill that some students have problems with in the
896 ocean.

898 **Lesley:** The mask removal and replacement.

899

900 **Henri:** Um, the mask removal and replacement And ah, I was sort of anticipating

901 what Frank may do, how he may react when he takes his mask off, although he's

902 already flooded his mask and he's done the skill in the pool. He flooded it fairly,

903 it, what, it wasn't too fast there, he....got a little bit anxious here putting it back on

904 but then got control again and he tilted his head a little bit better than he did on

905 the last dive. He still could tilt it a little bit better.

(S11, OW5, V3, A 5A5B, TL 895-905)

Another example of teacher anticipation occurred when Henri was getting ready for Frank to perform the controlled emergency swimming ascent:

590 **Lesley:** What's going through your mind at this point?

591

592 **Henri:** That, that he's not sure that he understands it and I mean, he had
593 problems with it in the pool and we briefed it and I'm just trying to think of little
594 things, expectations, sort of foreshadowing what he may do wrong and sort of
595 preparing myself mentally for it.

(S10, OW4, V3, A 5A, TL 590-595)

Similar to Henri's comment in the classroom environment regarding equipment sales were his comments regarding *selling diving*. Henri firmly believed in his students seeking continuing education. In Henri's opinion, the more diving an individual experiences, the safer the diver becomes. The following excerpt is typical of Henri's comments in this regard:

977 **Henri:** um, no, I still, I still like to dive myself. I think that's really important
978 when you're selling diving is you've got to like to dive and you've got to dive
979 yourself in order to sell the sport of diving.

(S11, OW5, V3, A 5A5B, TL 978-979)

There were several occasions in which Henri broached the subject of environmental preference. In these significant instances he contemplated and spoke about the environment he liked best to teach in. The researcher identified this element as *teaching preference*. Henri indicated that at first, he was very nervous in the classroom environment and he felt he didn't have the professional speaking skills necessary to keep the attention of the class, but as he taught more courses, this nervousness faded away. For Henri, the confined water environment can be difficult as it is the first time the students don the equipment and venture into an unfamiliar environment. Although not difficult to teach, Henri found the confined water sessions a challenge for his teaching abilities. He commented how the open water, although treacherous and unforgiving at times, is by far his favorite environment to teach in:

969 **Henri:** I like the ocean the best for sure.

970

971 **Lesley:** Why do you like....?

972

973 Henri: Because I'm showing them something new. I mean, here are adults and
 974 a lot of them have never seen this environment and I am showing them for the
 975 very first time something that is new and you can see in their eyes the excitement
 976 when you put a cucumber on top of a star fish and the thing starts dancing, I
 977 mean....

(S11, OW5, V3, A 5A5B, TL 966-977)

As noted in the classroom environment and in the confined water environment Henri chose to reflect on *teacher difficulties*. However, he did not identify many teacher difficulties in the open water. Henri reflected upon his struggle during the direct experience of managing the removal and replacement of the students' tanks on the surface:

749 Henri:Well, it was ah, I mean, it was
 750 different than the pool but I don't, I don't see how that could of, I mean, they still, I
 751 explained it step by step, I mean, you know, "give me your weights".... and
 752 waves could, weather could be a factor, the suits could be a factor and they're
 753 different suits and they're heavier belts you know.....

(S10, OW4, V3, A 5A, TL 749-753)

Henri chose to reflect upon specific instances of his *frustration with teaching*. The significant instances Henri identified were instances in which he had difficulty understanding why some students were unable to demonstrate their proficiency in a skill. Specifically, Henri was frustrated with a student's performance in the fin pivot. He was frustrated as he felt there must be something missing from his teaching and does not know how to rectify the problem. An excerpt of Henri's frustration with teaching centered around the skill of orally inflating the bouyancy compensator to accomplish neutral bouyancy in performing a fin pivot. He had difficulty with why it was Frank still had problems with understanding the application of this skill:

451 Henri: I think it was Frank, ya. No, I have to, we demonstrated it on, we talked
 452 about it on the shore, we did a dry run on the surface and I have to do it again with
 453 them under water. I'm not really supposed to demo the skill for them in the ocean.
 454 But he just still couldn't get it.

(S9, OW2, V3, A 5A, TL 451-454)

The twentieth and final element of Henri's reflective process was identified by the researcher as the *lack of control*. Henri identified instances where he had made a mistake in his positioning underwater thus exposing the students to unnecessary risk. On one such incident Henri described losing his students while on the tour portion of the fourth dive:

675 **Henri:** They are a bit, they definitely are. I can remember a couple of times
 676 going like this, to them giving them you know, the get together sign. I remember
 677 doing that at least two times. At the, at that, on that tour in about fifteen feet of
 678 water um, I may have just kicked a little, maybe a little bit too hard and gotten a
 679 little bit ahead of them and lost them for twenty or thirty seconds.

(S10, OW4, V3, A 5A, TL 675-679)

This was a very perplexing incident for Henri and he continued to discuss the incident with the researcher:

711 **Henri:** That's the worst feeling as an instructor and, and you know, I haven't
 712 experienced it a lot of times but it has happened on occasion and your heart
 713 goes up into your throat.

714

715 **Lesley:** Were you worried about them?

716

717 **Henri:** No, I wasn't worried about them ah, I mean, that's a tough question to
 718 answer, I mean, yes and no. I was worried. It's not like we were at fifty feet, we
 719 were in fifteen feet of water, in the bay, it's not, it's not like there's no bottom or
 720 anything like that, we're in a controlled area so we've got that going for us. But
 721 ah....

722

723 **Lesley:** But fifteen feet of water....

724

725 **Henri:** Oh, ya is fifteen feet of water. Now luckily you know on, on that particular
 726 dive they were with the camera man or camera women so that was reassuring as

727 well. She was still behind them. And ah, ya I mean ya I, I was worried sure.
 (S10, OW4, A 5A, TL 711-727)

The nature of teacher reflection in the open water (ocean) environment has been illustrated through twenty significant elements or events. The use of pertinent transcript excerpts, from Henri's reconstruction of his open water practice, allowed a detailed examination of the common features and the characteristics of the incidents chosen for recall. Table 6 provides a summary of the frequency of occurrence, for the elements and events reflected upon by Henri, for the second level analysis.

Table 6. Reflection in the open water (ocean) environment: frequency of significant elements and events.

Element and/or event	Frequency of occurrence	Element and/or event	Frequency of occurrence
1. student confusion	4	11. self criticism	6
2. getting to know your students	2	12. conflict resolution	4
3. body language	6	13. video as a learning tool	1
4. student mental rehearsal	4	14. missed student difficulties	1
5. instructor control	9	15. teacher anticipation	2
6. teaching strategies	12	16. selling diving	1
7. environmental context	7	17. teaching preference	3
8. student identification	1	18. teacher difficulties	1
9. instructor sensitivity	6	19. frustration with teaching	1
10. student difficulties	5	20. lack of control	3

Factors and dispositions influencing reflective activities

This section of the chapter presents the third level analysis, that is, where the compilation of the individual features and characteristics involved in the identification of the nature of teacher reflection in the second level analysis, were re-analyzed and grouped into larger categories according to the like features and characteristics which became evident. From these groupings the factors or dispositions, that is, the common significant factors found within the elements of the teacher's practice which were conjectured to underlie the reflective activities were identified.

Eight groupings or categories of teacher reflection were identified during the analysis. Each category has an assigned descriptor which influenced the teacher's reflective processes as he reconstructed his experiences in the open water (ocean) environment via the stimulated recall sessions. These groupings or categories are presented here and in Figure 16, p. 160. Secondly, close examination of these categories facilitated the identification of the factors or dispositions which influenced teacher reflection of each category's common features and characteristics. It was found, that within each group, the influencing factor or disposition was of a personal and emotional nature.

The researcher identified, in the first grouping, the reflective elements of 'instructor control' and 'instructor anticipation'. The reflection in this category was influenced by Henri's *need for control*. The need for control was a influencing factor in all three environments. Control in the classroom environment consisted of the instructor gaining the respect and trust of the students, while in the confined water (pool) environment control consisted of assisting the students through the awkwardness of using the extensive amount of equipment and through their clumsiness of weightlessness in the water, and finally, control in the open water (ocean) environment focused upon safety issues. The ever changing and unforgiving learning environment of the ocean requires tight measures of control which include the instructor's physical proximity to the student and the student's equipment, the use of descent lines and instructional assistants and the use of one's extensive diving experience.

The second grouping was comprised of the reflective elements of 'instructor sensitivity', 'getting to know the students' and 'student identification'. The reflection in

this category was influenced by Henri's *desire to comfort*. His desire to comfort in the open water (ocean) environment went beyond his sensitivity of the classroom setting, in which he allowed the students time to posture themselves with their new endeavor, and extended his sensitivity to the students clumsiness in the confined water (pool) sessions, where he tried to reduce their anxiety. In the ocean environment Henri's need to comfort was cultivated through his ability to recognize when students were not feeling comfortable (the amount and speed at which bubbles were flowing through their regulator) and was accomplished through relaxing the student with a simple pat on the shoulder, resting between exercises or a friendly look. In the ocean, the comfort level of an individual is a good measure of their ability to think clearly underwater in the unlikely event of an emergency situation.

The third grouping consisted of one reflective element, 'student mental rehearsal'. The reflection in this category was influenced by Henri's curiosity of a student's off task behavior. This grouping was significant to the open water environment only and was identified by the teacher as he had not seen this type of student behavior exhibited in other courses. Initially, Henri had thought the student's behavior to be off task and only later realized how the mental rehearsal accompanied by the student's overt actions enhance the student's performance underwater.

The fourth grouping consisted of the four reflective elements of 'teaching strategies', 'environmental context', 'body language' and 'teacher difficulties'. The reflection in this category was influenced by Henri's *affirmative pedagogy*. There were many instances in which Henri felt he had displayed positive instruction which highlighted his ability to effectively and safely teach, with an element of fun and enjoyment, within the unforgiving learning environment of the ocean.

The next grouping also consisted of four elements identified in the second level of analysis. They were 'lack of control', 'student confusion', 'frustration with teaching', and 'missed student problems'. Henri's *dismay at finding himself not up to speed* influenced the reflection of this category. This grouping is consistent with that identified in the confined water in that having viewed the video tapes of the ocean dives Henri was amazed at the number of times he found himself either out of position, not communicating effectively underwater, missing student problems and/or not attending to

setting up and controlling for the exercise appropriately before asking the student to proceed.

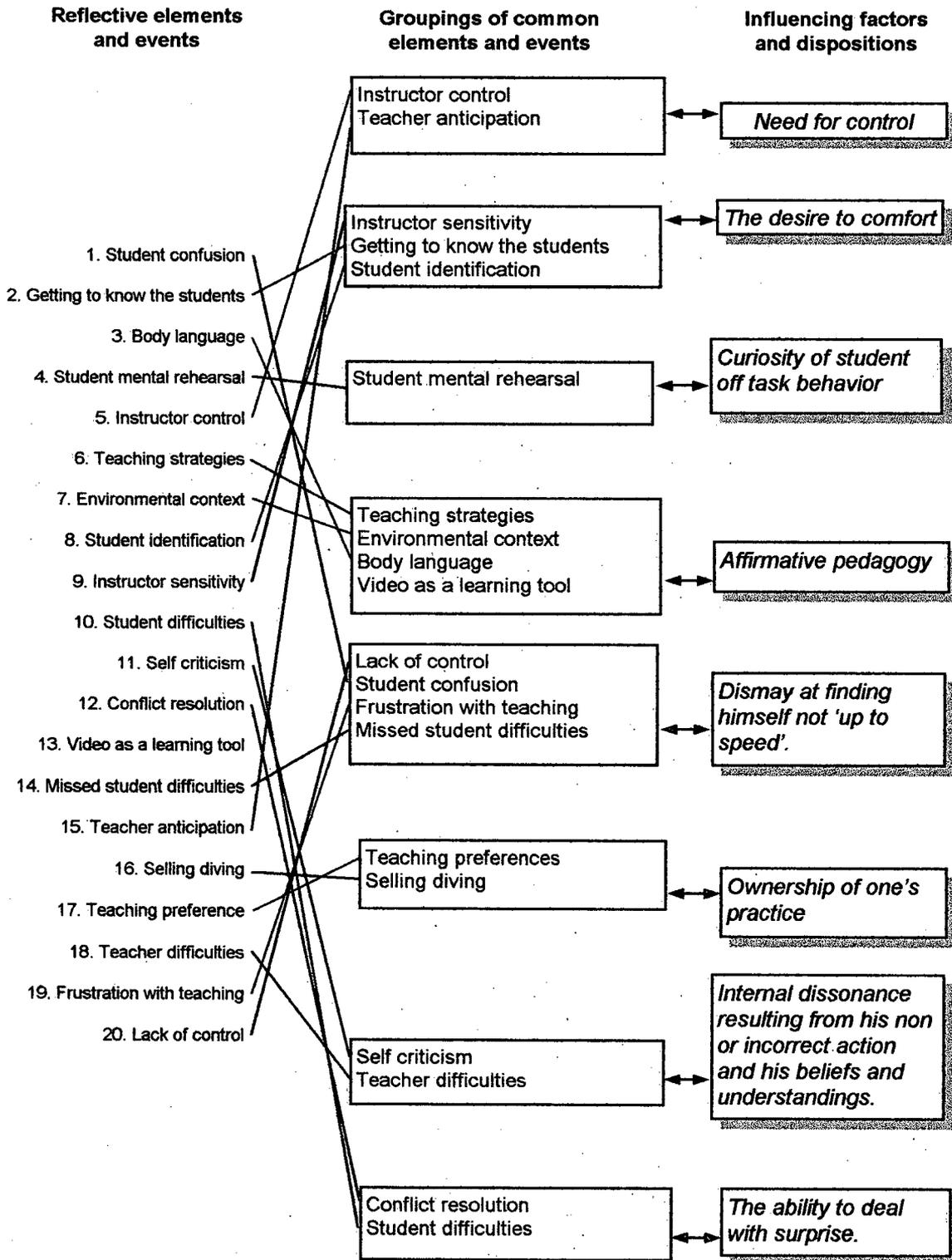
The sixth grouping of reflective elements included the elements of 'teaching preferences' and 'selling diving'. The reflection in this category was influenced by Henri's *ownership of practice*. This grouping was also specific to the open water environment in which the teacher, on previous occasions remarked about teaching to someone else's agenda, felt no restrictions upon his practice. He remarked that at the ocean he was in control and he had all the time in the world to make sure the students had an exciting adventure underwater. Henri had also expressed how he felt 'at home' teaching in the ocean environment, even though at times the environment controlled him and his students, versus teaching in the classroom and/or confined water (pool) environment. Interesting enough, this may be due to the fact that diving practitioners 'teach' in the classroom and in the confined water environment while in the ocean environment they do not teach as much as they monitor the performances of their students who demonstrate their proficiency of their exercises in the environment in which they are to later dive as certified buddy teams.

