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An Evaluation of the Development of Clinical Reasoning skills in a cohort of Occupational Therapy students in Hong Kong: Implications for Curriculum Design

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Abstract

The aim of the study was to evaluate how Hong Kong Occupational Therapy students develop their clinical reasoning abilities and progress through the stages of their undergraduate curriculum. The study examines a range of factors that may affect their development of clinical reasoning.

The student cohort was composed of a class of 80 BSc (Honours) occupational therapy students at the Hong Kong Polytechnic University. The study was predominantly quantitative; however, focus group interviews were included among a range of methodologies. Validated test instruments were administered during the four instances of pre- and post-clinical education intervention. The Study Process Questionnaire (Biggs, 1987c) assessed approaches to learning. The Moore & Fitch Inventory of Learning Preferences (cited in Woods, 1994) was administered to determine whether or not changes in students' learning preferences and attitudes affected clinical reasoning skills. The Self-Assessment of Clinical Reflection and Reasoning (Royeen et al, 1994) was administered as a pre- and post-clinical education intervention to evaluate students' level of clinical reflection and reasoning skills. A focus group interview was designed to probe students' understanding and application of clinical reasoning processes.

The study's findings enhance our understanding of the progressive development of students' clinical reasoning skills through novice to expert continuum. Extrapolating into the undergraduate domain, this study highlighted the difficulties students face when trying to reason through, integrate and synthesize their theoretical learning in both academic and clinical education settings. An outcome of this study identified that clinical reasoning is multifaceted and complex in its application.

The major conclusions suggest ways in which the development of Hong Kong students' clinical reasoning skills could be enhanced by taking account of their

culturally influenced learning styles. As clinical reasoning does not occur in isolation, students need to develop these skills, establish the connection between theory and practice, and apply these skills in client intervention.

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Chapter 1

INTRODUCTION

1.1 Introduction

This chapter sets the scene by introducing the reader to the significance and the scope of study. It begins with the background and justification of the study and a statement of purpose that outlines the main research objectives. It also provides a rationale for the development of reasoning skills from a novice to an expert therapist including the learning strategies that underlie successful development of clinical expertise.

Occupational therapy, as a practice-based profession with a service-oriented nature, is undergoing evolution, particularly in recent years. There has been move from institutional care to community-based care with growing emphasis on a client-centred approach. Occupational therapy service provision has extended from medically based institutions to a variety of community, educational, social service agencies, and private practice (Law & Mills, 1998; McColl, 1998; Chan et al, 1999; DH, 2000; Ranka, & Chapparo, 2000). As the health and social care system is adopting a client-centred approach, the provision of health and social care services should be geared towards a client's individual needs. The client-centred approach involves valuing the individual, understanding a client's occupational needs and their health and social care experiences (Cohn & Crist, 1995; Law & Mills, 1998; Ranka & Chapparo, 2000; Scaffa, 2001).

As a result of the rapid changes in the health care and social environment, occupational therapy practice is now facing new challenges. Demands of consumer groups, expectation of documentation, and the need for accountability of services and government intervention in service delivery have made an impact on every therapist. Within this context occupational therapists have a mandate to develop and implement therapy programs aimed at promoting maximum levels of independence in life skills and optimal quality of life. The process of occupational therapy in this context consists of problem solving under conditions of uncertainty and change (Rogers & Masagatani, 1982; Mattingly & Fleming, 1994; Sadlo, 1997; Vroman & MacRae, 1999; Martin, 2000).

Changes in the direction of health and social care also contributed to the interest and development of occupational therapy services in emerging new settings. The re-emergence of an occupational focus for the profession is changing the basis of practice from a medical model to a socio-political (community) model, which emerges the client in the process of care (Scaffa, 2001; Baum, 2002). As a result of these developments, fieldwork educators are now questioning the academic leaders to " provide practical (fieldwork) experiences addressing these emerging issues such as quality of life, client self-determination, advocacy, health promotion, (and) disease prevention" in order to prepare students for the movement of health care services into the community (Cohn & Crist, 1995, p104).

Clinical reasoning, the thought processes that clinicians use during evaluation and treatment, is central to practice (Mattingly & Fleming, 1994; Dutton, 1995; Neistadt, 1998). Teaching clinical reasoning is therefore vital to the professional preparation of occupational therapy students (Royeen, 1995; Martin, 2000). The types of clinical reasoning that have been identified in the occupational therapy literature include narrative reasoning, interactive reasoning, procedural reasoning, pragmatic reasoning, and conditional reasoning (Neistadt, 1996, 1998; Liu, Chan, & Hui-Chan, 2000; Ranka & Chapparo, 2000).

Narrative reasoning focuses on the client's occupational story which reflects the activities and roles that the client values (Clark, 1993; Neistadt, 1996; Ranka & Chapparo, 2000). Interactive reasoning focuses on the client as a person and examines the illness experience (Crepeau, 1991; Fleming, 1991a). Procedural reasoning focuses on identifying occupational therapy problems and treatment on the basis of the client's disease or disability (Fleming, 1991a; Mattingly & Fleming, 1994). Pragmatic reasoning considers the treatment environment and the possibilities of treatment within a given setting as well as the therapist's level of skill and experience (Schell & Cervero, 1993; Creighton et al, 1995). Conditional reasoning focuses on continuous modification of treatment to enable the person to function in the future (Fleming, 1991a). By using these different types of clinical reasoning, therapists view their clients not only as individuals with physical ailments, but also as social individuals within a context of family, environment, and culture (Fleming, 1991b).

The development of clinical reasoning follows a continuum from novice to expert with the accumulation of the clinical experience (Benner, 1984; Dreyfus & Dreyfus, 1986; Slater & Cohn, 1991; Dutton, 1995; Strong et al, 1995; Neistadt, 1996; Unsworth, 2001; Mitchell & Unsworth, 2005). According to Dutton (1995), a novice student is less flexible in applying the rules and principles learnt in school without considering the circumstances of the particular case when compared with the expert counterpart. Expert therapists seem to be able to organise their approach more in line with clients' cues than from preconceived plans of treatment. They are able to recognise clients' problems and potential by relating past and present experiences to set realistic goals with their clients. It is a normal development process for newly graduated therapists to move from being novices to experts and to develop competence in using appropriate clinical reasoning styles with different clients. However, other studies showed that this process could be facilitated when novice therapists went through a curriculum that prepared them with the awareness of the types of reasoning and their practice (Benner; 1984; Neistadt, 1996; Liu, Chan, & Hui-Chan, 2000; Ranka & Chapparo, 2000).

Occupational therapists work with a multitude of problems, many of which can be characterised by complexity, uniqueness and ambiguity. The goal of occupational therapists is wise action, which means making the best judgements in a specific context. The ability to treat the person's problem with professional and expert knowledge, and the ability to interact with the patient, as a person is important in occupational therapy. The degree to which therapists possess these skills seems to vary with the experience, personal traits, and points of view of individual therapists. The development of procedural expertise can probably be accounted for by education and experience. Studies, such as those conducted by Dreyfus (1972), Dreyfus & Dreyfus (1986), Benner (1984), and Benner & Tanner (1987), postulate a continuum of learning and skill that practitioners acquire through experience.

The above studies have begun to enlighten our understanding of how new procedural expertise evolves and develop. The question of how interactive skill and interactive reasoning evolve and develop in practitioners is not yet sufficiently addressed in the professional development or clinical-reasoning literature (Mattingly & Fleming, 1994). We know that experience is necessary, but certainly not sufficient, condition for expertise. In addition, we still know little about the process of how expertise is acquired, even though much research has been done on expert-novice differences, particularly in problem-solving or reasoning (Benner, 1984; Dreyfus & Dreyfus, 1986; Sadlo, Piper, & Agnew, 1994; Robertson, 1996; Vroman & MacRae, 1999; Unsworth, 2001; Mitchell & Unsworth, 2005).