The reflective elements of 'self criticism' and 'teacher difficulties' comprised the seventh category. The reflection in this category was influenced by Henri's *internal dissonance resulting from his non or incorrect actions and his beliefs and understandings*. Consistent with reflections in the classroom and confined water (pool) environments, this grouping focused upon Henri's problems within his practice and they caused him perplexity and internal turmoil as he was aware of the actions and understandings which characterize prudent instructor judgement and practice in the ocean, yet a times he fell short of this goal and hence, fell short of his beliefs of effective open water (ocean) instructional practices.

The eighth and final grouping of reflective elements included the two elements of 'conflict resolution' and 'student difficulties'. The reflection in this category was influenced by Henri's *ability to deal with surprise*. Regardless of how much control the instructor exercises and regardless of how well the students have been prepared for the ocean environment, students always have their 'way of doing it'. Therefore, the ability to

deal with surprise, that is, make prudent decisions and judgements quickly, is fundamental.

Figure 16. Reflection in the open water (ocean) environment: factors and dispositions influencing reflective activity.



Dominant themes

This section of the chapter reports the fourth and final level analysis which extended the third level by identifying the dominant trends and themes of the teacher's reflection in his reconstruction of experiences in the open water (ocean) environment via the stimulate recall sessions. The elements and events identified in the second level analysis, and the categories found in the third level analysis, in conjunction with their accompanying reflective underlying element, were analyzed to reveal five dominant trends and or themes which identified the focus of the teacher's reflection in the open water (ocean) environment. These dominant trends and or themes are summarized in Figure 17, p. 164:

The first theme identified by the researcher was the issue of *control*. Included under this theme were the two factors of 'instructor control' and 'teacher' anticipation'. Control was also identified in each of the preceding environments and in each case this theme was discussed and identified as a fundamental teaching concept. Essential to diving successfully in the ocean, is the ability to do so safely. Throughout the beginner scuba diver course the teacher maintained control in order that the students be afforded the opportunity to learn without the hindrance of having to deal with the many uncertainties, of the different learning environments, themselves.

The second dominant theme throughout the teacher's reflection of his open water environment practice was the issue of *trust*. This theme included such factors as 'instructor sensitivity', 'getting to know the students' and 'student identification'. The teacher had nurtured a trusting relationship between he and his students initially in the classroom and bolstered the relationship in the pool setting by demonstrating his grace and expertise of moving through the water. This relationship was further reinforced by Henri's ability to understand each students' idiosyncrasies and his competency in encouraging them to move past their difficulties encountered in the confined water. Having done so, he instilled in the students confidence in their own ability which continued to flourish in the open water environment. By the time the open water dives had approached the students had learned to trust their instructor, to trust their equipment and to trust their own abilities.

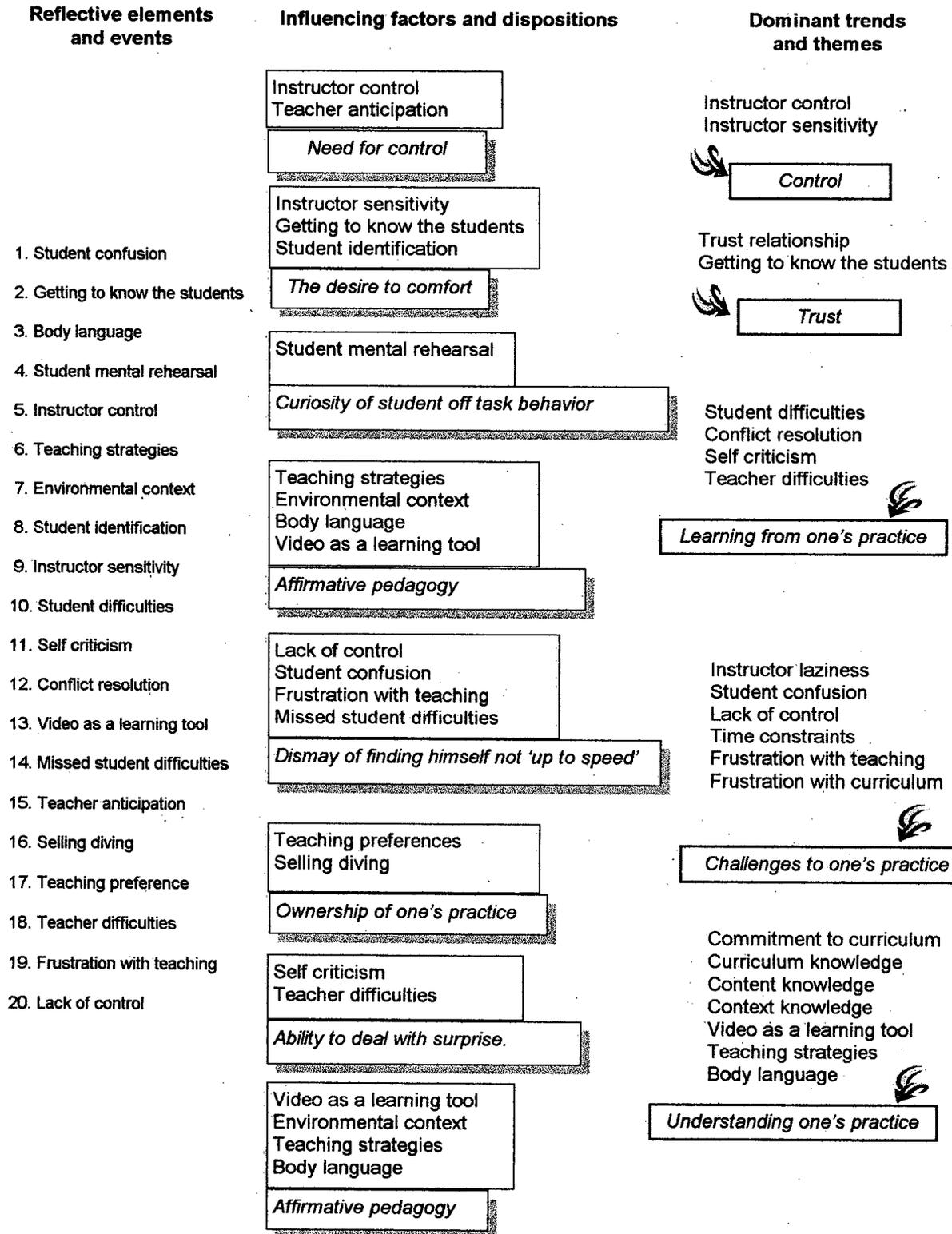
Thirdly, the researcher organized the factors of 'teaching strategies', 'environmental context', 'body language', 'video as a learning tool', 'teaching preferences', 'selling diving', and 'student mental rehearsal' under the theme of *understanding one's practice*. This grouping of elements highlight the positive components from which Henri drew his strength in teaching in the open water environment. These understandings provided Henri with the foundational knowledge necessary to be patient with, necessary to develop respect of, and necessary to teach in the unforgiving learning environment of the ocean.

The fourth dominant theme throughout the teacher's reflection in the open water setting was the issue of *learning from one's practice*. This theme included factors such as 'self criticism', 'teacher difficulties', 'conflict resolution' and 'student difficulties'. In each environment this theme was prominent, in that, it consisted of issues of troublesome practice for Henri. Excerpts, from which this theme was derived, reported the difficulties the teacher had with his teaching practice in the classroom, the confined water and the open water environment. In each teaching environment, he specifically made reference to his difficulties in teaching the module on problem management. His concern with this particular teaching module focused upon the possibility of a student mishap and he was perplexed that he was unable to express himself clearly in the classroom regarding out-of-air situations, he was unable to adequately demonstrate the controlled emergency swimming ascent in the pool and he was not set up for nor controlled effectively the exercise in the ocean. Considering each of Henri's reflective episodes, examined in this study, the recurring troublesome module on problem management illustrated most explicitly his ability to frame the problem through the process of problem setting, reframe the problem, contemplate a perceived response and evaluate the consequences of the resolution's implementation into practice. The internal dialogue, made explicit by the researcher's probing supervisory dialogue, aided Henri in learning from his practice.

The fifth and final theme revealed through Henri's reflective process was identified as the *challenges to one's practice*. This dominant theme contained the factors of 'lack of control', 'student confusion', 'frustration with teaching', and 'missed student difficulty'. As evidenced in each of the previous two environments, these

elements caused conflict and frustration for Henri and it was not until he viewed the video was he able to accept that some of these conflicts were his own doing.

Figure 17. Reflection in the open water (ocean) environment: dominant themes.



III. Summary

The transformation of the data collected in the open water (ocean) environment was accomplished through four levels of analysis. The initial level of analysis involved the verbatim transcription of the stimulated recall audio tapes. The second level of the analysis specified the characteristics of the incidents chosen for recall and chronicled their frequency of occurrence. This procedure resulted in the identification of twenty significant elements or events of teach reflection. The nature of these significant elements or events, upon which the teacher chose to reflect as he reconstructed his experiences in the open water (ocean) environment via the stimulated recall sessions, has been presented and operationally defined with transcript excerpts presented in evidence supporting the researcher's analysis. This component of the analysis emphasized the meaningfulness of these incidents and elements as the sport diving practitioner proceeded with his framing and reframing of these issues encountered in the open water teaching setting.

The third level of analysis resulted in the identification of eight groupings or categories of teacher reflection with each category based upon an underlying driving factor or disposition which influenced the teacher's reflective processes as he reconstructed his experiences. The factors or dispositions which were conjectured to underlie the reflective activities were associated with factors of a personal and emotional nature.

The final level of analysis extended the previous levels by identifying five dominant themes that emerged from the process of framing and reframing in which the practitioner engaged as he reflected upon issues of control, equipment concerns, problems, safety, etc., encountered in the open water (ocean) environment.

CHAPTER 7

Reflection as Reconstructing Experience – A Recurring Reflective Theme Across the Three Teaching Environments

I. Introduction

The analyses of the data presented in this chapter are drawn from the reflections of the sport diving teacher as he reconstructed his experiences in each of the three teaching environments throughout the stimulated recall sessions. A recurring theme across the three teaching environments, which the teacher identified as significant in his reflective activities, was the perplexity and uncertainty he experienced in teaching the module on 'problem management' and specifically, teaching the five out-of-air options in which the controlled emergency swimming ascent skill is fundamental.

The research subject, having considerably less teaching experience in the sport diving field as compared with the researcher, initiated several discussions regarding out-of-air options. The resulting dialogues were recorded as part of the stimulated recall sessions and were analyzed for recurring patterns. A pattern of thinking about sport diving phenomena from the students' perspectives emerged and the following excerpts illustrate the utility of the research design in providing insight for the improvement of teachers' reflective actions. In this teacher's case, the improvement of his reflective practice came through the introduction of student frames via a supervisory dialogue. This chapter illustrates most explicitly Henri's ability, via a supervisory dialogue, to frame the problem through the process of problem setting, reframe the problem, contemplate a perceived response and evaluate the consequences of the resolution's implementation into practice.

A recurring reflective theme across the three teaching environments: problem management

Few problems occur under water and even these can be avoided through sport diver awareness in each situation. Perhaps the most feared and misunderstood problem is the feeling of air starvation resulting in the eventual out-of-air situation. When out-of-air circumstances occur the situation is not serious, if, the diver stops momentarily, thinks of the options available and selects a course of action before reacting.

Henri, on many occasions, while engaged in the act of reconstructing his teaching practice during the stimulated recall sessions, reflected upon the difficulty he and his students had with the sport diving module on 'problem management' and specifically, the order of the out-of-air options and the controlled emergency swimming ascent. This difficulty was documented in each of the three teaching environments.

The reconstruction of Henri's experience in teaching 'problem management'

In teaching the order of the out of air options in the classroom environment, Henri was very specific in his explanation. His lesson included discussing, in detail and in order, each of the five options available to the out-of-air diver. The first and easiest option, Henri pointed out, is for the diver to make a normal ascent. Henri explained the diver is only out-of-air at depth and as the pressure is decreased during ascent, some additional air becomes available to the diver.

Henri highlighted the second option for the diver, which is to breath off of an alternate air source, which is carried as a secondary air source by the diver her/himself or is provided by another diver. Henri used training aids, in the form of different alternate air sources, to expose the students to the variety of available equipment combinations.

Henri went on to explain, if, in the unlikely event, an alternate air source is not available, or the buddy pair is separated and the water is thirty to forty feet or less in depth, a controlled emergency swimming ascent is performed as the third option. This ascent, he explained, involves swimming to the surface while allowing air to escape from the lungs. Henri presented an elaborate classroom demonstration, simulating the controlled emergency swimming ascent, in front of the students. In doing so, he broke the skill down into easily identifiable and manageable parts accompanied by a detailed description.

Continuing, Henri explained that if in deep water, or if the surface is not directly accessible, the diver's fourth option would be to share a single air source while ascending to the surface. Partnering with a certified assistant, Henri provided a classroom demonstration of buddy breathing. Once again he broke the skill down into easily manageable components and described each part.

The fifth and final option, Henri explained, is the emergency buoyant ascent, which involves the jettison of weights and emphasized that this option is only exercised in a situation where the diver doubts if s/he will be able to make it to the surface. Then, and only then, would the weight belt be dropped. Henri introduced and summarized the out-of-air options by placing a training aid, inscribed with the correct sequence, on the board.

Henri's classroom presentation of 'problem management', which focused on the diver's options in an out-of-air situation, was typical for a sport diving practitioner. The next section explores the potential of thinking about classroom, confined water (pool), and open water (ocean) environment phenomena from students' perspectives. A striking feature resulting from several of the supervisory dialogues, which occurred during the stimulated recall sessions, was how the researcher strategically probed Henri to engage in problem setting and problem solving activities of reflective practice.

II. Analysis of supervisory dialogue

In the classroom environment

The analysis that follows focuses on the discussions regarding 'problem management' that transpired between the subject and the researcher and highlights the teacher's frustration with the teaching of this particular module of the beginner sport diving course. His primary concern is that at least one student, Frank, having received a number of repetitions on this topic, continued to misinterpret his instruction. (An ellipse indicates a slight pause, not an omission).

Lesley: Now, a lot of this discussion that we're having here in the classroom is on problem management....

Henri: Ya.

Lesley:such as inflating the bouyancy compensator at the surface, cramp control, free-flowing regulator, the five out-of-air situations, we practice a lot of that in the pool

Henri: Ya, in the pool.....

Lesley:and the ocean.

Henri: And the ocean, that's right. So they read about it, they watch it on video, you talk about it, you do it in the pool and then you do it in the ocean. And I find it frustrating that this next thing I put up here, the out-of, the low on air, out-of-air order, that people can't memorize that, even sometimes by the end of the course. I, I just, I don't understand.

The researcher restated what Henri has said in the hopes Henri would go on to explore and elaborate upon his frustration with teaching this material and in particular his frustration centering around the controlled emergency swimming ascent.

Lesley: ...they do them in the pool, we go to the ocean, you give a pre-dive briefing, in fact you get them to simulate portions of it, before they actually do it, and the frustrating thing is....is that they still get it incorrect.

Henri: Yes, particularly one skill, that's the controlled emergency swimming ascent. I remember Frank had troubles with that in the pool and in the ocean and on his exam. By the time he wrote his exam, his final exam, we had, he had read about it, watched it on video, talked about it in class and done a quiz and....have, have done them most of them in the pool, ya....he would of done all of them in the pool at that point yet still on his final exam he couldn't get the order down.

Lesley: and still there is error?

Henri: Well, I mean it, it, I, I don't, I don't understand why, I mean, is it...., I'd like to know if other instructors have this problem or if it's me, something I'm doing um...I've taught, every teaching experience I have is with young children. I used to teach, you know, three year olds to fifteen year olds um, hockey skills and skating and, and you know, it's almost likeI don't know if this relates to this but their attention span at times is ...they seem to, it seems better than adults, sometimes to me. I don't know if it's because of what I'm teaching, you know an example of this is just, you know, we used to teach three year olds um...games on the ice and where to put things and, and they would remember all of this. And I don't understand how an adult who has high school and a university or college

education can't remember these five things in the correct order. I don't understand that.

Lesley: And he's an, he's an engineer.

Henri: He's an engineer, ya.

Lesley: And has some experience.

Henri: Ya, and he has some experience um....

The researcher encouraged Henri to rethink the circumstances surrounding his frustration with this concept. Diverting his focus from one particular student, the researcher attempted to move him towards reconstructing and questioning his own practice.

Lesley: Now, is, has, has your experience been, that it's not just Frank?

Henri: It's not just Frank.

Lesley:that other students....

Henri: Other students have, um maybe in a class of 10 on average, you know, one or two students

The researcher redirected Henri to think about what underlies his frustration towards teaching this topic. Henri stated that he is frustrated with students not getting the order down. However, what is more important, which he had not considered, was the fact that the students need to develop an 'appreciation' for choosing the correct out-of-air procedure for the particular circumstance. Order is nice, but in this case, not essential. What is essential is that the student first 'sees' the circumstances, 'sees' the environmental considerations and 'sees' the equipment available to her/him in order to elect the best out-of-air procedure to use. Henri has missed the point in this situation and as a result has taught the module emphasizing order of choice rather than emphasizing circumstance of choice. The researcher tried to get him to 'frame' his problem in light of these new understandings.

Lesley: Now, why is this so critical?

Henri: Well, um...

Lesley: Besides knowing, you know, the right order....

Henri: Why?... in my opinion, two of them are, are dangerous, buddy breathing and a buoyant emergency ascent are dangerous things to do.

Lesley: Ok, so they're, they're dangerous,

Henri: Ya.

Lesley:but, why is it, is it that, is it just that they're putting them in the wrong order or is it also that they don't know how and when to do them?

The researcher persisted in getting Henri to reexamine his problem, to 'reframe' the difficulties into the frame of the students' perspective.

Henri: Well ya, um....that could very well be it, I mean, like the controlled emergency swimming ascent you get into the ocean they still don't understand it, they don't understand the concept. Um....so they are putting them in the wrong order because they don't know exactly what that controlled emergency swimming ascent is. They don't know how or when to do it.

Lesley: And why is that, why is that, if they don't know how or when to do it, why is that critical?

Henri: Oh, well, I mean, if they don't know how to do it, it's, why is it critical? Um....how could I relate it to something, um....I think that as you go down that list you go from 1 to 2 to 3 to 4 you know your putting yourself at a higher risk. Even doing a controlled emergency swimming ascent then making a, a, a, a normal ascent you've got to know that if your buddy is there and you have run out-of-air, a controlled emergency swimming ascent is not the thing to do.

Henri realized, at this point in the dialogue, arranging the out-of-air options in the correct order, is not as critical as being able to determine what option should be exercised under which conditions. To make this clear the student must understand how and when to execute the five out-of-air options in order to make an appropriate decision.

The researcher then redirected the conversation to explore the controlled emergency swimming ascent.

Lesley: So, with the controlled emergency swimming ascent the big problem is, when they're doing it incorrectly, that it's one skill, out of all the skills that we teach in the whole curriculum, that it's probably the most likely that they would have a lung expansion injury....

Henri: Ya, absolutely and I think it's and there's no question about it that it is the most critical skill in the system.

Lesley: In the classroom, discussing each one of these five out-of-air situations.... what's the job of the instructor?

Henri: The job of the instructor in discussing these?

Lesley: Right.

Henri: To make sure that they, in the classroom understand how you would conduct it,in the pool and in the ocean.

Lesley: You really went through the entire skill physically on how to do the controlled emergency swimming ascent there.

Henri: I did, I had my hand up, showed them deflating, keeping the gear in place, swimming, making a continuous ah sound, ya, I think I did, I did aum I could have gotten them to practice it in the classroom I suppose that would be something they could have done. You know, sitting in their chairs maybe that would help.

In getting Henri to highlight how he taught the controlled emergency swimming ascent, he reflected upon his action and this reflection-on-action process allowed him to 'see' another way of presenting the material. This supervisory dialogue encouraged Henri to reflect upon his 'in action' practice, to frame and reframe the problem by

considering the students' perspective. The reframing of the problem, in light of the students' perspective, brought new meaning and understandings for Henri. These new meanings and understandings encouraged further reframing of the situation in which Henri 'sees' doing as a part of knowing and stated, "I could have gotten them to practice it in the classroom I suppose that would be something they could have done. You know, sitting in their chairs maybe that would help".

Although it is not possible to know with certainty what Henri was thinking about in this interchange, it is certain that Henri conceded that the direction of his frustration, about the way Frank could have been interpreting the problem management module, may need to be refocused. Indeed, Henri's success as a sport diving teacher rests upon his ability to systematically analyze, through reflective activities, his own teaching practice.

In the confined water (pool) environment

The analysis that follows is focused on the discussions regarding the controlled emergency swimming ascent skill performed in the confined water (pool) environment. Once again, the discussion highlights Henri's frustration in teaching the skill. He is concerned that at least one student, Frank, having completed the classroom instruction and having received a number of demonstrations of the skill underwater, still misinterpreted his instruction. The perplexity which this situation created in Henri, resulted from his own demonstration. Unknown to Henri, at this point in the dialogue, is the fact Henri's demonstration of the skill and his expectation of the students' performance of the skill, are not related as Henri was not aware of an inconsistency in his teaching methodology. The researcher attempted to get Henri to place himself in the position of the student and see things from their perspective.

Henri: Ya, ok, so I, this, here what we're doing is a controlled emergency swimming ascent. I, I talked about this in classroom, talked about it again in the, before we went to the pool tonight, I gave a short briefing on the surface.So I'm simulating I'm taking the three breaths. I put my hand up, deflating....when I've demonstrated that skill in the past often I'll demo it in front of them like that and then start swimming up to the shallow end. Um, probably it, it might, it would be better to demo it in, the how they're going to do it in the deep end there up to

the shallow end but they can't, I don't know how to position them so that they could all see me properly then. They could, you know, some of them could be down on the other side there and not see what I'm doing with my regulator.

Lesley: So at this point they were all along the back wall...?

Henri: They are all along the back wall.

Lesley:and you demonstrated horizontally in front of them?

Henri: Horizontally in front of them, the key points to the skill. And now we're taking them up one at a time from there to the shallow, towards the shallow end.

From watching the sequence on the video, Henri was quick to reflect on his action and then to criticize his demonstration. However, his criticism regarded the control of the students and their positioning on the pool bottom, and did not consider his demonstration. The researcher prompted Henri to continue to talk about the controlled emergency swimming ascent in an effort to get him to change his perspective. She encouraged him to view the faults of his demonstration beyond that of simply a control issue and attempted to get him to adopt the students' perspective.

Lesley: Ya. So let's just talk a little bit more about the emergency swimming ascent.

Henri: Ya.

Lesley: You um...you had them along the back, you had them along the back wall....

Henri: Ya.

Lesley:and then you went....

Henri: In front of them.

Lesley:in front of them horizontally....

Henri: That's right.

Lesley:now when you got them to do the skill how did they do the skill.

Henri: They did the skill from the back wall....

Lesley: The back wall....

Henri:diagonally up to the shallow end.

Lesley:diagonally?

Henri: Ya, towards the surface.

Lesley: So, can you think of, when you did the demonstration, if you were the student, what would you'd be seeing....?

Henri: Ya, that that is I think a bit confusing however, um....I would think that they should be able to understand the other parts of the skill, how my hands up, how my inflator is positioned, ah I'm exhaling and all of them did other than the hand positioning did seem to understand the exhaling and the kicking.

Lesley: Now what about if um, what about if you had the students sitting along this wall....(the researcher draws on the white board students kneeling along the side edge of the pool, on the bottom, half way between the deep and shallow end)

Henri: Ya.

Lesley:and you started here....(the researcher draws Henri on the bottom of the deep end at the far end wall)

Henri: And went up there? (Henri indicates his demonstration should be to swim diagonally in front of the students from the bottom of the deep end to the surface of the shallow end)

Lesley:and maybe have them starting here, sitting there and you started and you did your horizontal towards the shallow end like this? (realistically, the horizontal swim would be a diagonal swim due to the topography of the bottom of the pool sloping gently, transitioning deep to shallow water)

Henri: Ya, that's, that ultimately would be a lot better.

Lesley: Because then....

Henri: Because what I'm doing is exactly what they're going to be doing, ya.

Henri had come to 'appreciate' the students' perspective. He realized his demonstration of the skill, swimming horizontally, from one side of the pool to the other, along the bottom of the deep end, in front of the students, is a completely different skill from the one he had the students perform, swimming diagonally from the bottom of the deep end to the surface of the shallow end of the pool.

In the open water (ocean) environment

The analysis that follows is focused on the discussions regarding the controlled emergency swimming ascent skill performed in the open water (ocean) environment. The discussion highlights Henri's frustration with the number of repetitions Frank needed in performing the skill as well as his uncertainty as to why Frank, who does not kick when performing the skill, had difficulty in executing the controlled emergency swimming ascent. The difficulty Henri experienced with this skill was caused by his own non action and he does not realize that he has contributed to the student's difficulty. The researcher tried, once again, to get Henri to put himself in the position of the student and 'see' things from that perspective.

Henri: So now I'm winding my leg around the line again and, and I'm going to get Frank to do the controlled emergency swimming ascent.

Lesley: What's going through your mind at this point?

Henri: That, that he's not sure that he understands it and I mean, he had problems with it in the pool and we briefed it and I'm just trying to think of little things, expectations, sort of foreshadowing what he may do wrong and sort of preparing myself mentally for it.

In controlling the controlled emergency swimming ascent skill in the ocean the teacher readies the student by making sure s/he is neutrally buoyant. Neutral buoyancy is accomplished, in this case, by ensuring the student has some air in the buoyancy compensator device.

The teacher readies her/himself by wrapping one leg around the descent line, holds the student usually by way of the buoyancy compensator device (usually securing

the student's front right arm hole) and signals the student to commence the skill and go up.

Ensuring the student is neutrally buoyant is fundamental to the student successfully completing the skill. In so doing, the simulated out-of-air sequence is as close to the real thing as is possible. Theoretically, as the student starts to go up, the ascent is aided by the expansion of air in the buoyancy compensator device. The student holds the inflator/deflator device high above the head in the left hand. In the event the ascent becomes too fast the student can vent air from the buoyancy compensator device to slow and control the ascent. If the set up is done correctly the student aids the ascent with normal kick cycles.

During the course of an actual dive, a diver would be properly weighted and neutrally buoyant. If the diver found her/himself in an out-of-air situation, in which the execution of a controlled emergency swimming ascent was prudent, the neutrality of the diver would assist the ascent to the surface.

Henri, unfortunately, focused intently upon the multitude of possible problems Frank could have while performing the skill and did not secure a proper set up for the commencement of the skill. In reviewing the problems Frank experienced, the researcher encouraged Henri to think about his set up for the skill.

Henri: He, look his legs didn't move on that at all, I don't know if he just thought he would go to the surface but he had his hand up again and his legs, he just, they just were there and they weren't, he wasn't kicking.

Lesley: And?

Henri: And he's breathing sort of normally. So now we're going to try it again.

Lesley:what's the problem there?

Henri: Ya, he's just, I don't, I don't, he just couldn't get the idea down that....

Lesley: What are you thinking at this point?

Henri: Um....right now, what was I thinking then, at that point I was trying to decide what am I going to, try this one more time, you know, and I, I, got my hands to sort of try and simulate my legs with "kick, kick" and he and I was trying to decide well, maybe I should just take him to the surface and re-brief, you know, explain yet another time. And I think that's what I ended up doing after three attempts. We ah, surfaced.

Lesley: Is that what you're signaling there?

Henri: Ya, just stop and let's go up, ya. So we went up the line and I explained it to him on the surface, he went down and the, the fourth time he did it satisfactory but it wasn't, it wasn't as smooth as Brock or Tom but he did do the skill.

Lesley: What are you motioning here?

Henri: Just to ah, Oh I'm just telling him to relax....Ya, I'm just, ya, I'm simulating slow breathing, getting him to relax before we try the skill again. Relaxed on the bottom. You can tell, you can tell with a student, um and it's something I didn't mention, in the pool and the ocean another thing you can use is how fast the bubbles are coming out of the regulator, I mean, that's an indication of their comfort level. If they're coming out fast then, like, they are now, then everything isn't hunkydory. So now I'm looking down at his legs to see if he's kicking.

Lesley: Had you put any air in his bouyancy compensator?

Henri: Oh!....No I don't think I did. No!.....We could have practice it another fifteen times!

Throughout the dialogue Henri was fixated on Frank's poor ascent rate with Henri totally attributing Frank's problems to Frank. The researcher, on several occasions, tried to refocus Henri's attention to his own practice. Unsuccessful in this endeavor, she finally asked about the set up of the skill. The 'light went on' and although he was embarrassed with himself, Henri immediately identified his own problem of control. This was evident from his exclamation, "we could have practiced it another fifteen times!"

III. Summary

This type of an analysis of the supervisory dialogue between Henri and the researcher has shown the scope and importance of the research design in providing insight for the improvement of teachers' reflective activity. The new understandings, acquired by the teacher from these short passages provide a strong rationale for the inclusion of a reflective practicum in sport diving. The dialogue and analysis presented identified a pattern for reflecting on classroom, confined water (pool) and open water (ocean) events. 'Seeing from the students' perspective' is one way of describing the pattern.