Most efforts in promoting occupational therapists' problem solving and reasoning skills are based on the assumption that these skills are largely dependent on a set of generalised processes. The Occupational Therapy faculty has referred to theories and models, which illustrate the general properties of clinical reasoning, as well as the processes on teaching occupational therapy students. However, clinical problem solving in itself involves complex processes, and skills are not easily developed by this direct, step-wise protocol (Royeen & Salvatori, 1997; Sadlo, 1997; Vroman & MacRae, 1999; Martin, 2000). As a result, a line of examining the nature of clinical problem solving prevails. Furthermore, although clinical reasoning has been defined as one of the critical elements of occupational therapy education, there is an unresolved question whether clinical reasoning ability is generic or inherently related to the skills and dispositions of a clinical problem-solving process. And to what extent clinical reasoning skills can be taught to the occupational therapy students if this ability can be learned is still unclear.

There are a number of aspects of clinical reasoning, which require further research. These include further exploration of the nature of the reasoning process, the direct applicability of the hypothetico-deductive reasoning process to occupational therapy and the complex interaction between knowledge and reasoning. Contemporary researchers were dissatisfied with the representation of hypothetico-deductive reasoning and heuristics in explaining the occupational therapists' clinical decision making (Barrows et, 1978; Elstein, Shulman & Sparfka, 1978; Feltovich et al, 1984). In view of the assumption that most occupational therapy educators hold, the variables most commonly associated with the hypothetico-deductive model did not prove adequate in differentiating strong from weak problem solvers (Bordage & Lemieux, 1991). Instead credence was given to information-processing approach (Newell & Simon, 1972), with a presumption that it is generalised to solve all problems across the occupational therapy field provided the practitioners employ each proposed strategy or process in dealing with any clinical problem (Cohn & Crist, 1995; Bonello, 2000; Hocking & Rigby, 2002).

From a critical examination of literature, there is clear evidence, which supports speculations that the failure of occupational therapy students' skills in clinical problem solving is dependent upon the instruction used for the related skill development. This poses a challenge to both occupational therapy education and occupational therapy practice in providing opportunities and resources for practising problem solving skills (Sadlo, Piper, & Agnew, 1994; Vroman & MacRae, 1999; Liu, Chan, & Hui-Chan, 2000; Martin, 2000). Occupational therapy education, on the other hand, is confronted with the challenge of determining the content, curricular strategies and opportunities that describe, explore and develop clinical skills. The essence of this study is that there is no single way to look at clinical reasoning – rather it is multifaceted and complex. Further research therefore, is needed to determine whether or not expert clinicians produce different and more effective patient outcomes than do novice clinicians.

1.2 Setting the Scene

There is a notion that individuals are regarded as effective problem solvers with reasoning abilities if they pass the written examination designed to assess the essential knowledge that is related to the clinical problem-solving context. However, only little evidence (for example, Robertson, 1996; Higgs & Jones,2000; Martin, 2000; Ranka & Chapparo, 2000) is available to support the view that students can transfer their knowledge and adopt specific cognitive strategies in understanding the situation while trying to solve the problem. In fact, most occupational therapy teachers believe that students need to be helped to understand how therapists make sense of clinical problem situations and how they decide on the progress of the therapy.

Clinical reasoning has been studied since the early 1980s and its types, styles and process of reasoning are well discussed in the occupational therapy literature (Schell & Cervero, 1993; Crabtree, 1998). In the absence of sound clinical reasoning, clinical practice becomes a technical operation requiring direction from a decision-maker (Higgs & Jones, 2000). Among many descriptions, clinical reasoning can also be described as the types of inquiry or thinking that a therapist does to understand clients and their problems in doing routine occupations. It is a specialised cognitive process that uses thinking and sometimes talking (narrative) to facilitate effective problem solving and decision making (Reed & Sanderson, 1999). It provides a language that may assist therapists to articulate their reasoning to others.

According to Higgs & Jones (2000), three core elements are essential to skilled clinical reasoning; use of knowledge, the act of cognition or thinking and the process of metacognition. Knowledge is essential for reasoning and decision-making, which are central to professional practice. In the health professions, clinical reasoning provides the vehicle for knowledge use in clinical practice as well as for knowledge generation (Bordage & Limieux, 1986; Grant & Marsden, 1987; Higgs & Titchen, 2000). Metacognition, on the other hand is reflective self-awareness. It is thinking, which is over and above normal conscious thinking (cognition). It refers to having knowledge, and examining one's own cognitive processes (Higgs, 1992). Metacognitive skills can be thought of as cognitive skills that are necessary for the management of knowledge and other cognitive skills (Biggs & Telfer, 1987; Biggs, 1988).

Knowledge and thinking are interdependent, since the development of knowledge requires thinking, and thinking can be defined as the ability to apply knowledge. The importance of domain-specific knowledge in problem-solving expertise is widely supported (Bordage & Lemieux, 1991; Grant & Marsden, 1987). On the issue of domain-specific knowledge, Baron & Sternberg (1987, p8) argue that 'although domain-specific knowledge is essential to good thinking within a domain, it is not sufficient to assure good thinking will occur'. One possible explanation for this observation was that only a minor trend of occupational therapy researchers (See for example, Rogers & Holm, 1991; Slater & Cohn, 1991; Schell & Cervero, 1993; Creighton et al, 1995) were adopting information-processing theory in examining clinical problem-solving, thus generalisations were quite difficult to achieve. It was further believed that, in exploring the theoretical underpinnings of problem solving studies in occupational therapy, researchers did not take into consideration the role(s) of domain-specific knowledge in all aspects of student learning.

In medicine, research has shown that clinical reasoning is not a separate skill acquired independently of clinical knowledge and other diagnostic skills, but they go hand in hand (See Schmidt & Boshuizen, 1992; Schmidt, Boshuizen, & Norman, 1992; Boshuizen & Schmidt, 2000). This was further supported by Elstein and his colleagues (1990) in their earlier work in that a clinician's clinical reasoning performance varied greatly across cases, implying that it is dependent on the clinician's organisation of knowledge in a particular area.

Evidence is also accumulating in the literature that expert and novice problem solvers differ in their use of problem-solving strategies, such as chunking (Feltovich, 1983). Experts chunk data into larger information units than novices do. The novice's memory structures, on the other hand, arise from features more peripheral to functional use. The novice relies on conceptual principles to retrieve things out of memory. The expert however retrieves knowledge on the basis of both situational cues and conceptual stimuli. As the reasoning process unfolds, experts monitor their own thinking and understanding, which enables them to curtail errors and omissions (Rogers, 1983). In other words, expert clinicians are those who are competent in action and, simultaneously reflect on this action to learn (Schön, 1983).

With reference to expert-novice differences, van der Vleuten & Newble (1995) suggested that the way the expert differs from the novice is strongly connected to knowledge and how the knowledge is stored, retrieved, and used. Thomas, Wearing, & Bennett (1991) proposes that novice problem-solving is search-driven – looking for relevant information, where as experts are schema-driven – using stored chunks and patterns of information action. According to Hagedorn (1996), experts have the ability to think in and out of ''the box'', backward and forward in time using the concept of problem space, whereas novices are less able to think quickly through a situation than the experts (Schmidt, Norman, & Boshhuizen 1990; Robertson, 1996; Unsworth, 2001; Mitchell & Unsworth, 2005).