In each teaching environment, the teacher highlighted the source of his frustration, perplexity and uncertainty to be 'owned' by the student, that is, the student's inaction or misunderstanding were responsible for the instructional difficulties. The analysis suggested differently.

The supervisory dialogue regarding issues in the classroom environment redirected the teacher from 'seeing', to 'seeing from the students' perspective', that is, to realize that his difficulty was derived from his own teaching practice.

The supervisory dialogue regarding issues in the confined water (pool) environment has re-directed the teacher to enable him to 'see' that his demonstration was inconsistent with that of his expectations of his students. Once again, by placing himself in the 'students' shoes' or 'seeing from the students' perspective', a demonstration/expectations compatibility review may become a component in his future teaching.

Finally, the supervisory dialogue regarding issues in the open water (ocean) environment highlighted and verified for the teacher that instructional difficulties can result from one's own non action in securing the appropriate set up for a skill.

CHAPTER 8

Conclusions, Discussion, and Implications for Practice

The conclusions, discussion and implications for practice that appear in this chapter are drawn from the reflective practices of one sport diving teacher as he prepared, taught, and reconstructed his practice in three teaching environments, through the process of stimulated recall. There are four sections to this chapter: conclusions emanating from the research questions, a discussion of critical issues arising from the study, implications for practice, and suggestions for future research.

I. Conclusions emanating from the research questions

Question 1: What factors or themes do sport diving teachers reflect upon in each of the three teaching environments?

Six reflective themes were identified in this case study of a sport diving instructor. Five were common across the three teaching environments with the remainder being specific to the classroom environment. The common themes were: a trusting relationship, the necessity of teacher control, recognition of the 'unforgivingness' of the environment, learning from one's practice, challenges to one's practice, and understanding one's practice. These themes and their underlying factors are listed in Table 7, p. 183.

The first theme emanating from the results was that of the development of a **trusting relationship** between the teacher and the students. The existence of the unknown, created by the instability of the environment and the unfamiliarity with the life supporting equipment needed to venture into the underwater world, undermines the students' faith in their own ability – a situation which could result in a struggle for survival. Henri achieved a good student-to-teacher rapport early in the beginner sport diving course to minimize student anxiety and to enhance their learning experience. The building of the student-to-teacher rapport led to the development of the students' trust relationship with the teacher which led to the student placing greater reliance in their equipment ultimately resulting in greater confidence in their own ability.

The second theme that emerged from the data was the **necessity of teacher control**. Reflection in this theme was characterized as the teacher's success in reacting to the uncontrollable, that is, anticipating the unexpected and preventing misfortune. The unforgiving nature of the learning environment requires immediate and unquestioning student responses to teacher direction, which are based on the need for quick and prudent judgment. Henri reported several interpretations of control and fundamental to all is the goal of student safety by way of the maximal reduction of 'uncertainty'.

The third theme that emanated from the data was evident only in the classroom environment and was the teacher's reflection on his ability to encourage his students to **see the 'unforgivingness' of the environment** in which they were to dive. This theme was characterized by the teacher communicating to his students, in a very positive way, the negative elements they may encounter, examples of others' misfortunes, and his own personal diving experiences, which were intended to encourage the students to reflect upon these instances when faced with making decisions for themselves.

The fourth theme that emerged from the data was the teacher's reflection on **learning from his own practice**. Henri's reflection of this theme was characterized as a shift from a teacher's perspective to a student's perspective regarding the way in which students learn. He recognized he was interpreting aspects of his practice quite differently than his students, and as a result, he had come to realize that his teaching frustrations were spawned from his own teacher centered perspective.

The teacher's reflection on **the challenges to his practice** emanated as the fifth theme. Reflection in this category was characterized as a shift from the teacher's view of his inadequacy in his own teaching practice to accepting his practice as adequate through the identification of some of the burdens placed upon his practice. One issue around which these reflections took place included the mismatch of Henri's teaching agenda with a very restraining, hidden, economical 'business of sport diving' agenda.

The sixth and final theme that emanated from the data was the teacher's reflection upon **understanding his practice**. This theme was characterized through the escalation of the teacher's initial understanding of practice to a higher level which was

attained through avoiding mistakes, oversights and inaccuracies of his own practice, through his ability to successfully implement the tools he acquired through his instructor course, to utilize the resources of more experienced practitioners and to employ his own personal diving experiences in his practice.

Table 7. Themes the sport diving practitioner reflected upon across three teaching environments.

Reflective themes	Underlying factors in each teaching environment		
	Classroom environment	Confined water (pool) environment	Open water (ocean) environment
1 Trust	-Trust relationship -Getting to know the students	-Trust relationship -Getting to know the students	-Teacher sensitivity -Getting to know the students -Student identification
2 Control	-Professional credibility -Gender issue	-Instructor control -Instructor sensitivity	-Instructor control -Instructor anticipation
3 Unforgiving learning environments	-Diving accident -Dispel misconceptions -Life threatening incidents -Equipment concerns -Environmental concerns -Safety concerns		
4 Learning from one's practice	-Self criticism -Teacher difficulties -Student difficulties	-Student difficulties -Conflict resolution -Self criticism -Teacher difficulties	-Self criticism -Teacher difficulties -Conflict resolution -Student difficulties
5 Challenges to one's practice	-Frustration with curriculum -Frustration with teaching -Teaching criterion -Ethical conflict -Time constraints -Manager/instructor role conflict -Equipment sales -Instructor laziness	-Instructor laziness -Student confusion -Lack of control -Time constraints -Frustration with teaching -Frustration with curriculum	-Lack of control -Student confusion -Frustration with teaching -Missed student problems
6 Understanding one's practice	-Teaching preparation -Classroom management -Body language -Content organization -Teaching strategies -Implicit instructor knowledge -Curriculum knowledge -Content knowledge -Currency in teaching	-Commitment to curriculum -Curriculum knowledge -Content knowledge -Context knowledge -Video as a learning tool -Environmental context -Teaching strategies -Body language	-Teaching strategies -Environmental context -Body language -Video as a learning tool -Teaching preferences -Selling equipment -Student mental rehearsal

Question 2: What influences the reflective process or themes?

Thirteen underlying or influencing factors or dispositions were identified across the three teaching environments, depicted in Table 8, p. 185, with eight being common to either two, or all three, of the environments. Three were specific to the classroom setting and the remaining two to the open water setting. Common to all three of the instructional environments were the four underlying factors and dispositions of: the need for control, the desire to comfort, internal dissonance resulting from the teacher's non or incorrect action, his beliefs and understandings, and affirmative pedagogy. Consistent within the classroom and confined water settings were the two factors identified as frustration at not possessing the necessary instructional materials and/or skills and knowledge of teaching. The two dispositions labeled dismay of the teacher finding himself not 'up to speed' and the ability to deal with surprise were present in both the confined and open water environments. Specific to the classroom reflection were the three dispositions labeled the need to express the lack of control in the unforgiving learning environment, the desire for correct interpretation, and the repression of natural feelings. The reflections on reflection-on-action in the open water setting revealed the factors of the curiosity of student off task behavior and the ownership of one's practice.

Table 8. The underlying factors and dispositions which influence the sport diving practitioner's reflective process across the three teaching environments.

Underlying factors and dispositions	Teaching environments		
	Classroom environment	Confined water (pool) environment	Open water (ocean) environment
1. The need for control	Yes	Yes	Yes
2. The desire to comfort	Yes	Yes	Yes
3. Internal dissonance resulting from the teacher's non or incorrect action and his beliefs and understandings	Yes	Yes	Yes
4. Affirmative pedagogy	Yes	Yes	Yes
5. The need to express the lack of control in unforgiving learning environments	Yes	No	No
6. Desire for correct interpretation	Yes	No	No
7. Repression of natural feelings	Yes	No	No
8. Frustration at not possessing the necessary instructional materials and/or skills	Yes	Yes	No
9. Knowledge of teaching	Yes	Yes	No
10. Dismay of the teacher not finding himself 'up to speed'	No	Yes	Yes
11. Ability to deal with surprise	No	Yes	Yes
12. Curiosity of student off task behavior	No	No	Yes
13. Ownership of one's practice	No	No	Yes

For each reflective theme it was possible to identify up to four associated main influencing factors or dispositions. In each instance the underlying factors precipitated the teacher's framing process, however, on some occasions the teacher did not proceed to the reframing stage. The influencing factors or dispositions were usually extrinsically subjective and of an informal nature (an observed incident in the video replay or a casual comment strategically interjected by the researcher) however, in a few instances other factors were more intrinsically subjective and of a formal nature (the teacher internalized the issue and explicitly referenced it on more than one occasion). Table 9, p. 187 presents a list of the main influencing factors or dispositions for the six reflective themes reported in this study.

An example of a theme incorporating both types of underlying factors was Henri's reflection on learning from his own practice, and in particular, the supervisory dialogue he initiated in, with the researcher, about his teaching of the controlled emergency swimming ascent in the confined water (pool) environment. Watching the video tape (extrinsic non formal influence in the framing stage) elicited Henri to comment that his students were not performing the controlled emergency swimming ascent correctly and he was able to deal with the number of hybrids of the skill, which came as a surprise (internal subjective formal influence in the framing stage). The internal subjective formal elicitation resulted from Henri's critique of his teaching and demonstration in terms of having a teacher centered perspective of the controlled emergency swimming ascent (the frame). Henri's reframing of his practice was initially stimulated by the researcher suggesting Henri put himself in the place of the student and 'see' what s/he sees (the reframe). This comment stimulated Henri's articulation of an intention to demonstrate the skill incorporating the students' perspective (external non formal elicitation in the reframing stage) and that there existed a dissonance between his beliefs about teaching and demonstrations and his actual practice in the confined water (pool) setting (internal formal elicitation in the reframing stage). As a result, Henri reframed his teaching and demonstrations in the confined water to incorporate the students' perspective. Thus, Henri's reflection was a product of external and internal influences at both the framing and reframing stage. The influencing factors or dispositions for Henri's framing and reframing process, in his reflection upon his practice with this exercise, is illustrated in Table 10, p. 187.

Table 9. List of influencing factors and dispositions for the reflective themes.

Theme	Influencing factors and dispositions
1. Trust	-Desire to comfort
2. Control	-The need for control
3. Learning from one's practice	- Internal dissonance resulting from the teacher's non or incorrect action and his beliefs and understandings -Ability to deal with surprise
4. Challenges to one's practice	-Repression of natural feelings -Frustration at not possessing the necessary instructional materials and/or skills -Dismay of the teacher not finding himself 'up to speed'
5. Understanding one's practice	-Affirmative pedagogy -Knowledge of teaching -Curiosity of student off task behavior -Ownership of one's practice
6. The unforgiving learning environment	-The need to express the lack of control in unforgiving learning environments - Desire for correct interpretation

Table 10. An example of different levels of underlying factors and dispositions.

Reflective theme components	Descriptors
⇒ Theme:	-Learning from one's practice
⇒ Influencing factors and dispositions:	-Internal dissonance between beliefs and actions -Ability to deal with surprise
⇒ Frame:	-Having a 'teacher perspective' focus
Extrinsic subjective non formal factor:	-Watching the video of the confined water (pool) teaching - 'controlled emergency swimming ascent'
Internal subjective formal factor:	-Henri noting his students are not performing the skill correctly and his surprise in their mistakes
⇒ Reframe:	-Having a 'student perspective' focus
Extrinsic subjective non formal factor:	-Henri's intention to demonstrate the skill incorporating the students' perspective
Internal subjective formal factor:	-Henri noticing the dissonance between his beliefs and actions
⇒ Plan for future action:	-To match his actions with his beliefs

Note: The internal subjective formal factors were regarded as the main underlying factors for the theme.

This pattern of influencing factors or dispositions was evident each time the teacher framed and reframed his practice in each of the three teaching environments. The internal subjective formal influence of the reframing stage was the most important underlying factor in terms of the teacher's reflections and his plans for future practice. In some instances the teacher framed his practice and did not proceed to the reframing stage and in this reflective activity, the initial extrinsic subjective non formal influence was documented. Regarding underlying influencing factors and dispositions as originating from both external subjective non formal factors and internal subjective formal factors provides a more complete understanding of teacher reflection.

In general, the reflective themes in this study were influenced when 1) there was a contrast between what the teacher thought was going to happen and what actually happened (troublesome practice) and 2) that which actually happened was a more positive outcome than had been expected by the teacher (positive practice). This was the occurrence for each of the teaching environments. In the first instance, it was less than positive instances arising from the teacher's action or non-action that highlighted this discrepancy while in the second instance, it was a positive teacher action or display of conduct that was emphasized.

Question 3: What is the nature of sport diving practitioners' reflective practice?

There were seven common elements or events across the three teaching environments: teaching strategies, getting to know the students/student identification, body language, self criticism, frustration with teaching, students difficulties/missed student problems and teaching difficulties. Six other elements were common between the classroom setting and the confined water (pool) environment: curriculum knowledge, content knowledge, instructor laziness, time constraints, a trust relationship, and currency in teaching/commitment to the curriculum. Eight other elements were common between the confined water (pool) environment and open water (ocean) environment: instructor control/instructor anticipation, environmental context, instructor sensitivity, lack of control, student confusion, conflict resolution, using the video as a learning tool, and context knowledge/teaching preference. One element was identified as common to both the classroom setting and open water (ocean) environment which was the selling of equipment and/or diving.

All elements and events noted in the confined water (pool) environment were common to either the classroom environment and/or the open water (ocean) environment, therefore, supporting the proposition that the confined water (pool) environment provided the appropriate transition from theory to practice. There were a few elements or events of the teacher's reflective process specific only to the classroom environment or to the open water environment which will be addressed last.

The nature of the reflective activities is addressed from the perspective of five categories: 1) across environment related, 2) classroom and confined water (pool) environment related, 3) confined water (pool) and open water (ocean) related and 4) classroom and open water (ocean) related and 5) specific to one environment. An instance and/or element was considered if it contributed to the development of one of the four components of reflection (the underlying factor or disposition, frame, reframe, or plan for future action) as the sport diving practitioner reconstructed his practice in each of the three teaching environments through the aid of stimulated recall sessions. Each of these groupings was further refined to include factors under two headings: factors which identified positive practice and secondly, factors which identified troublesome practice, with the latter being regarded as most important in the development of reflective activity. The conclusions that follow, which are depicted in Table 11, p. 198, are drawn from the relationships discovered within factors across and between teaching environments.

1. Across environment related

The nature of reflection across the three teaching environments (classroom setting, the confined water [pool] environment and the open water [ocean] environment) consisted of three elements related to positive practice (teaching strategies, getting to know the students/student identification, and body language) and four elements associated with troublesome practice (self criticism, frustration with teaching, student difficulties and teacher difficulties).