There is much to learn about occupational therapy practice and the evolution from novice to an expert clinician. There is also a greater need to learn much more about the characteristics and actions of experienced clinicians in a variety of patient care settings. Other professions like teaching, nursing, physiotherapy, and medicine are looking at models of expertise (Benner, 1984; Benner, 1994). The review of literature revealed a variety of concepts but limited formal research on clinical reasoning skill development in occupational therapy, physiotherapy and nursing professions. What are the stages of development for occupational therapy expertise? There was a need for longitudinal studies to help uncover the process of change from novice to competent and expert clinician. This paved way to a new line of examining the nature of clinical reasoning skill development in novice students, which will be the basis of the research for this study.

1.3 Significance and Scope of the Study

Occupational therapists are knowledge workers. Knowledge work is a prerequisite for effective clinical reasoning. Students learn the knowledge base relatively easily. The framework for decision making, or clinical reasoning skill, is less easily acquired. Mattingly (1991a) stated that the beginner therapist does not know much more than what he/she can state. The performance of the new therapist is characterised by starts and stops; he/she must stop to think at every stuck point. The expert therapist on the other hand demonstrates fluidity of performance; because he/she knows much more than can be articulated ("highly tacit and embodied knowledge," (Mattingly, 1991a, p979) and can access that knowledge while "in action". "The expert therapists continually modify goals and procedures to meet the individual needs of the particular patient" (Mattingly, 1991a, p985) through the use of explicit or intuitive clinical reasoning strategies.

Although clinical reasoning has been studied in different ways for the past 35 years, it is only in the past 10 years that it has become more widely heard of and understood. Educators, clinicians and students are finding that it is being increasingly referred to in the literature or being spoken of; it cannot be ignored. Although much research remains to be developed, the existing knowledge from research studies can be put into useful practice in many innovative ways. Educators need to understand how clinical reasoning can be developed and how this can be taught and facilitated (Neistadt & Atkin, 1996; Neistadt, 1998; Neistadt, Wright, & Mulligan, 1998; Bonello, 2000; Liu, Chan, & Hui-Chan, 2000; Hocking & Rigby, 2002).

Although a great deal of literature on clinical reasoning exists, the majority of that literature focuses on "what" and "how to" questions. As reported earlier, Schell & Cervero (1993) summarised previous literature on clinical reasoning as "to either describe clinical reasoning or prescribe approaches to improve it" (p605). Clearly, research studies are necessary in other dimensions of clinical reasoning to gain a thorough understanding of it.

Clinical reasoning is recognised as the core of occupational therapy practice and clinical decisions are an integral part of this (Mattingly & Fleming, 1994; Dutton, 1995; Neistadt, 1996, 1998). Many studies have been conducted to investigate how occupational therapists use knowledge to make a particular clinical decision. Each time an occupational therapist meets a new patient he or she must attempt to make sense of the case, decide what action to take and decide what to do first. This process is usually referred to as clinical decision-making and utilises a number of forms of clinical reasoning, which have been studied and described (for example, Crepeau, 1991; Fleming, 1991a; Clark, 1993; Mattingly & Fleming, 1994; Ryan, 1995, Neistadt, 1996).

It is unclear from critical examination of the literature whether therapists use distinctly different types of reasoning that translate into mutually exclusive forms of thinking, or whether the different styles of reasoning which have been identified in each separate research are images of thinking that have been constructed through the process of attempting to put words to a largely internal, tacit phenomenon (Ranka & Chapparo, 2000). It seems that descriptions of the different clinical reasoning processes that exist may actually be a reflection of the influence of the knowledge base of various researchers (Crepeau, 1991; Fleming, 1991a; Rogers & Holm, 1991; Clark, 1993; Mattingly & Fleming, 1994; Dutton, 1995; Neistadt, 1996; Bridge & Twible, 1997).

Both the knowledge and cognitive processes are required to explore the solutions in clinical situations. As a phenomenon for study, clinical reasoning's contribution lies in describing the diversity, commonalties and complexities of therapists' thinking (Ranka & Chapparo, 2000). According to Jones (1997), clinical reasoning is influenced by the therapist's needs and goals, values and beliefs, knowledge, cognitive, interpersonal and technical skills, the patient's values and beliefs, individual physical, psychological, social and cultural presentation, and the environmental factors such as resources, time, funding, and any externally imposed requirements. All these influences may be considered a source of knowledge and motivation for decision-making (Ranka & Chapparo, 2000).

One area of notable omission is the development of ways to evaluate clinical reflection and reasoning. To evaluate the effectiveness of different teaching strategies for clinical reflection and reasoning, we need various ways to measure and evaluate the development and improvement of clinical reasoning skills (Royeen et al, 1994; Allison & Turpin, 2004; Tan, Meredith, & McKenna, 2004; Thomas, Penman, & Williamson, 2005; Dasari, 2006b).

Problems with assessing clinical reasoning of occupational therapy students are a major concern of educators, both in occupational therapy and other related disciplines, and there has long been a question of how to achieve more objective assessments of students' clinical performance (Cross & Hicks, 1997). Evidence from educational research into the nature and breadth of criteria used by educators to assess students' clinical performance, although often inconsistent suggests that judgements are frequently inaccurate. The capacity of assessors to understand what they are actually judging in students' performance, what importance is attached to various attributes, or the extent to which evidence, personal values and assumptions contribute to decision making is not clearly understood. In a study of clinical supervisors in occupational therapy Ilott (1990) demonstrated how infrequently supervisors used their behaviourally based clinical objectives and accompanying guideline to help them in reaching assessment decisions.

The search for varied ways to help students see connections between theory and clinical practice is an ongoing one in occupational therapy education (Chung & Spelberg, 1982; Pressler, 1983; Schwartz, 1984; Mann & Banasiak, 1985; Sabari, 1985). The ideal setting to enhance clinical reasoning is the fieldwork education and this is one of the best ways to help students transfer their academic skills to clinical settings in order to teach them the clinical reasoning process. Rogers' model (1983) for teaching clinical reasoning appears to be an effective way to connect classroom theory to clinical practice and is well worth the extra educator effort it involves. Further research is needed to examine the actual clinical carryover of this teaching approach in comparison with other models.

Researchers agree that novice and experienced clinicians maintain noticeably different clinical reasoning skills (Dutton, 1995). To teach students and novice clinicians to think like experienced or more expert occupational therapists, researchers and educators have begun to explore ways to teach and improve clinical reasoning skills (Schwartz, 1991; Royeen, 1995; VanLeit, 1995; Neistadt, 1996). In developing clinical reasoning skills, it is crucial for students to master the knowledge base and establish their competence in integrating their knowledge into practice. The clinical education subjects provide the opportunity for students to apply what they had learnt in terms of theories, clinical and technical knowledge and professional practice to actual case management. The fieldwork practicum therefore is regarded as the major channel through which occupational therapy students integrate knowledge into practice. To enhance the transfer of knowledge, both teachers and clinical educators must develop a clear framework. A well-designed fieldwork practice better prepares novice therapists to choose their appropriate clinical reasoning styles to match with clients' needs (Duke, 2004; Martin et al, 2004; Lysaght & Bent, 2005; Thomas, Penman, & Williamson, 2005; Johnson et al, 2006).

We are entering a period in which health science curricula worldwide are undergoing dramatic transformations and experiencing significant structural changes. These changes are likely to shape the practice of the health sciences for decades to come. The role of a curriculum design is one of the focal issues in this transformation (Liu, Chan, & Hui-Chan, 2000; Patel & Kaufman, 2000; Ranka & Chapparo, 2000). The occupational therapy curriculum is also changing its structure to cope with today's need for client-centred practice-ready graduates. Therefore, practice-related and contextual problem-based learning is an approach that appeals to today's occupational therapy education (Vroman & MacRae, 1999; Martin, 2000; Sadlo & Richarson, 2003). These lifelong and self-directed learning skills enable students to attain high level of clinical competence. As reported in the literature, the definition of problem-based learning varies from programme to programme. According to Vroman & MacRae (1999), no matter what the definition is, the primary outcome is that students learn to synthesize knowledge for practice in the occupational worlds of their clients, influenced by the level of impairment and handicap. This helps students to choose the appropriate clinical reasoning that matches well with clients' needs.

An individual's knowledge base is unique. Recent research places an increasing emphasis on the essential interconnection between knowledge and clinical reasoning. According to Higgs & Titchen (2000), "Knowledge is essential for reasoning and decision making which are central to professional practice" (p23). This comprises of practical, theoretical and research knowledge as well as personal knowledge, which results from attempting to make sense of the individual's own experiences and the opinions and experiences of others. A well-organised knowledge base therefore is an essential requirement along with well-trained social, perceptual and psychomotor skills (Schmidt, Boshhuizen, & Norman, 1992; Merri'nboer, 1997; Boshuizen & Schmidt, 2000).

It is not reasonable to expect occupational therapy students to graduate as competent, proficient, or expert therapists. To reach the level of a competent, proficient, or an expert therapist, requires years of clinical experience and continuing education. However, it is possible for students to enter practice as novices or advanced beginners who are capable of progressing to higher levels of clinical reasoning if their academic preparation for higher level fieldwork has given them as awareness of the types of reasoning they will be using in practice. This awareness of clinical reasoning concepts can help students to learn about their thinking and doing clinical practice simultaneously, intensifying the learning derived from clinical experience.

As noted earlier, educators, academics and clinicians in many parts of the world are only recently becoming aware of the importance of clinical reasoning, so its importance has not yet been fully realised. There is an enormous potential for discovery and learning about this exciting aspect of study. Results from various studies illustrate the difficulties that newly qualified therapists have when they begin to work, and this hypothesis would probably hold true for other health care practitioners. (See for example, Barrows, et al, 1978; Elstein, Shulman, & Sprafka, 1978; Schell & Cervero, 1993; Mattingly & Fleming, 1994; Dutton, 1995; Neistadt & Crepeau, 1998; Ranka & Chapparo, 2000). The lack of understanding of the learning of clinical reasoning processes among occupational therapists led to growing interest among researchers in exploring representations of knowledge and processes separately. What are the processes involved? Do occupational therapists examine the construction process while making clinical decisions? What is the relevant knowledge content used to organise the information about the problem context? Answers to these questions may give hints to the different types of discourses used for clinical problem solving by health care practitioners (Bordage & Lemieux, 1991).

The essence of the proposed study is that there is no single way to look at clinical reasoning – rather it is multifaceted and complex. However, with a heightened understanding of the processes involved in clinical reasoning, clinicians, fieldwork educators, academics and students can be better helped to develop into sensitive, knowledgeable, artistic practitioners and researchers. This research was based on a two-year longitudinal study of a cohort of student occupational therapists, which provided insights into the phenomena of how one moves from the chaotic world which the novice clinician struggles to make sense of to the apparently more organised world of the adept expert clinician, who is able to make more sense out of the chaos. For example, how and when does one learn the importance of teaching as a clinical skill, and when does one learn how to elicit and use rich patient-specific illness data?

The findings from this research study add to the understanding of the development of clinical reasoning skills and could inform the design and content of courses for newly qualified therapists. Extrapolating these findings backwards into the undergraduate domain, this study may highlight the tremendous difficulties students may face when trying to reason through, integrate and synthesise their theoretical learning in both academic and clinical settings.

1.4 The Study

This study examined implications for curriculum design resulting from a two-year longitudinal study of a cohort of 80 occupational therapy students, which explored their development of learning from novice to beginning therapist.

1.4.1 Context of the Study

A cohort of 80 occupational therapy students who followed a course of Bachelor of Science (Honours) Degree in occupational Therapy at the Hong Kong Polytechnic University from 1998 to 2001 provided the context of this study.

The Bachelor of Science (Honours) degree in occupational therapy programme offered by the Hong Kong Polytechnic University has been in operation for more than 20 years and is the only occupational therapy programme in Mainland China. The BSc (Honours) in Occupational Therapy is a three-year, full-time (or equivalent) programme comprising 104 credits for the academic component and 24 credits for the clinical education component, which occurs in major clinical settings in Hong Kong (See **Chapter 3** for details on BSc (Hons) Occupational Therapy Curriculum structure). The programme is structured to allow for alternating periods of academic and clinical studies so that knowledge and skills acquired in the Hong Kong Polytechnic University will be applied and evaluated in tandem with the development of skills in practice. The relationship between clinical studies and academic work is based on a cyclic series of theoretical and practical exposure. Students have clinical placements in clinical education settings, which are spread across the academic terms and over the vacation period to achieve the integration of academic knowledge and clinical practice (See **Chapter 3** for more details).

1.4.2 Aim of the Study

To develop a programme of initial training and education using a range of measures and show what evidence is there for the progressive development of clinical reasoning skills in trainee occupational therapy students of the Hong Kong Polytechnic University?

(For main research questions developed from the aim of the study, refer to **Chapter (9)** on Research Methodology and Design of Study).

1.5 Organisation of Thesis

The thesis is organised as follows:

Chapter 1	Sets the scene by introducing the research objectives, the significance and scope of the study.
Chapter 2	Presents review on Occupational Therapy as a client-centred profession. The review includes occupational therapy philosophy, conceptual framework and a brief introduction to clinical reasoning.
Chapter 3	Introduces briefly the BSc (Hons) Degree in Occupational Therapy programme structure & curriculum followed by the study cohort.
Chapter 4	Reviews the updated literature of the types and models of clinical reasoning. The review also presents the development of cognitive skills and various teaching strategies for the development of clinical reasoning skills.
Chapter 5	Presents an overview of the development of clinical reasoning in three disciplines – Occupational Therapy, Physiotherapy and Nursing including novice-expert differences among occupational therapy, physiotherapy and nursing professions.
Chapter 6	Reviews the Dreyfus & Dreyfus model of skill acquisition as an organised framework to distinguish novice-expert continuum. The review also includes the nature of competence and qualities of an expert.
Chapter 7	Covers the pertinent literature on the educational philosophy of occupational therapy in the pursuit of a curriculum framework covering curriculum evaluation leading to a curriculum reform design.
Chapter 8	Presents relevant literature on students' approaches to learning and its implication for teaching and learning activities.
Chapter 9	Focuses on the methodology model used for this study. This chapter is divided into two phases. The first phase introduces the test instruments, Study Process Questionnaire (SPQ), Moore & Fitch Learning Inventory

(ILP) and Self Assessment of Clinical Reflection and Reasoning (SACRR) and the second phase explains the focus group interviews. Discussion also involves the data collection and analyses procedures. Concerns of validity and reliability and the ethical issues involved are also presented.

Chapter 10 Offers a detailed presentation and interpretation of the findings according to the main research objectives.

Chapter 11 Discusses the major findings of the research study. This chapter will explore the appropriateness of the research approach used and seek to describe how the study answered the research questions.

Chapter 12 This chapter closes the discussion in the form of drawing conclusions and making recommendations for present and future research.

1.6 Summary

The main focus of this chapter was to set the scene by providing the reader with the background and justification of the study. This research was based on a two-year longitudinal study of a cohort of student occupational therapists, which provided insights into the phenomena of how novice and experienced clinicians maintain noticeably different clinical reasoning skills.