Of particular significance, in the development of reflective teacher practice, are the four elements relating to troublesome practice. The use of the stimulated recall strategy while reviewing the video taped lessons provided the teacher with the rare opportunity to examine his practice 'first hand', in that, the video was a 'raw' account, (a

wide angle focus was used to collect it) free of interpretation of his practice. Henri stopped, started, and reviewed portions of his lessons which had not produced the results expected. In this fashion, he was able to frame, problem set and problem solve, reframe issues he found problematic and make revisions for future action.

The instructor preparation course Henri attended equipped him with generic approaches to problems encountered in the practice setting, however, these approaches did not always provide solutions to specific problems with specific students in specific learning environments (the messy, relevant, and important problems depicted in Schön's swamp analogy). The reliance on the generic or, what Schön referred to as the technical problem solving approach, led to Henri's self criticism, frustration with teaching and the difficulties he encountered with his own efforts and those of his students.

Henri had been teaching for eight years encountering similar problematic events and had attempted to solve these difficulties with a 'what works' approach. For example, in the classroom setting, he used an instructional training aid to help students identify the order in which to consider out-of-air procedures in a module on problem management. He had relied upon this training aid to 'set straight' what all students have difficulty with, however, his students continued to have difficulty remembering the correct order of the out-of-air options. Further, in the confined water (pool) environment, he had performed a demonstration of the controlled emergency swimming ascent which allowed him to remain in the deep end of the pool, so that he could get the students started at attempts at the exercise. However, for the students, expediency was not part of the exercise. The reliance on each of these two traditional practices were developed from his own experiences as a learner and a result of the technical problem solving approach he utilized in his practice.

Henri, influenced by his review of the video tapes, was able to focus upon specifics of his practice, and shift his attention from a technical problem solving approach to a practical problem setting approach. For example, when Henri reconsidered what was the underlying cause of his frustration towards teaching problem management, he began to ask questions such as 'why do they not understand the order?', 'what is it that they are missing to get the order down?' and he began to (re)examine the video tape of his own practice. His frustration with his students was

redirected toward himself for using an incomplete training aid, in that, he realized the training aid listed the procedures in order, but did not convey to the students an 'appreciation' for understanding the circumstances (the environmental and equipment concerns) which are fundamental in electing the right out-of-air procedure at the right time. Henri framed his problem (the students were not comprehending the sequence of out-of-air procedures) and using a problem setting process realized his method of teaching was inadequate (the training aid did not convey pertinent and complete information). He speculated that the training aid was not exhaustive enough (reframing the situation) and suggested, in the future, he would present a better foundation for his training aid in order to explain the circumstances upon which one should make such a decision (problem resolution).

In the second example, Henri 'put himself in the students' place' when teaching the controlled emergency swimming ascent in the confined water (pool) environment. He started to ask questions such as 'what are they seeing in my demonstration?', 'how does my demonstration and their attempt differ?', 'what am I doing in my demonstration that is different from what I am asking them to do?' and 'can they see the whole demonstration clearly?', and thereby began to (re)examine aspects of his practice which he had taken for granted.

Henri's shift from technical problem solving to the importance of problem setting, while (re)viewing the video tapes, enhanced his reflections on his practice. Similar results have been found by Kilbourn (1988), Ross (1990) and Clarke, (1994). Fundamental to Schön's epistemology of practice (reflective practice), is the importance of problem setting as opposed to technical problem solving. The combination of (re)viewing the video tapes and problem setting has allowed Henri to 'see' his practice differently. In retrospect, Henri's eight years of teaching experience may be more accurately portrayed as one year of teaching eight times.

2. Classroom and confined water (pool) environment related

The nature of reflection between the classroom setting and the confined water (pool) environment consisted of four elements related to positive practice (curriculum knowledge, content knowledge, trust relationship and currency in teaching/commitment to the curriculum) and two elements associated with troublesome practice (instructor

laziness and time constraints). Of particular significance is the relationship within the elements found to be both positive and troublesome in each environment.

Henri's teaching practice in each of these environments had similar pedagogical characteristics even though the environments themselves were physically different. Fundamental to engaging students in the learning process, specifically in the confined water (pool) environment, is the development of a trusting student to teacher relationship. Close examination of the transcript indicated Henri nurtured this positive practice relationship from the very first classroom lesson. In the process of doing so, he interacted with his students to validate his personal knowledge of the curriculum, his content knowledge and his zest for keeping up to date with new materials.

The interaction with students was particularly noticeable in both environments. For example, in the classroom setting Henri had a one-on-one situation with each student while they introduced themselves to the class. He asked meaningful questions of each of them in an effort to make them feel comfortable. When introducing new material Henri engaged each student in a one-on-one situation as he encouraged them to search their repertoire of past experiences to see the unfamiliar material or situation as both similar to and different from the familiar one. This is similar to Schön's notion that "...the familiar situation functions as a precedent, or a metaphor....an exemplar for the unfamiliar one". (p.67)

In the pool environment, his patience and empathy with his students' feelings of curiosity with their equipment and their uncertainty about breathing underwater provided him with a different perspective on his practice. Comments from his students provided positive feedback regarding his practice of having them breath underwater without a mask before they had time to think about what they were doing.

In both cases, the importance of the interactions with the students allowed Henri to reflect upon his practice in a different way by incorporating pedagogical methods instrumental in strengthening a trust relationship. The importance of student and teacher interactions have been reported by other researchers (Beyer, 1984; LaBoskey and Wilson, 1987; and Clarke, 1992) and are consistent with the findings of

this study, that is, interactions with students have provided teachers with a different perspective upon which to examine their practice.

On the other hand, troublesome practice, outlined in the transcript, referring specifically to instructor laziness and time constraints, common to both the classroom setting and the confined water (pool) environment have also influenced the teacher's reflective process. In the first instance, Henri used his past experiences as a learner in the sport diving industry as a basis for analyzing his teaching practice and specifically identified instances in which he had been lazy in his performance. His past experiences as a learner made him examine more closely the 'things' he takes for granted and the 'things' that have been 'cut short' in his teaching practice. Making past experiences explicit is consistent with Schön's argument that practitioners draw upon past experience to frame and reframe conflict, uniqueness, and perplexity in non-routine instances of practice. The importance of referring to and making explicit past experiences has also been reported by other studies (MacKinnon, 1987; Sergiovanni, 1985; Clarke, 1992). Thus, the results of this study indicate that the nature of Henri's reflective activity, the use of his past experiences as a learner, allowed him to investigate his practice using another perspective.

In the second instance, the issue of time allowed Henri to view his practice from yet another perspective. In both the classroom setting and the confined water (pool) environment, the time it takes to teach aspects of the course is crucial as a specified amount of time in these environments is allocated to, and paid for by, the sport diving facility, in advance. Therefore, Henri's perspective shifted from 'what do I have to teach?' to a time conscious perspective asking 'how might I teach it better?'. The importance of redirecting the element of time from constraining practice to enhancing the quality of practice has been documented by others (Selye, 1974; Mackay, 1988; Covey, 1990). Thus, the results indicated reflections on Henri's practice were enhanced by using a time quality approach.

3. Confined water (pool) and open water (ocean) related

The nature of reflection between the confined water (pool) environment and the open water (ocean) environment consisted of five elements associated with positive practice (instructor control/instructor anticipation, instructor sensitivity, conflict resolution,

video as a learning tool and context knowledge/teaching preference) and three elements relating to troublesome practice (environmental context, lack of control and student confusion). Of major significance, in developing reflective teacher practice in the confined water and the open water environments, was the 'unforgiveness' of the water environments.

Characteristic of Henri's reflections in the water environments, as identified in this study, was his focus on the underwater problems and difficulties encountered by himself and his students (the elements of troublesome practice). As might be expected, his reflections tended to center on the uniqueness of the equipment, the uncertainties, the 'unforgiveness', and the complexities of the environment as precipitators of the surprising events which were encountered in both the pool and the ocean.

Clearly, the instructor course Henri completed, and even more so the amount of time he had spent diving in the unforgiving ocean environment (within a buddy team and/or with other classes), had a considerable impact on the nature of his reflection. These activities that were curricular (instructor course and diving activities with other classes) and extra-curricular (diving with a buddy for pleasure) enhanced the teacher's appreciation of the 'situatedness' and the 'contextual and cultural milieu' in which his teaching takes place. This was evidenced by the reflective elements of 'instructor control and anticipation', 'conflict resolution' (solving problems), and 'context knowledge'.

Various components of the instructor course and his experiences diving resulted in an association between theory and practice which provided Henri with the tools to create meaning of the problematic aspects encountered in the unforgiving learning environment. Highlighted here, is Schön's argument for an epistemology of practice which places technical problem solving (the rigor of scientific theory) within a broader context of reflective practice (the relevance of art). The importance of the different contributions made by the contextual and cultural milieu, theoretical components of courses and teaching experience has been the subject of many studies (Brown et al, 1989; Houston and Clift, 1990; Krough, 1987, Zeichner and Liston, 1987, Clarke, 1992). Thus, the results of this study suggest when links between theory and practice are explicit, teachers use this knowledge while engaged in reflective activities regarding their practice.

4. Classroom and open water (ocean) environment related

The nature of reflection between the classroom environment and the open water (ocean) environment consisted of one element, the selling of diving and diving equipment, which Henri noted to be both a positive and a troublesome element in his practice. In the first place, one of the assumptions inherent in the notion of teaching sport diving is 'selling diving and diving equipment'. As the trust, support and confidence in the teacher increased, the students reportedly purchased their personal diving equipment for the confined water (pool) environment (positive practice). Henri reflected upon this student practice as providing a comfortable foundation in which to learn the underwater skills. He reported proper fitting equipment resulted in positive experiences in the water, however in some cases, he felt the students lost some respect for him as a teacher because they were unsure of his motives for 'pushing' equipment sales in the classroom and at the open water (ocean) site (troublesome practice).

The feeling of insecurity provided a valuable direction for Henri's viewing of his practice and as he watched the video tapes he was surprised at the extent to which he talked about equipment sales without allowing the students time to interact and ask questions in this regard. Henri's dominance, in this one-way dialogue, prevented the students from inquiring into aspects of purchasing equipment that interested them, therefore, resulting in their misinterpreted intentions of the teacher. Not surprising, the students wanted to know the teacher cared about their interests before they cared about what the teacher had to say regarding sales. The importance of 'negotiating' equipment sales has been the subject matter of others (McCormack, 1984; Karrass, 1992) and this study has demonstrated that Henri's awareness of his one-way sale dialogue directed his attention to reframe his practice from that of a dominating sales person to that of a sales negotiator.

5. Specific to one environment

The last part of this section reports the nature of the reflection that did not have any apparent relationship between or across environments. There were two groupings of elements, of a troublesome nature, that were significant only to the classroom environment. The first grouping (content organization, frustration with the curriculum, professional credibility, teaching preparation and classroom management) was related to the sport diving curriculum and the second grouping (safety concerns, diving accidents,

dispelling misconceptions, life threatening instances, gender issues, environmental concerns, equipment concerns, manager/instructor role conflict and ethical conflict) was related to concerns related to the unforgiving learning environment. Lastly, one element, student mental rehearsal, was significant to the open water (ocean) environment solely.

It became apparent, at the beginning of the study, that Henri's reflections in the classroom revolved around the incompatibility existing between the curricula presented in his Instructor Guide and the certifying agency's newly developed academic slide presentation. An examination of the transcript data indicated that this discrepancy elicited many reflective issues relating to his teaching practice, such as, 1) what material should be included in the lesson plan? (i.e., some topics included in the instructor guide [buddy system procedures and breathing air at depth] are not explicitly covered in the new slide presentation and, as witnessed by Henri's difficulty in getting his students to work together in buddy teams, caused learning difficulties when left out of the teacher's elaboration in the classroom), 2) what material should be left out of a lesson plan? (i.e., breathing air at depth was left out of the new system slides, therefore, Henri left the topic out of his classroom presentation, yet later a question appeared on the quiz relating to breathing air at depth), 3) how should the lesson plans be prepared? (i.e., presenting the material on the new presentation slides in a modular format proved difficult) and finally 4) how should the curricula in the instructor guide be integrated into the new slide presentation? (i.e., integrating the overview statements, objectives and values, and the body of knowledge found in the instructor manual with the topics in the new slide presentation proved difficult). Central to Schön's conception of reflection are these unknowns which caused curiosities and excitement and of itself drove Henri's inquiry process seeking resolution. Hence, Henri was as reflective about the issues he raised relative to the inconsistencies of the entry-level sport diving curriculum, as he was about his practice of implementing it. Thereby, the results of this study suggest that when the teacher articulated his opinion about issues regarding problems with the curriculum, he also reflected on how these issues affected his practice.

The second grouping of elements, pertaining to the unforgiving learning environment, were significant because they were only discussed through Henri's reflection in the classroom. The nature of these reflections was one of negativity and it was ironic that while these elements regarded action in the water environments, Henri

addressed the nature of the unforgiving learning environments in the classroom setting. Thus, he felt that the value in sharing the concerns about the unforgiving learning environment with his students in the classroom, they would be better prepared for the realities awaiting them in the pool and the ocean (i.e., the overwhelming amount of equipment and the poor visibility). The importance of providing students with the necessary tools to be used in the actual situation has also been determined by others (Brown et. al., 1989).

Finally, the nature of the reflection process identified a single element specific to the open water (ocean) environment. These reflective incidents were elicited as a result of reflection upon student difficulties in the open water environment. On several occasions, Henri reflected upon the explicit overt mental visualization approach to learning used by one of his students, who, throughout the study, had difficulty with each facet of the course. The interesting strategy the student used before each open water experience was a combination of mental rehearsal and overt action, in that, each exercise to be performed underwater was performed as a 'dry run' on the surface during the briefing. In a sense, this student's overt mental rehearsals acted as a primary source for Henri to reflect upon his practice thus providing him with the opportunity to examine whether his practice had been understood as intended. In short, the student's explicit overt mental rehearsal provided the teacher with another perspective in which to reflect upon his practice. The importance of mental practice enhancing the learning process and performance for both the student and teacher has also been highlighted in other studies (Singer, 1988; Porter and Foster, 1990; Orlick and McCaffery, 1991; Gordon, 1990; Sinclair and Sinclair, 1994).

Table 11. The nature of teacher reflection across the three teaching environments.