In this study, clinical reasoning is examined from several perspectives. First, the practical nature of clinical reasoning will be described, along with the relationship between formal theory and clinical reasoning. Second, an understanding of the development of clinical-reasoning skills and related implications for teaching of these skills will be presented. Next the expert-novice comparisons of students' clinical reasoning skills and application of Dreyfus & Dreyfus (1986) model of skills acquisition as an organised framework to occupational therapy practice will be developed. Furthermore, it is hoped that this study might form a framework for the development of reasoning skills from a novice to a beginning therapist including personal and contextual elements, content and process of clinical reasoning of occupational therapy students and provide insights into their learning strategies that underlie successful development of clinical expertise.

Developing quality health care services depends on technological advances and organizational improvements in the way occupational therapists relate to their clients in an effort to make better health care decisions. The next chapter is based on the belief that client-centred decision-making is likely to result in better clinical decisions. Based on this, it makes an attempt to give an overview of occupational therapy as a client-centred profession including its philosophy, conceptual models of practice, evaluation of occupational performance and occupational therapy process and its relationship to clinical reasoning.

Chapter 2

OCCUPATIONAL THERAPY: A CLIENT-CENTRED PROFESSION

2.1 Introduction

This chapter presents an overview on occupational therapy as a client-centered profession. The knowledge presented will form a basis for understanding the development of clinical reasoning skills along a novice-expert continuum. It also explains occupational therapy philosophy, conceptual models of practice and models of occupational performance and provides a framework for the development of clinical reasoning skills with a particular emphasis on the significance of a client-centered approach to clinical reasoning (CAOT, 1997; Law, 1998; Sumsion, 2000; Sumsion & Smyth, 2000; Unsworth, 2004).

Occupational therapy has emerged and continues to exist because it has an implicit social contract to address the problems of those members of society who have limited capacity to perform in their everyday occupations. Occupational therapists provide specialized services that enhance the ability of individuals to perform and to achieve satisfaction in their daily occupations. This practice requires the application of occupational therapy knowledge that defines and guides the decisions, actions, and techniques of therapists. Without the force of that conceptual foundation, which explains and justifies the service, the pragmatic work of therapists would have little value for society.

Society's health needs are rapidly changing and, accordingly, the health care system is being rapidly altered. This change will bring occupational therapy unprecedented challenges and opportunities. The refocusing of health care goals is creating new opportunities for occupational therapy. As the opportunities for the occupational therapy profession grow dramatically, the challenges will increase proportionately. With the transformation of health care services, occupational therapy practice will also change. Because of this change, occupational therapy service provision has extended from hospital-based to a variety of community situations, and the therapist will be working less in hospital settings and more in educational and social service agencies which include schools, home health agencies, private practice, industry, and other community facilities (Luban-Plozza, 1995; Law & Mills, 1998; McColl, 1998; DH, 2000; COT, 2003).

In view of the rapid changes in health and social care systems, occupational therapy practice is undergoing evolution, particularly in recent years. In line with this, the nature of occupational therapy practice will shift from the application of a limited number of known clinical solutions to the use of increasingly complex, autonomous decision-making and problem solving in multifactoral situations. The process of occupational therapy in this context consists of problem solving under conditions of uncertainty and change (Rogers & Masagatani, 1982; Mattingly & Fleming, 1994; Vroman & MacRae, 1997; Sadlo, 1997). The, therapist must, therefore, be a critical thinker, capable of evaluating and synthesizing information from a variety of sources about a wide range of phenomena.

2.2. Occupational Therapy: A Client-Centered Profession

Occupational therapy is a client-centred profession; it values the individual needs and rights and understands clients' illness pattern and health care experiences. A Client-centred approach may involve patients' participation in determining appropriate treatment goals. It is assumed that most patients' want and benefit from the treatment by taking an active role in the clinical decision-making process. Although patient-centered decision-making is likely to result in better clinical decisions, there may be difficulties in achieving concordance with the care plan, which may impact on clinical effectiveness.

Clinical reasoning and clinical decision-making has long been inherent in the field of occupational therapy. However, it is only in recent years that the metacognitive concepts of clinical reasoning have been operationalised and articulated in occupational therapy literature (Biggs & Telfer, 1987; Carnevali, 1995; Neistadt, 1996) and curricula. In the context of this chapter, clinical reasoning refers to the ''thinking and decision making processes which are integral to clinical practice'' (Higgs & Jones, 2000, pxiv). Based on this, fundamental questions may be asked about the role that patient/client can play in the clinical reasoning processes. Since client-centered care involves valuing the client needs and rights, understanding clients' illness pattern, family and social background and health care needs, it is necessary to embrace them with effective relationships in order to enable them to participate effectively in the clinical reasoning process. Concepts of patient choice, participation, empowerment and working in partnership are being widely examined, advocated and challenged within the professional literature (Luban-Plozza, 1995; Law & Mills, 1998; Higgs & Jones, 2000; Sumsion, 2000; Scaffa, 2001). There is no doubt; active participation by patients in the decision-making process is likely to result in better clinical decisions which in turn result in achieving clinical effectiveness.

There is evidence in the literature that a level of participation the in treatment process may contribute to the patient's sense of control and positively affect psychological well-being, physical recovery and satisfaction resulting in patients accepting greater responsibility for their health (Cahill, 1996; Chan et al, 1999). Since, client-centred care is fundamentally about the process of care, broader perspectives are needed to understand the complexities of the issues to develop a collective understanding and vision of what a patient-centred care might be and to discover how different professionals, including occupational therapists, can provide explanations and pointers to effective action.

2.2.1 Occupation as a Therapeutic Agent

Occupational therapists have long held the belief that there is a link between engagement in occupation and positive health. Occupational therapy researchers have recognised occupation as a force in human development (e.g., Clark, 1979; Wiemer, 1979; Kielhofner & Burke, 1980). This section will review some of the literature in order to clarify what the term "purposeful activity'' means and why the use of purposeful activities as treatment tools remains a vital part of occupational therapy practice.

Both in the past and the present many scholars have written about the complexity and uniqueness of occupation (Clark, et al, 1991; Kielhofner, 1993; Fisher, 1998; Hocking, 2000; Pierce, 2001). The use of occupation to improve a person's health and well-being is the essential dynamic of occupational therapy. Clark & her colleagues (1991) defined occupation as "chunks of culturally and personally meaningful activity in which humans engage that can be named in the lexicon of the culture" (p301). By that they meant such things as doing one's job, dressing, cooking, and gardening. The philosophical basis of occupational therapy adopted by the American Occupational Therapy Association (AJOT, 1979) articulates this premise further:

> The common core of occupational therapy is active participation of the patient/client on occupation for purpose of improving performance. The use of facilitating procedures is only acceptable as occupational therapy when used to prepare the patient/client for better performance and prevention of disability, through self-participation in occupation.

2.2.2 What is Purposeful Activity?

Mosey (1981) identified six "legitimate tools'' of occupational therapy. These are: non-human environment, conscious use of self, teaching-learning process, use of purposeful activities and activity groups. Purposeful activity involves interaction with both the human and nonhuman environments and is one of the ways in which people achieve mastery or competence.

Occupational therapists use purposeful activity as its medium to help clients accomplish their desired goals. Purposeful activities are used to promote and maintain health, prevent injury or disability, and help their clients develop or redevelop needed abilities and skills (Punwar, 1994; Creek, 1998). The American Occupational Therapy Association (AJOT, 1983) has defined purposeful activity as:

> Individuals engage in purposeful activity as part of their daily life routine. Purposeful activity, in this natural context, can be defined as tasks or experience in which the individual actively participates. Engagement in purposeful activity requires and elicits coordination between one's physical, emotional, and cognitive systems. An individual who is involved in purposeful activity directs attention to the task itself, rather than to the internal processes required for achievement of the task. Activities may yield immediate results or may require sustained effort and multiple repetitions. They may represent novel and singular responses or be part of complex, long-standing patterns of behaviour. Purposeful activities, influenced by the individual's life roles, have unique meaning to each person.

One way to view the therapeutic use of activity is to look at the domain of occupational therapy. Mosey (1981) has reported that the domain of occupational therapy consists of performance components within the context of age, occupational performance, and an individual's environment.

The use of term occupational performance first appeared in the literature in 1970s. Occupational performance is the big picture of the individual functions within the context of his/her environment. Performance components are the building blocks that support occupational performance. By evaluating the client's performance components in sensory-motor, neuromuscular, cognitive and psychosocial areas, the occupational therapist attempts to identify the root cause of the limitations in occupational performance. When the basic cognitive, perceptual, socio-emotional, and sensorimotor capabilities are normal, the person is capable of doing those tasks that they value and occupational therapy would not be needed. If the basic capacities and abilities are lacking, the occupational therapist is called on to help the person to regain them or learn new methods of achieving activities and tasks of daily life needed for competent role performance.

2.2.3 Goals of Occupational Therapy

Occupational therapists claim that purposeful activity is both the goal of their interventions and one of the major tools they use. The main outcome of purposeful activity is the attainment of a goal or objective that can lead to a sense of achievement and an improved self-image (Creek, 1998). Christiansen (1991) stated that "the goal of occupational therapy is to prevent, remediate, or reduce dysfunction relating to occupational performance'' (p33). Trombly (1995) spoke of the purpose of an activity being the goal. Although purposeful activity is an integral part of our entire life, the meaningfulness or value of this activity performance cannot be understood without considering the context of that performance. As Cynkin (1995) stated, "The nature of everyday activities emerges only from the context in which they are embedded (p131). From these explanations, it would, therefore, seem that occupational therapists understand the nature of purposeful activity and its potential therapeutic effects.

2.3 Conceptual Models in Occupational Therapy

Conceptual models of practice have proliferated since the 1960s. In the literature, various terms such as practice, theory, conceptual framework, and frame of reference have been used. The discussion of theory is yet another area that is bedevilled by semantics (Argyris & Schön, 1974; Miller, 1993; Kielhofner, 1997). Is there or are there not any differences between models, frames of reference and approaches. Of the three terms, "approach'' seems to be least controversial (Hagedorn, 1995). The term "model" perhaps is the most controversial term. Mosey (1981) avoids the use of "model", and uses "frames of reference" instead. Reed (1984), on the other hand, avoids the use of the term "frames of reference" and describes numerous models. Having defined these terms, one needs to emphasise one point. Ultimately it is the content of these concepts/theories, which are important.

On the debate over terminology, the author of this thesis believes that models & frameworks occur more or less naturally in the field because they reflect the practical needs and considerations of occupational therapy. For example, the field needs to create its own knowledge or theory and to develop practical clinical approaches. Thus, models seek to link together in a single framework both of these purposes. Furthermore, the framework of a model guides thinking and reasoning in certain ways. The therapist's knowledge of the core theory forms his/her identity and action as a practising therapist. The therapist selects from his/her theoretical knowledge of occupational therapy, which fits the problem of the client or is appropriate to his/her interests, expertise, or practice setting. So, for example, he/she will be continually aware of the humanistic, client-centred nature of therapy and perception of the individual, which is an integral part of the profession.

As part of their daily practice, occupational therapists encounter problems and challenges, which call for knowledge, clarity and organisation from a clinical and theoretical perspective. It is through the integration of theory and practice, occupational therapy models become more highly developed and provide a significant resource for practitioners to reflect upon and develop their practice; this in turn, enhances the practitioner's clinical reasoning, and hence enables them to understand and address the problems encountered by their clients. A conceptual model of practice is not only prescriptive, that is guides treatment, but is also scaffolding for creative problem solving within the therapeutic situation (Schön, 1983; Kielhofner, 1997).

2.4 Philosophical Base of Occupational Therapy

Occupational therapists are experts in enabling people to engage in those roles, tasks, and activities that have meaning to them on a day-to-day basis and that define their lives. People who have occupational dysfunction because of an impairment, disability, or handicap are referred to an occupational therapist (Trombly, 1993). As a clinical intervention, occupational therapy facilitates individuals' occupational performance (major social roles and functions) by building the performance components (abilities and skills) that are fundamental to the performance.

A basic concept of modern health care is the holistic approach to resolve clients' problems resulting from impairment caused by development deficits, the ageing process, physical injury, and psychological or social disability. The occupational therapist's concern is for the health and function of each individual within his or her own environment. Occupational therapists work with humans as whole beings and are committed to providing opportunities for development and maintenance of the highest potential in the biological, psychological, social and cultural dimensions of each individual.

Occupational therapy is based on the belief that performance of purposeful activity (occupation) will promote learning, adaptation and change. Occupational therapists facilitate the active participation of the client in occupation for the purpose of improving performance and ultimately, adaptation within the environment to lead a productive life. Furthermore, occupational therapists identify the client's life roles and determine the ways in which these roles have been disrupted by disability or dysfunction at home, in the community, or at work, whether participating in family life, earning a living or playing. The occupational therapist facilitates the client's participation in selected tasks, modifying or selecting an appropriate environment in order to integrate, reinforce and enhance newly learned behaviours.

Models of professional practice convey different views about the respective roles of professional and patient, the goals of specific types of health care, and the beliefs and values that ought to underpin the practice. The choice of which model of practice to use comes from both the therapist's knowledge about the problem, his/her philosophy of health and occupational functioning. All conceptual models of practice used by occupational therapists must be compatible with the single philosophic base of occupational therapy, which is summarized in the **Table 2.4** below:

Table 2.4

Philosophical Base of Occupational Therapy

1.	Humans are active beings whose development is influenced by use of purposeful activity
2.	Human beings are able to influence their health and environment through purposeful activity.
3.	Human life is a process of continuous adaptation.
4.	Adaptation is a change in function that promotes survival and self-actualisation.
5.	Biological, psychological, and environmental factors may interrupt the adaptation process at any time throughout the life cycle, causing dysfunction.
6.	Purposeful activity facilitates the adaptive process.
7.	Purposeful activity (occupation) may be used to prevent and mediate dysfunction and to elicit maximal adaptation.
8.	Activity as used by the therapist includes both an intrinsic and therapeutic purpose.

(Source: American Association of Occupational Therapy, 1993)

2.5 Occupational Therapy Definition

Based on the above philosophical base, occupational therapy is, therefore, defined as the,

> "design and use of therapeutic activities (occupations) to increase independent function in daily living tasks, work, and leisure; to enhance development; and to prevent disability. It may include adaptation of tasks and environment to achieve maximum independence, to enhance quality of life, and finally for the individual to lead a productive life", AOTA, 1994).

Arising from the above definition, the goal of occupational therapy is, through the use of occupation, or purposeful and goal directed activity, to prevent, remediate, or reduce dysfunction in relation to the life tasks, (self-care, productive, play/leisure), and to promote maximum adaptation and function for the individual to lead a productive life, i.e. to meet his/her own needs in the living environment, and to be a contributing member of the society. When the independent functioning of an individual is disrupted by illness, injury, psychosocial problem, or developmental deficit, improvement measures will begin at the client's level of receptiveness to learning and provide for practice over a period of time.