Nature of reflection (P) = reflection on positive practice (T) = reflection on troublesome practice	Teaching environments		
	Classroom environment	Confined water (pool) environment	Open water (ocean) environment
1. Across environment related			
Teaching strategies (P)	Yes	Yes	Yes
Getting to know the student/student ident. (P)	Yes	Yes	Yes
Body language (P)	Yes	Yes	Yes
Self criticism (T)	Yes	Yes	Yes
Frustration with teaching (T)	Yes	Yes	Yes
Student difficulties/missed student difficult. (T)	Yes	Yes	Yes
Teaching difficulties (T)	Yes	Yes	Yes
2. Classroom and confined water related			
Curriculum knowledge (P)	Yes	Yes	No
Content knowledge (P)	Yes	Yes	No
Instructor laziness (T)	Yes	Yes	No
Time constraints (T)	Yes	Yes	No
Trust relationship (P)	Yes	Yes	No
Currency in teaching/commitment (P)	Yes	Yes	No
3. Confined water and open water related			
Instructor control/anticipation (P)	No	Yes	Yes
Environmental context (T)	No	Yes	Yes
Instructor sensitivity (P)	No	Yes	Yes
Lack of control (T)	No	Yes	Yes
Student confusion (T)	No	Yes	Yes
Conflict resolution (P)	No	Yes	Yes
Video as a learning tool (P)	No	Yes	Yes
Context knowledge/teaching preference (P)	No	Yes	Yes
4. Classroom and open water related			
Equipment sales and selling diving (P&T)	Yes	No	Yes
5. Specific to one environment			
Elements related to sport diving curriculum (T)	Yes	No	No
Concerns related to the unforgiving environ. (T)	Yes	No	No
Student mental rehearsal (T)	No	No	Yes

Note: Descriptors and their definitions evolved from the teacher's dialogue in the stimulated recall sessions.

II. Discussion of critical issues arising from the study

The reflection documented in this study suggests that Schön's notion of reflective practice is very applicable to the professional development of sport diving as his conception of reflection applies to three areas of teaching in unforgiving learning environments: the problem solving disposition of teacher reflection, the learning from one's practice, and the probing of internal dialogue.

The problem solving disposition of teacher reflection

This study was undertaken by the prospect of being able to identify reflective incidents (positive and troublesome), within the domain of sport diving instruction, more specifically, to identify reflection during the course of a single stimulated recall session within a single teaching environment. It became immediately apparent that the activity of reflection arose as critical incidents, which were identified during the stimulated recall sessions, and emerged as a problem solving disposition across all teaching environments.

The reflective incidents and problem solving disposition displayed by the teacher within a teaching environment, were foundational to the identification of the reflective themes revealed within and across teaching environments as the reflective incidents and problem solving disposition often initiated the teacher's development of new frames to understand other issues related to his teaching practice. For example, the problem solving disposition of the teacher reflecting upon the controlled emergency swimming ascent demonstration in the confined water (pool) environment resulted in the reframing of his practice to incorporate the students' perspective. The teacher's problem solving disposition created associations between related incidents which combined into a variety of reflective themes within and across teaching environments. Hence, the nature of teacher reflection observed in this study indicated reflection was initially influenced by a disposition to resolve problematic critical incidents within a teaching environment. It was found that recurring themes were revealed between and across all the teaching environments.

The conceptualization of reflective practice as being comprised of a problem solving disposition, resulting in the identification of recurring themes between and across

the teaching environments, has important implications for professional development for teachers who function in unforgiving learning environments and specifically those who teach sport diving. Through the use of a problem solving disposition, i.e., reflective practice, in one environment, teachers might consider alternative ways to approach the complexity of teaching in another environment. Specifically, the guided development (by more experienced practitioners) of a reflective problem solving disposition might enable teachers to step back from their routine ways of approaching problematic practice and consider alternative instructional and management options in all three teaching environments and the consequence those choices might be expected to have on students struggling with learning to dive. In this manner, sport diving teachers should be encouraged to rely less on generically prepared instructional materials for classroom, confined water (pool), and open water (ocean) problems and gain confidence in their own strength as professionals through collaborative efforts with other practitioners.

Learning from one's practice

This study has extended Schön's notion of reflection, as it applies to teaching in unforgiving learning environments, by addressing 'why', 'how' and 'what' sport diving teachers reflect upon when engaged in the instructional process. The nature of teacher reflection, in which questions regarding 'why' teachers reflect upon their practice and 'how' teachers reflect upon their practice, has been the subject matter for many other studies (Ross, 1987; Krough, 1987; Shulman, 1988, Grimmitt, 1988; Loudon, 1989; MacKinnon, 1989; Clarke, 1992). The substance of teachers' reflective engagement, the 'what' question of teacher reflection, has also been studied by others but has received less attention (Boirko, Livingston, McCaleb, and Mauro 1988; Grimmitt and Creehan, 1990; Erickson and MacKinnon, 1991; Clarke, 1992). In addition to providing additional insights to the 'why' and 'how' question of reflective practice describe above, the results from this study have also provided a degree of perceptiveness to the 'what' question of the reflective process of sport diving practitioners and is discussed below.

The intent of the first research question - what factors do sport diving practitioners reflect upon in each of the three teaching environments - was to identify the substance of the reflective process in which sport diving practitioners engaged. Previous studies (Boirko et al., 1987; Russell, 1988) have provided insight to teacher reflection upon lesson content, other studies have highlighted teacher reflection on

student learning (Freiber and Waxman, 1990; Erickson and MacKinnon, 1991) and the teacher's reflection upon the ownership of one's practice has also been documented (Clarke, 1992). The results of these studies are consistent with the sixth main theme which emerged from this study. This theme, 'understanding one's practice', included the teacher's reflection upon lesson content, student learning, and the ownership of practice. The fourth main theme that emerged from the data of this study, 'learning from one's practice', stands out as significantly different from other studies.

Learning from one's practice embraced the teacher's reflection upon the 'pedagogical conduct' of his practice which he reflected on numerous occasions as he reviewed each of the teaching environments. Previous research has placed less emphasis upon teacher reflection regarding the pedagogical conduct of one's practice perhaps for several reasons. One possible explanation is the difference between the methods courses offered to student teachers, in the school setting, undertaking their professional year of study at a tertiary institution, and those offered to sport diving professionals in their instructor development courses. Earlier studies concerned with teacher reflection in teacher education were often conducted with teachers who have a sound theoretical and methodological grounding in pedagogical conduct, hence conduct was not an issue. Thus, in studies on reflection in the educational system, the pedagogical conduct of one's practice may have been subsumed within other themes or may not have been recognized as an issue for teachers at the time.

Another possible explanation is associated with the context in which studies on teacher reflection have taken place. In the school setting, studies generally take place in the classroom in which the physical surroundings, for the most part, remain relatively static, consistent and/or predictable from day to day and lesson to lesson. However, the sport diving context features three different teaching settings, one of which was a classroom, whereas the other two teaching environments involved physical settings that are dynamic not consistent and/or predictable from day to day or lesson to lesson. Hence, the teacher's reflection in this study focused upon learning from one's practice in an attempt to refine his pedagogical conduct which provides the basis for the safety of both the teacher and his students in these ever changing teaching environments. The contribution this study has to make, in this regard, is that learning from one's practice, in

its various forms, constituted a substantial component of the sport diving teacher's reflection across the three sport diving settings.

The probing of internal dialogue or guided discovery

One of the primary aims of professional development is to nurture a disposition and a capacity which will enable a teacher to be able to reflect-on-action and then eventually reflect-in-action. The three teaching environments of the beginner sport diving course provided a more complex and dynamic teacher setting than the settings in which Schön first clarified his notion of reflective practice. Schön's thinking on the nature and development of teachers' professional knowledge is not drawn from the field of teacher education, rather his studies are grounded in the practice of master teachers working with gifted protégés in primarily 'clinical' settings in which the students were provided a relatively risk free 'virtual' world in which to experiment. The students' experimentation, in Schön's work, primarily involved planning settings in which the student and the teacher collaborated on projects such as the design of a building and the preparation of a musical performance. The interactions between the master teacher and the gifted protégés, in these instances, reflected upon 'planning' in a 'virtual' world. In this study, the stimulated recall interaction between the teacher and the researcher reflected upon the 'planning' of lessons in three different teaching environments as well as the 'implementation' of what was planned. As reported in this study, the teacher's reflection included both the planning of action in the 'virtual' world and the implementation of the planned action in the 'real' world. Hence, the contribution this study has made in this regard is that teacher reflection-on-'reflection-in-action' and teacher reflection-in-action can be documented, although with difficulty, in the 'real' world.

Of significance between Schön's notion of reflective practice in the 'virtual' world and this study's examination of reflective practice in the 'real' world was Henri's examination of his practice which took the form of an internal dialogue. As previously noted, teacher reflection-in-action was documented with difficulty because the teacher had difficulty articulating his internal dialogue. This difficulty stemmed from the fact that much of this teacher's practice was dependent upon tacit recognitions and judgments. As pointed out by Schön, much of teachers' knowing about teaching is embedded within their actions and is often not consciously available to them. Hence, to reveal the tacit

understandings in the teacher's internal dialogue and therefore the nature of the reflection-in-action, in some cases, the researcher stimulated or probed the teacher's internal dialogue by engaging him in an external dialogue or exchange. In this way, the researcher conducted a guided discovery procedure which encouraged the teacher to frame and reframe instances which ultimately resulted in him 'seeing' his practice differently. The results of this study suggest the internal dialogue of the teacher may be revealed, and thus made available for critical analysis, through a guided discovery technique or a probing of the teacher's internal dialogue. This result provides evidence for the potential contribution of peer teachers in the development of the reflective practice of sport diving professionals.

III. Implications for practice

Since teacher educators, advocating reflective, inquiry-oriented teacher education, argue that reflective practice can be encouraged throughout teacher education (Pugach and Johnson, 1990; Wildman et al., 1990; Freiberg and Waxman, 1990), it follows that a discussion of how this is to be accomplished should be pursued. In this section, four suggestions for the provision of the opportunity, for teachers involved in teaching physical activities in unforgiving learning environments and specifically for teachers in the sport diving arena, to reflect upon their practice are presented under the following headings: observation of others, self-assessment of teaching, problem setting versus problem solving and the community practicum experience.

Observation of others

The issue of 'seeing' things from different perspectives was prevalent in many of the reflective themes identified in this study. In fact, access to different perspectives contributed significantly to the teacher's framing and reframing of his practice. This result is consistent with other studies (Wildman et al., 1990; and Ross, 1990) which have indicated that the access to a multiplicity of perspectives through networking, video tapes, dialoguing with other teachers and interactions with students have contributed to the development of reflective practice.

Observation of other sport diving teachers will provide newly certified sport diving instructors with the opportunity to actually observe specific teaching behaviors that were

emphasized in their instructor development courses. Furthermore, focused observation may allow the inexperienced sport diving practitioner to understand how these teaching behaviors can differentially influence student cognitive, affective and performance outcomes. Unless teachers actually have the opportunity to observe the effectiveness of these behaviors within each of the teaching environments of a beginner sport diving course, they may not 'appreciate' the value of these teaching skills. Moreover, through observation of others, skills important to reflective practice are activated, shaped and refined. Thus, the reflection documented in this study suggests that reflective practice is enhanced by providing opportunities for teachers to view their practice from a multiplicity of perspectives. Finally, the observation of others, in each teaching context applicable to sport diving instruction, brings some structure and relevance to what can otherwise be an overwhelming teaching assignment.

Self-assessment of teaching

The stimulated recall sessions involving the reconstruction of practice captured on video tapes were not intended as a tool for self-assessment of teaching but rather as a means at gaining insights to teacher reflection. However, the stimulated recall sessions and the reconstruction of practice captured on video tapes did provide perspicacity into possible ways of examining one's practice.

The sport diving teacher education programme involves the use of micro-teaching (Allen and Fortune, 1966; Bush and Allen, 1964) in which simulated teaching involves one instructor candidate teaching five or six other candidates for ten to twenty minutes. Typically the instructor candidates first learn a series of teaching behaviors, such as sequencing material, the use of instructional aids or underwater control measures and later teach other members of the group. The instructor candidate receives feedback as to which previously identified behaviors have been exhibited.

Both instructor candidates and instructor educators have questioned the utility and appropriateness of this summative use of micro-teaching because of its differences from the natural teaching environments (Good, Biddle, and Brophy, 1975). This environment provides minimal opportunities for reflection. Modification of the micro-teaching process, however, may provide opportunities for using it as a reflective tool providing opportunities for formative feedback, peer feedback, and self-assessment.

The micro-teaching experience may be modified to include the video taping of a segment of the candidate's teaching in each of the three teaching environments with actual students and actual circumstances. Later the micro-teaching segments captured on video can be stopped, started and reviewed allowing the candidate the opportunity to examine her/his practice 'first hand'. In this fashion the micro-teaching experience can enhance the reflective process and professional development by affording individuals the opportunities for self-assessment, insight into differing students' perspectives, learning from other candidates and receiving constructive criticism from their more experienced counterparts. Providing the encouragement and the climate for reflection in a modified micro-teaching experience increases the chance of professional growth.

Problem setting versus technical problem solving

Another aspect of reflection that emerged as a trend in this study was the teacher's attempts at problem setting as opposed to technical problem solving when trying to deliver instructional material to the students. Several examples contributed to the identification of this trend, with the common element being the teacher's attempts to make sense of how to integrate and implement the certifying agency's new instructional slide presentation with the instructor guide.

Professional competence is specific to domains, that is, in making correct decisions there are no global formulas (Shulman, 1986a). Teachers need detailed knowledge both of the teaching specialty and of how to employ that knowledge to teach others. Other researchers have studied the dilemmas faced by novice teachers as they struggle to teach material they have yet to learn (Shulman, 1986b, 1987; Ringstaff, 1987; and Grossman, 1988). The results of these studies are similar to the results found in this study that in the absence of detailed content knowledge or of pedagogical knowledge, teachers cannot make content as accessible to students.

The reflective practice of teachers depends upon content-specific knowledge, upon pedagogical knowledge, upon the knowledge of their students as a group and as individuals, and knowledge of the milieu of the teaching environments. Hence, reflective practice is enhanced not only by the depth of knowledge in these areas but also by a breadth of knowledge, and the interrelationship among these areas. Therefore, the results of this study suggest the breadth and depth of content knowledge and

pedagogical knowledge enables teachers to reflect upon their practice and upon their students' understandings which allows the teacher to better adapt his instruction to meet the students' needs.

The community practicum

A key element of reflective practice, identified in this study, was the addressing of particular problems of practice. Troublesome practice was precipitated by instances of uncertainty which in itself prompted teacher reflection. Thus, through entertaining situations of uncertainty the teacher's reflection produced the themes identified in this study. However, articulation of teacher reflection was not easily expressed in many situations and therefore the researcher applied a gentle probing dialogue to facilitate the teacher's vocalization of his reflection. The aforesaid instances were documented as the basis of productive teacher learning and reflection for both the teacher and the researcher. Hence, a peer from within the community, in this case the researcher, provided a comfortable atmosphere for this type of enunciation. Thus, if reflective practice is to be an important aspect of teaching, in unforgiving learning environments, sport diving instructors should be encouraged to discuss their practice with peers as it is through interactive dialogue that reflections on general teaching practices and contexts, reflection-on-action, and reflection-on-'reflection-in-action' can be identified and nurtured.