2.6 Relevance of Philosophical Base to Occupational Therapy Education

With the foreseeable changing pattern of health care delivery around the world, the qualifying therapist faces a changing and developing role in which initial professional education must be a preparation. Education must inculcate a capacity to reason and to act in situations, which may change, as treatment progresses. It must also allow for the development of professional objectivity, which will permit critical evaluation of the results of practice, and emergence of the maturity, imagination and flexibility needed to make useful innovation and autonomous decisions. Clinicians who have been in the field for a number of years find themselves at a loss when supervising students who have been exposed to these concepts and strategies. This has prompted many clinicians to desire further professional education (Cohn & Crist, 1995; Craik & Austin, 2000; Neary, 2000)

Each profession has a particular way of seeing and dealing with the problems it addresses. Problem definition and solution are grounded in the professional's understanding of his or her work, responsibilities, and capabilities. This self-understanding is called professional identity (Kielhofner, 1997). Professional identity is gained from education, experience as a therapist, and formal and informal encounters with colleagues. While each professional's identity comes from a unique set of personal experiences, it is ultimately shaped by the paradigm, the shared collective culture of the profession.

While a professional identity derived from the paradigm is critically important in providing an orientation to one's work, responsibilities, and capabilities, more is needed to enable the therapist to engage in the process of doing occupational therapy. The therapist must make intelligent decisions and take actions as therapists. This clinical reasoning is influenced by the field's paradigm, but it also requires the active use of the field's conceptual model of practice and related knowledge. As active leaders in the health care community, occupational therapists must be able to operationalise and articulate how clinical reasoning informs decision making and how this process influence outcomes. The development of these skills is important in the education of beginning therapists, clinicians, researchers and academicians (See for example, Elstein, Schulman, & Sprafka, 1978; Mattingly & Fleming, 1994; Higgs & Jones, 2000; Liu, Chan, & Hui-Chan, 2000; Ranka & Chapparo, 2000).

As health care professionals, occupational therapists work closely with other multi-disciplinary team colleagues such as nurses, physiotherapists, speech therapists and social workers in resolving clients' problems. The occupational therapist's professional role involves not only treating, but also motivating and teaching: in addition the occupational therapist is, increasingly, a source of information, a co-coordinator of resources, and a manager. In such roles, an occupational therapist needs to be adaptable and prepared to solve problems in client care, administration, research, education, and professional activities.

2.7 The Core Components of Occupational Therapy

Much debate (Mosey, 1981; Gilfoyle, 1984; Kielhofner, 1997) has taken place about whether or not it is legitimate for a client-centred practice profession such as occupational therapy to own a paradigm. Opinions on this are divided, because of differing views of what constitutes a paradigm. Fundamental to this view is the idea that a paradigm exists and is challenged, then a crisis occurs and a new and different one - a paradigm shift, replaces the old paradigm.

Creek (1998) described a paradigm containing philosophy, content, theory and process of practice. She describes feedback between this core and the practice of occupational therapy, and between the profession and the environment in which it exists. Kielhofner (1997) on the other hand, characterises the occupational therapy paradigm as including "three components; core assumptions (what members of the profession fundamentally know and believe about their field and their practice), a focal viewpoint (a commonly shared view of phenomena with which members are interested –'a map of the territory') and values (deeply held convictions pertaining to the rights of those served and the obligations of the practitioner)". On this, Hagedorn (1992) in her review of basic theoretical structures illustrated the relationships between the core of the profession, its theoretical concepts and service delivery, and the elements, which feed the development of new ideas or practice.

From the above authors, it is clear that although they deal in various ways with the same concept of a professional core, they express in their own way, that of a central core (paradigm) surrounded by frames of reference or models, informed by related knowledge, values and experience, and responsive to or adapted by the environment of professional practice.

The core components seem the most significant, for they define the philosophy of the profession and the territory to which the remaining elements relate. In order for therapy to take place, the following four central components are required (Hagedorn, 1995):

- person in need of therapy,
- the therapist providing it,
- the occupational focus of it, and
- a suitable environment relating to each of these components.

These core elements remain constant, despite the changes in perspective and emphasis offered by the various models and frames of references. The core content of the profession must, therefore, relate to those four elements.

2.8 Occupational Therapy: Principles and Practice

The practice of occupational therapy, as with any professional practice, is not carried out in disconnected bits and pieces. Theoretical foundations guide it. As Mosey (1992) described it, "the theoretical foundations of profession consist of selected theories and empirical [observable] data that serves as the scientific basis for practice" (p63). Because theory is, by nature an abstraction of the real world, theory is always too general to fully guide practice (Argyris & Schön, 1974). On the other hand, practitioners need some way of making sound clinical decisions and predicting outcomes associated with those decisions. That is where theory and clinical reasoning come together.

As described before, the conceptual model of practice helps the therapist specify and frame the problem. Once the problem is identified and characterised, the clinical reasoning involved in problem solving and treatment planning begins. A model of practice is not only prescriptive, i.e., guides treatment, but is also scaffolding for creative problem solving within the therapeutic situation (Schön 1983; Hagedorn, 1995; Kielhofner, 1997).

In occupational therapy, there has been tendency to evaluate and treat individuals in component parts and isolated functions. The client-centred approach, on the other hand, takes the person's point of view and invites the patient to take responsibility for his own health and quality of life (Pollock, 1993). Client-centred therapy is individualised therapy. Intervention is directed at those activities that are meaningful to the client (Law, 1998; Sumsion, 2000; Sumsion & Smyth, 2000; Unsworth, 2004).

According to the Occupational Therapy Guidelines for Client-Centred Practice published by the Canadian Association of Occupational Therapists (CAOT) in 1991, in client-centred practice, the importance of the clients' living environment and cultural values should be considered in the delivery of occupational therapy services. Its treatment program pulls clients' personal experiences with the influence of their social realities. It also encourages clients' active participation during the treatment programme. The model guides the client-centred practice of occupational therapy with the beliefs that clients are an essential part of the treatment intervention (Townsend et al, 1990; CAOT, 1991).

2.8.1 Model of Occupational Performance

Occupational Therapy has its goal in the promotion of individuals' independence in daily activities so as to enable them an opportunity to meet their own expectations (Christiansen & Baum, 1997). As a clinical intervention, occupational therapy facilitates individuals' occupational performance (major social roles and functions) by building the performance components (abilities and skills) that are fundamental to the performance. Since an occupational therapist's job is to help clients to resume previous social roles or engage in new social roles and functions, it is important that therapists understand clients' needs and wishes.