Other researchers have found, as revealed in this study, the acquisition of and continuing support for a reflective disposition among teachers can be mediated and substantially enhanced by peers, whose role might be described as helping to stretch the limits of their colleagues' capabilities for reflection (Pugach and Johnson, 1990). Peer collaboration, in the form of a community practicum, may engage two or more teachers in an interactive dialogue encouraging new strategies of reflective thinking. One teacher takes the role of 'initiator' and addresses a particular problem of practice (particular problems are posed and responded to as a means of reframing the nature of the problems), and the second teacher takes the role of 'peer facilitator' and guides her/his partner through the summarizing of the redefined problem, generating possible solutions and predicting what might happen should the solutions be utilized. Collaboratively, the teachers consider various ways of evaluating the effectiveness of the solution chosen. The documentation of reflection in this study suggests that peer

collaboration is needed to help even the most skilled teachers consider their practice in a reflective manner as teacher reflection is not likely to occur unless it is prompted.

IV. Further Research

There were many areas that emerged during the analysis that are worthy of further research attention. Three such areas; accepting change to the sport diving curriculum, the psychological skills training and the learning and instructional process, and the practicum as professional development for sport diving teachers, are highlighted here. All three are related to the reflective practices of teachers who teach in unforgiving learning environments and specifically of teachers in the sport diving industry.

Accepting change to the sport diving curriculum

The teacher's reflections in this study identified an incompatibility between curricula found in the Instructor Guide and the certifying agency's newly developed academic slide presentation. This discrepancy raised many issues for Henri about his teaching practice. One reason for this discrepancy may be that curricula changes are often introduced to teachers with the emphasis on the benefits of the innovation in general or on long-term goals and are expected to be implemented independently by the teachers. Yet even when the innovation is thoroughly explained at the outset, it cannot be absorbed, for teachers do not incorporate new ideas immediately and completely. Change is a process, not an event (Fullan, 1982).

Innovations are rationally advocated from the point of view of what is rational to the change agent, not the teachers, and as such are independently interpreted when left solely to the teachers. On top of all this, even potentially good changes do not fare well because far too many changes are in front of teachers at any one time. Regardless of the reasons, there are more changes being proposed than are humanly possible to implement, if by implementation we mean changes in behavior and thinking. A research project designed to give some support, external assistance and clearly provide procedural content for (how to implement) the curricula change might eliminate this issue. In this way the conditions and time needed to develop new practices will be realized.

The psychological skills training and the learning and instructional process

Another significant incident highlighted by the teacher as he reflected upon student difficulties in the open water environment was the explicit overt mental visualization approach of learning used by one of his students. This interesting strategy, a combination of mental rehearsal and overt action, was utilized by the student in an effort to perform a 'dry run' of exercises on the surface before actually having to perform them underwater. The consequence of this student's actions allowed Henri to reflect upon his practice from yet another perspective. There has been much research in the area of psychological skills training which was foundational to this student's strategy of preparation. A research project addressing, more specifically, the natural linkage between psychological skills training and the learning and instructional process, as well as the role of teachers in unforgiving learning environments as they design and manage the practice setting may provide new insight for the integration of mental skills (i.e., attention, focus, refocus, positive self talk, routine formulation, etc.) with the instructional process.

The practicum as professional development for sport diving practitioners

The teacher's reflection in this study stressed the importance of remaining 'up to date' and current with the certifying agency's standards and procedures of practice. The sport diving industry has not employed the pre-service teaching practicum typical of student teachers undergoing their professional year of study at a tertiary institution. This is likely because the Recreational Scuba Training Council (RSTC) require practitioners to have liability insurance before working with students, which is only possible by becoming fully accredited sport diving teachers. Hence, a pre-service teaching practicum has not been instituted into the educational system of sport diving practitioners, however, sport diving practitioners, once certified as instructors and having acquired liability protection, may engage in a teaching practicum, of sorts, under the supervision of another certified instructor. In this manner the essence of a preservice teaching practicum can serve the needs of a novice sport diving instructor in the same fashion the pre-service teacher practicum in education serves the needs of pre-service teachers. This same form of practicum, as long as liability protection is maintained, may be entered into at anytime throughout the sport diving teacher's career.

This study's results have underscored the productivity of working with another professional. The advantages and insights derived from such an experience are considerable and are relevant to both participants. The potential for professional development and the possibilities for maintaining currency with industry standards and procedures is inordinate. A research project addressing the possibility of implementing a mini-practicum, in which two teachers engage in reflective activities as they work together on one module of the curriculum per year, as a prerequisite for obtaining and maintaining one's liability insurance, would enhance teacher reflection and would be a method of propagating currency in the profession.

References

- Alexander, L. D. (1982) . Moving from theory to practice in physical education: The application of selected motor learning concepts. Unpublished masters major paper. University of British Columbia, Vancouver, British Columbia, Canada.
- Alexander, L. D. (1989) . A multi-case study of teacher planning in sport diver education. Unpublished masters major paper. University of British Columbia, Vancouver, British Columbia, Canada.
- Allen, D., and Fortune, J. (1966) . An analysis of micro-teaching: New procedures in teacher education. Micro-teaching: A description. Stanford University Press.
- Bain, L. (1985) . A naturalistic study of student's responses to an exercise class. Journal of Teaching in Physical Education, 5 (1), 2-12.
- Berlak, A., and Berlak, H. (1981) . Dilemmas of schooling: Teaching and social change. London: Methuen.
- Berliner, D. (1987) . Ways of thinking about students and classrooms by more or less experienced teachers. In J. Calderhead (Ed.), Exploring teachers' thinking. (pp. 60-84) . London: Cassell.
- Beyer, L. (1984) . Field experience, ideology, and the development of critical reflectivity. Journal of Teacher Education, 35 (3), 36-41.
- Bloom, B. S. (1953) . Thought processes in lectures and discussions. Journal of General Education, 7 (3), 160-169.
- Boirko, H., Livingston, C., McCaleb, J., and Mauro, L. (1988) . Student-teachers' planning and post-lesson reflections: Patterns and implications for teacher preparation. In Calderhead, J. (Ed.), Teacher's Professional Learning. London: Palmer Press.
- Brown, J. S., Collins, A., and Duguid, P. (1989) . Situated cognition and the culture of learning. Educational Researcher, 18 (1), 32-42.
- Bush, R., and Allen, D. (1964, January) . Controlled practice in the training of teachers. Paper presented at the Santa Barbara Conference on Teacher Education sponsored by the Ford Foundation.
- Carter, K., Sabers, D., Cushing, K., Pinnegar, S., and Berliner, D. (1987) . Processing and using information about students: A study of expert, novice and postulant teachers. Teaching and Teacher Education, 3, 147-157.
- Carter, K. (1990) . Teacher's knowledge and learning to teach. In W.R. Houston (Ed.), Handbook of research on teacher education (pp. 291-310) . New York: Macmillan.

- Clarke, A. (1992) . Student-teacher reflection in the practicum setting. Unpublished doctoral dissertation, University of British Columbia, Vancouver.
- Cochran-Smith, M. (1991) . Reinventing student teaching. Journal of Teacher Education, 42 (2), 104-118.
- Comeaux, M., and Peterson, P. (1988, October) . Teacher evaluation as an opportunity for promoting reflection. Paper presented at the Reflective Inquiry Conference, Orlando, Florida.
- Conners, R. D. (1978) . An analysis of teacher thought processes, beliefs and principles during instruction. Unpublished doctoral dissertation, University of Alberta, Calgary.
- Court, D. (1988) . Reflection-in-action: Some Definitional problems. In P. P. Grimmett and G. L. Erickson (Eds.), Reflection in teacher education (pp. 143-146). New York: Teachers College Press.
- Covey, S. R. (1990) . The seven habits of highly effective people: Restoring the character ethic. Fireside, Simon and Schuster, New York.
- Curtner-Smith, M. D. (1996) . The impact of an early experience on preservice physical education teachers' conceptions of teaching. Journal of Teaching in Physical Education, 15, 224-250.
- Darst, P., Mancini, V., and Zakrajsek, D. (1982) . Systematic observation: Instrumentation for physical education. West Point, NY: Leisure Press.
- Denzin, N. K. (1978) . Sociological methods. New York: McGraw-hill.
- Dewey, J. (1925) . Experience and nature. New York: Macmillan.
- Dewey, J. (1933) . How we think: A restatement of the relation of reflective thinking to the educational process. Chicago: Henry Regnery Co.
- Dougherty, N. J. (1990) . The professionally standardized instructional system: A valuable tool in the reduction of programmes and instructor liability. In International PADI, Inc. (Eds.), General standards and procedures of the PADI instructor manual appendix. (pp. A9-A10) . Santa Ana, CA: Professional Association of Diving Instructors.
- Doyle, W. (1990) . Case methods in the education of teachers. Teacher Education Quarterly, 17 (1), 7-15.
- Erickson, G., and MacKinnon, A. (1991) . Seeing in new ways: On becoming a science teacher. In D. Schön (Ed.), The reflective turn: Case studies in professional practice (pp. 15-36) . New York: Teachers College Press.
- Feiman, S. (1979) . Technique and inquiry in teacher education: A curricular case study. Curriculum Inquiry, 9, 63-79.

- Feiman, S. (1980) . Growth and reflection as aims in teacher education. In G. Hall, S. Hord, and G. Brown (Eds.), Exploring issues in teacher education: Questions for future research. Austin, TX: The University of Texas Research and Development Center for Teacher Education.
- Feiman-Nemser, S. (1983) . Learning to teach. In L. Shulman and G. Sykes (Eds.), Handbook of teaching and policy (pp. 150-170) . New York: Longman.
- Feiman-Nemser, S. (1986) . The cultures of teaching. In M. Wittrock (Ed.), Handbook of Research in Teaching (3rd ed.) . (pp. 505-526) . New York: Macmillan.
- Feiman-Nemser, S. (1990) . Teacher preparation: Structural and conceptual. In W. Houston (Ed.) Handbook of Research in Teacher Education (pp. 212-233) . New York: Macmillan and the Association of Teacher Educators.
- Feiman-Nemser, S., and Parker, M. B. (1990) . Making subject mater part of the conversation in learning to teach. Journal of Teacher Education, 41 (3), 21-31.
- Fenstermacher, G. D., and Soltis, J. F. (1986) . Approaches to teaching. New York: Teachers College Press.
- Fisher, C., Filby, N., Marliave, R., Cahen, L., Dishaw, M., Moore, J., and Berliner, D. (1978) . Teaching behaviors academic time, and student achievement: Final report of Phase III-B, Beginner Teacher Evaluation Study. San Francisco. Far West Laboratory for Educational Research and Development.
- Freiberg, J., and Waxman, H. (1990) . Reflection and the acquisition of technical teaching skills. In R. Clift, R. Houston, and M. Pugach (Eds.), Encouraging reflective practice in education (pp. 119-138) . New York: Teachers College Press.
- Fullan, M. (1982) . The meaning of educational change. OISE Press, The Ontario Institute for Studies in Education.
- Gagné, E. D., Yekovich, C., W., and Yekovich, F. R. (1993) . The cognitive psychology of school learning. Harper Collins College Publishers.
- Geertz, C. (1973) . The interpretation of cultures. New York: Basic Books.
- Gilliss, G. (1988) . Schön's reflective practitioner: A model for teachers? In P. P. Grimmett and G. L. Erickson (Eds.), Reflection in teacher education (pp. 47-53) . New York: Teachers College Press.
- Giroux, H. (1981) . Ideology, culture, and the process of schooling. London: Falmer.
- Glasser, B., and Strauss, A. (1967) . The discovery of grounded theory. Chicago: Aldine-Atherton.
- Goldman-Segall, R. (1995) . Configurational validity: A proposal for analyzing ethnographic multimedia narratives. Journal of Educational Multimedia and Hypermedia, 4, (2), 163-183.

- Good, T., Biddle, B., and Brophy, J. (1975) . Teachers make a difference. New York: Harper and Row.
- Goodman, J. (1988, October) . University constraints of reflective teacher education. Paper presented at Reflective Inquiry Conference, Orlando, Florida.
- Gordon, S. (1990) . A mental skills training programme for the Western Austrian state cricket team. The Sport Psychologist, 4, 386-399.
- Grimmett, P.P., (1988) . The nature of reflection and Schön's conception in perspective. In P. P. Grimmett and G. L. Erickson (Eds.), Reflection in teacher education (pp. 5-15) . New York: Teachers College Press.
- Grimmett, P. P. (1989) . A commentary on Schön's view of reflection. Journal of Curriculum and Supervision, 5 (1), 19-28.
- Grimmett, P., and Creehan, P. (1990) . Barry: A case study of teacher reflection in clinical supervision. Journal of Curriculum and Supervision, 5 (3), 214-235.
- Grimmett, P. P., Erickson, G. L., MacKinnon, A., and Riecken, T. (1990) . Reflective practice in teacher education. In R. Clift, R. Houston, and M. Pugach (Eds.), Encouraging reflective practice in education. (pp. 20-38) . New York: Teachers College Press.
- Grimmett, P. P., and MacKinnon, A. M. (1992) . Craft knowledge and the education of teachers. Review of Educational Research, 118, 1-20.
- Grossman, P. L. (1988, April) . Learning to teach without teacher education. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Guba, E. G. (1981) . Criteria for assessing the trustworthiness of naturalistic inquiries. Educational Communications and Technological Journal, 29 (2), 75-91.
- Guba, E.G., and Lincoln, Y.S. (1982) . Epistemological and methodological bases of naturalistic inquiry. Educational Communication and Technology Journal, 30, 233-252.
- Guba, E. G., and Lincoln, Y. S. (1994) . Competing paradigms in qualitative research. In Denzin, N. K. and Lincoln, Y. S. (Eds.), Handbook of quantitative research. (pp. 105-117) . Thousand Oaks, CA: Sage Publications.
- Gumperz, J. (1981) . Conversational inference and classroom learning. In J. L. Green and C. Wallat (Eds.); Ethnography and language in educational settings. Norwood, NJ" Ablex.
- Guyton, E., and McIntyre, D. L. (1990) . Student teaching and school experiences. In W.R. Houston (Ed.), Handbook of research on teacher education (pp. 514-534) . New York: Macmillan.

- Haring, M., and Nelson, E. (1980, April) . A five year follow-up comparison of recent and experienced graduates from campus and field based teacher education programs. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.
- Harris, I. (1989) . A critique of Schön's views on teacher education: Contributions and issues. Journal of Curriculum and Supervision, 5 (1), 15-18.
- Houston, R., and Clift, R. (1990) . The potential for research contributions to reflective practice. In R. Clift, R. Houston, and M. Pugach (Eds.), Encouraging Reflective Practice in Education (pp. 208-222) . New York: Teachers College Press.
- Johnston, S. (1992) . Images: A way of understanding the practical knowledge of student teachers. Teaching and Teacher Education, 8 (2), 123-136.
- Karrass, C. L. (1992) . The negotiating game: How to get what you want. HarperCollins Publishers, Inc., New York.
- Kilbourn, B. (1988) . Reflecting on vignettes of teaching. In P. P. Grimmett and G. L. Erickson (Eds.), Reflection in teacher education (pp. 91-111) . New York: Teachers College Press.
- Kliebard, H. (1972) . Metaphorical roots of curriculum design. Teachers College Record, 73, 403-404.
- Krough, S. (1987, April) . Reflection on reflective thinking in methods classes: Where the buck finally stops. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.
- LaBoskey, V. (1989) . From studio to classroom – or not? Journal of Curriculum and Supervision, 5 (1), 29-33.
- LaBoskey, V., and Wilson, S. (1987, April) . The gift of case study pickle: Case writing in the education of reflective teachers. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.
- Lave, J., and Wegner, E. (1991) . Situated learning: Legitimate peripheral participation. Cambridge, MA: Cambridge University Press.
- Lincoln, Y., and Guba, E. (1985) . Naturalistic inquiry. California: Sage Publications.
- Locke, L. (1970) . Supervision, schools and student teaching: Why things stay the same. Academy Paper, 13, 65-74.
- Logsdon, B.J., Barrett, K.R., Ammons, M., Broer, M.R., Halverson, L.E., McGee, R., and Robertson, M.A. (1984) . Physical education for children: A focus on the teaching process. Philadelphia: Lea and Febiger.
- Lortie, D. (1975) . Schoolteacher: A sociological study. Chicago: University of Chicago Press.

- Louden, W. (1989) . Understanding Teaching: Meaning and method in collaborative research. Unpublished doctoral dissertation, University of Toronto, Toronto.
- Lutz, F. W. (1981) . Ethnography – the holistic approach to understanding schooling. In J. L. Green and C. Wallat (Eds.), Ethnography and language in educational settings. Norwood, NJ: Albex.
- Mackay, H. (1988) . Swim with the sharks without being eaten alive. Ballentine Books a division of Random House, Inc., New York.
- Mackinnon, A. (1987) . Detecting reflection-in-action among preservice elementary science teachers. Teaching and Teacher Education, 3 (2), 135-145.
- Mackinnon, A. (1989) . Conceptualizing a 'reflective practicum' in constructivist science teaching. Unpublished doctoral dissertation. University of British Columbia, Vancouver.
- Mackinnon, A., and Erickson, G. L. (1988) . Taking Schön's ideas to a science teaching practicum. In P. P. Grimmett and G. L. Erickson (Eds.), Reflection In Teacher Education (pp. 113-137) . New York: Teachers College Press.
- Magill, R. A. (1998) . Motor learning concepts and applications. (Rev. ed.) . Dubuque, Iowa: WCB McGraw-Hill.
- Magoon, A. J. (1977) . Constructivist approaches to educational research. Review of Education Research, 47 (4), 651-693.
- Marx, R. W., and Petersen, P. L. (1975, April) . The nature of teacher decision making. Paper presented to the American Educational Research Association, Washington, DC.
- McCormack, M. H. (1984) . What they don't teach you at Harvard business school. Bantam Books, New York.
- Merriam, S. B. (1985) . The case study in education research: A review of selected research. The Journal of Educational Thought, 19 (1), 204-217.
- Novak, J., and Gowin, A. (1984) . Learning how to learn. Cambridge University Press.
- O'Gorman, R. (1989) . Knowing is in action. Journal of Curriculum and Supervision, Fall, 5 (1), 10-12.
- Orlick, T., and McCaffery, N. (1991) . Mental training with children for sport and life. The Sport Psychologist, 5, 3-334.
- Placek, J. H., and Locke, L. F. (1986) . Research on teaching in physical education: New knowledge and cautious optimism. Journal of Teacher Education, 37 (4), 24-28.

- Placek, J., Siverman, S., Shute, S., Dodds, P., and Rife, F. (1982) . Academic learning time (ALT-PE) in a traditional elementary physical education setting: A descriptive analysis. Journal of Classroom Interaction, 17 (2), 41-47.
- Plato. (1964) . The collected dialogues of Plato . E. Hamilton and H. Cairns (Eds). New York: Bollingen Foundation.
- Popkewitz, T., Tabachnick, B., and Zeichner, K. (1979) . Dulling the senses: Research in teacher education. Journal of Teacher Education, 30, 52-60.
- Porter, K., and Foster, J. (1990) . Visual athletics: Visualization for peak sports performance. Dubuque, IA: Brown.
- Pugach, M., and Johnson, L. (1990) . Developing reflective practice through structured dialogue. In R. Clift, R. Houston, and M. Pugach (Eds.), Encouraging Reflective Practice in Education (pp. 186-207) . New York: Teachers College Press.
- Ringstaff, K. (1987, April) . Teacher misassignment: The influence of subject matter knowledge on teacher planning and instruction. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.
- Rist, R. C. (1982) . On the application of ethnographic inquiry to education: procedures and possibilities. Journal of Research in Science Teaching, 19, 439-450.
- Ross, D. (1987, October) . Reflective teaching: Meaning and implications for preservice teacher educators. Paper presented at the Reflective Inquiry Conference, Houston, Texas.
- Ross, D. (1990) . Programmatic structures for the preparation of reflective teachers. In R. Clift, R. Houston, and M. Pugach (Eds.), Encouraging reflective practice in education (pp. 97-118) . New York: Teachers College Press.
- Russell, T. (1988, October) . Documenting reflection-in-action. Paper presented at the Reflective Inquiry Conference, Orlando, Florida.
- Schön, D. A. (1983) . The reflective practitioner: How professionals think in action. New York: Basic Books.
- Schön, D. A. (1987) . Educating the reflective practitioner. San Francisco: Jossey Bass.
- Schön, D. A. (1988) . Coaching reflective teaching. In P. P. Grimmett and G. L. Erickson (Eds.), Reflection in teacher education (pp. 19-29) . New York: Teachers College Press.
- Sciarappa, J. (1990) . Defensive teaching: A *must*. In International PADI, Inc. (Eds.), General standards and procedures of the PADI instructor manual appendix. (pp. A15-A18) . Santa Ana, CA: Professional Association of Diving Instructors.
- Sebren, A. (1995) . Preservice teachers' reflections and knowledge development in a field-based elementary physical education methods course. Journal of teaching Physical Education, 14, 262-283.

- Selman, M. (1988) . Schön's gate is square: But it is art. In P. P. Grimmett and G. L. Erickson (Eds.), Reflection in teacher education (pp. 177-192) . New York: Teachers College Press.
- Selye, H. (1974) . Stress without distress. Signet Books, The New American Library of Canada Limited, Scarborough, Ontario.
- Sergiovanni, T. (1985) . Landscapes, mindscapes, and reflective practice in supervision. Journal of Curriculum and Supervision, 1 (1), 5-17.
- Shulman, L. S. (1986a) . Those who understand: Knowledge growth in teaching. Educational Researcher, 15 (2), 4-14.
- Shulman, L. S. (1986b) . Paradigms and research programs in the study of teaching: A contemporary perspective. In M. Wittrock (Ed.), Handbook of Research on Teaching, (3rd ed., pp. 3-36) . New York: Macmillan.
- Schulman, L. S. (1987) . Knowledge and teaching: Foundations of the new reform. Harvard Educational Review, 57 (1), 1-22.
- Shulman, L. S. (1988) . The nature of reflection and Schön's conception in perspective. In P. P. Grimmett and G. L. Erickson (Eds.), Reflection in teacher education (pp. 31-37) . New York: Teachers College Press.
- Shulman, L. S., and Elstein, A. S. (1975) . Studies of problem solving, judgement and decision making: Implications for educational research. In F. N. Kerlinger, (Ed.), Review of Research in Education, Volume 3, Itasca, Illinois: Peacock.
- Shreeves, K. (1995a) . The tyranny of "academic freedom". In International PADI, Inc. (Eds.), The best of the undersea journal (pp. 3.1-3.3) . Santa Ana, CA: Professional Association of Diving Instructors.
- Shreeves, K. (1995b) . Your judgement will be judged. In International PADI, Inc. (Eds.), The best of the undersea journal (pp. 3.3) . Santa Ana, CA: Professional Association of Diving Instructors.
- Singer, R. N. (1988) . Strategies and metastrategies in learning and performing self-paced athletic skills. The Sport Psychologist, 2, 49-68.
- Siedentop, D., Birdwell, D., and Metzler, M. (1979, April) . A process approach to measuring teaching effectiveness in physical education. Paper presented at the National Convention of the American Alliance for Health, Physical Education, Recreation, and Dance.
- Sinclair, G. D., and Sinclair, D. A. (1994) . Developing reflective performers by integrating mental management skills with the learning process. The Sport Psychologist, 8, 13-27.
- Smith, L. M., (1982) . Benefits of naturalistic methods in research in science education. Journal of Research in Science Teaching, 19, (8), 627-638.

- Spradley, J. P. (1980) . Participant observation. New York: Holt, Rinehart and Wilson.
- Tinning, R., and Siedentop, D. (1985) . The characteristics of tasks and accountability in student teaching. Journal of Teaching in Physical Education, 4 (4), 286-299.
- Tom, A. (1980) . The reform of teacher education through research: A futile quest. Teachers College Record, 82, 15-29.
- Tom, A. (1985) . Inquiring into inquiry-oriented teacher education. Journal of Teacher Education, 36 (5), 35-44.
- Tsangaridou, N. and O'Sullivan, M. (1994) . Using pedagogical reflective strategies to enhance reflection among preservice physical education teachers. Journal of Teaching in Physical Education, 14, 13-33.
- Tuckwell, N. (1982) . Stimulated recall: Theoretical perspectives and practical and technical considerations. (Occasional Paper Series: Technical Report 8-2-3). Alberta: University of Alberta, Center for Research in Teaching.
- Turney, C., Eltis, K., Towler, J., and Wright, R. (1985) . A new basis for teacher education: The practicum curriculum. Sydney: University Press.
- von Glasersfeld, E. (1987) . Constructivism. In Husen and Postlewaite (Eds.), International Encyclopedia of Education. Oxford: Pergamon Press.
- Walker, R. (1981). On the uses of fiction in educational psychology to education. The Journal of Educational Psychology, 1, 5-12.
- Wang, B. (1977) . An ethnography of a physical education class: An experiment in integrated living. Dissertation Abstracts International, 38, 1980A. (University Microfilms No. 7721750).
- Westerman, D. A. (1991) . Expert and novice teacher decision making. Journal of Teacher Education, 42, 292-305.
- Wideen, M. F., Mayer-Smith, J. A., and Moon, B. J. (1993, October) . The research on learning to teach: Prospects and problems. Paper presented at the annual meeting of the American Educational Research Association, Atlanta, GA.
- Wildman, T., Magliaro, S., Niles, J., and McLaughlin (1990) . Promoting reflection among beginning and experienced teachers. In R. Clift, R. Houston, and M. Pugach (Eds.), Encouraging reflective practice in education (pp. 139-162) . New York: Teachers College Press.
- Yinger, R. (1987) . Learning the language of practice. Curriculum Inquiry, 17 (3), 293-317.
- Zeichner, K. M. (1981) . Reflective teaching and field-based experience in teacher education. Interchange, 12, 1-22.

- Zeichner, K. M. (1983) . Alternative paradigms in teacher education. Journal of Teacher Education, 34 (3), 3-9.
- Zeichner, K. M. (1987) . Preparing reflective teachers: An overview of instructional strategies which have been employed in preservice teacher education. International Journal of Educational Research, 11 (5), 565-575.
- Zeichner, K. M., and Liston, D. (1987) . Teaching student teachers to reflect. Harvard Educational Review, 57 (1), 23-48.
- Zeichner, K., and Tabachnick, B. (1982) . The belief systems of university supervisors in an elementary student teaching program. Journal of Education for Teaching, 8, 34-54.

Appendix A – The camera and the researcher

This study involved the presence of both a video camera and the researcher in the practice setting. This potential intrusion into the teacher's environment slightly altered the typical practice setting, particularly in the classroom environment. To minimize any possible detrimental affects associated with this necessity, the researcher video taped the pilot study within the same sport diving educational facility which participated in the main study. Since the confined water (pool) environment and the open water (ocean) environment involved the extensive use of a great deal of equipment, the integration of the video camera was not an issue.

The following transcript excerpts from Henri's participation in the stimulated recall sessions provide evidence that neither the camera and the resulting video quality nor the presents of the researcher hindered or in any way altered the practice setting. There are transcript excerpts from each of the three teaching environments.

The camera and the researcher in the classroom environment

4645 Henri: Ya, ya the camera seems positioned a bit, a bit more to the, oh maybe

4646 not.

4647

4648 Lesley: I'm moving it.

4649

4650 Henri: You're moving it?

4651

4652 Lesley: Actually, I'm following you.

4653

4654 Henri: Right.

4655

4656 Lesley: So, because of that I can imply then that the camera didn't bother

4657 you?

4658

4659 Henri: No, it did not.

(S6, CR5, V1, A 3A3B, TL 4645-4659)

The camera and the researcher in the confined water (pool) environment

582 **Lesley:** Did you ah....think that the video was going to be this clear?

583

584 **Henri:** No. No actually it's really good.

(S3, CW1/2, V2, A 4A, TL 582-584)

995 **Lesley:** When you're in the pool and you are demonstrating and in control of
996 your students and getting them to do the skills for you and that, were you aware
997 of the video camera being around?

998

999 **Henri:** Not under water, on the surface I knew it was there but ah, well it, when
1000 actually, it was when I demonstrated the skill I, I was aware because often the
1001 video camera was where the students are but when I'm working with the students
1002 I had no idea, I mean, I knew it was there but it wasn't affecting me in any way. It
1003 was behind me and I couldn't see the camera.

(S5, CW3/4, V2, A 4A4B, TL 995-1003)

The camera and the researcher in the open water (ocean) environment

143 **Henri:** ...ya that's not bad clarity under

144 water....

145

146 **Lesley:** Are you surprised?

147

148 **Henri:** I'm, surprised, very surprised, yes.

149

150 **Lesley:** I mean, the visibility under water seemed quite bad.

151

152 **Henri:** Ya, it did.

153

154 **Lesley:** But the video, um, has turned out ah....

155

156 **Henri:** Ya....

157

158 **Lesley:**quite well?

159

160 **Henri:** I would, I would say that's good, yes.

(S8, OW1, V3, A 5A, TL 144-160)