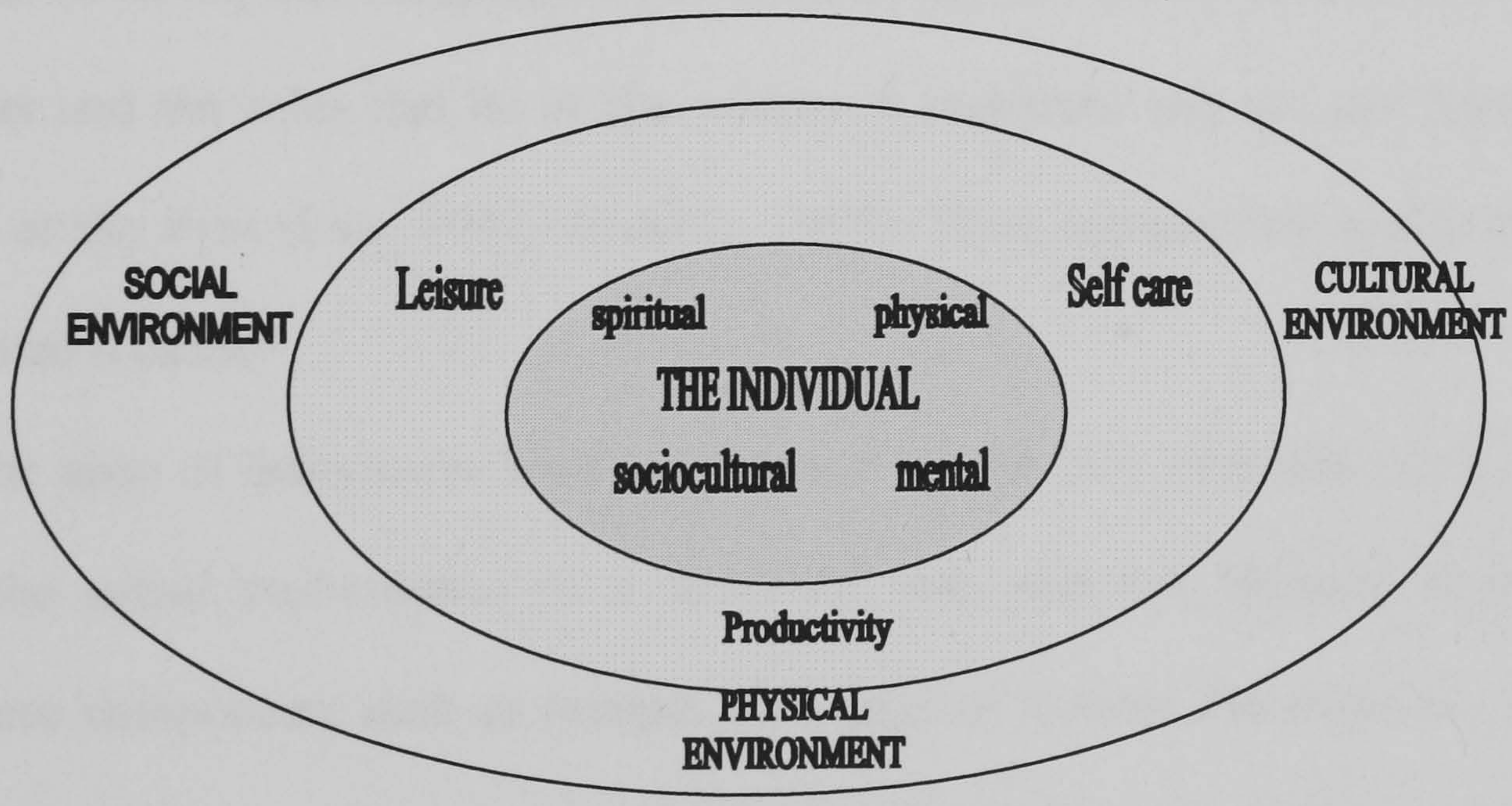
The Model of Occupational Performance is widely employed by many occupational therapists engaged in physical rehabilitation services in Hong Kong. In the Model of Occupational Performance, occupational therapists work under the premise that individuals need to be engaged in occupations or occupational performance in self-care, productivity, and leisure (CAOT, 1991). These occupations are influenced by performance components, categorised under sensory-perceptual, motor, cognitive and psychosocial areas. Clients' engagement in various occupational roles and occupational performance must be considered in the contexts of life roles, life space influences, (including physical, social and cultural environments), developmental age, and chronological age and health status.

Every individual has a unique combination of occupational performance that constitutes an individual's occupational roles, such as a worker, housewife, or student. A breadwinner of a family assumes a worker role; he needs to engage in gainful employment in order to support his family and perform self-care activities, such as grooming, dressing, bathing, feeding. Furthermore, he engages in leisure activities with family and friends, such as playing ball games after work. According to an occupational performance model, a two-year old child is assisted in self-care activities by the parents. A retired woman manages her own self-care activities, helps in simple household tasks and goes to a nearby park for a walk. Independent performance of occupational roles therefore relies very much on the interaction of the individual's performance components (physical, mental, sociocultural, and spiritual) and the physical, social, and cultural environments the individuals inhabit (Trombly, 1995; Pedretti & Early, 2001).

Figure 2.8.1 below is extracted from the occupational Therapy Guidelines for Client-Centred Practice (CAOT, 1991, p17). It illustrates the interaction between the individual, his or her performance and the influence of the environment, which characterises the Model of Occupational Performance.

Figure 2.8.1

The Model of Occupational Performance



(Reference: Occupational Therapy Guidelines for Client-centred Practice, Health Canada, 1991, cited in McCall & Pranger, 1994, p252)

The Model of Occupational Performance guides the client-centred practice of occupational therapists in which clients' behaviours are viewed in a holistic way. Occupational therapists are encouraged to apply this model of clinical practice to the assessment and treatment of clients.

2.8.2 Occupational Therapy: Assessment and Intervention

The goal of occupational therapy is to enable individuals to achieve independence in areas of occupational performance, which include activities of daily living, work, and leisure (AOTA, 1989). Whenever a person experiences a trauma or disease that results in physical impairment, independence in these tasks is usually jeopardised. Occupational therapists provide treatment to clients by assessing their occupational dysfunction in terms of their abilities and limitations and tailor-make a unique programme for each individual client.

Under the Model of Occupational Performance, assessment of clients takes into account clients' deficits in performance components and the effects of their deficits to clients' occupational performance under specific conditions. Occupational therapy assessment includes interviews, standardised and non-standardised tests, checklists, observation and self-evaluation (Turner et al, 1996; Pedretti & Early, 2001). It has been recognised, however, that occupational performance depends on the individual's culture and gender and the roles that he or she wishes to undertake and the environment in which he or she lives (Law, 1991; Trombly, 1995). Thus, occupational performance is an individual concept.

The aims of assessment are to understand clients' life roles and environment, observe the actual performance of a necessary task, and test physical abilities or performance components such as strength and range of motion. For example, a client with haemiplegia may present a perceptual deficit due to a stroke. Interaction with the client indicates that he/she needs to be able to dress himself/herself after discharge because he/she lives alone. As a consequence, intervening in the dressing problem becomes one of the goals of occupational therapy after the assessment. In treating clients with the disability as described above, the goal of the occupational therapy is to increase clients' independence in occupational performance (Trombly, 1993).

Occupational therapy assessment enables clinicians to formulate a list of clients' problems and the goals of the subsequent intervention. Therapists make use of purposeful activities to elicit clients' active participation in the treatment program (Mosey, 1986). In the context of the Model of Occupational Performance, besides aiming at promoting clients' independence in occupational performance and enhancing clients' performance components, purposeful activities should be congruent with clients' physical, social, and cultural environments.

The choosing of appropriate tests for assessment, the setting of relevant goals and the provision of relevant intervention in occupational therapy are crucial to clients' success in engaging in their life roles. This process of occupational therapy depends very much on clinicians' clinical reasoning and that is the main theme of this study.

In most occupational therapy textbooks, the terms "occupational therapy process" or "treatment planning process" are used to describe a process which most therapists would like to call "case management", which includes clinical reasoning and problem analysis. Clinical reasoning occurs at each stage in the process and is the means whereby, through the knowledge, judgement, skills and experience of the therapist, the generic core of the profession becomes applicable to the unique situation and needs of an individual. A crucial point in the case management process is the selection of a suitable model or frame of reference. All subsequent action and conceptualisation depends on this. The process of case management serves to integrate and organise the other core processes of occupational therapy. These are processes which are either unique to the profession, or which the profession employs in a particular manner which is determined by the principles and practice of occupational therapy.

Intervention is the pivotal part of the case management process; it begins once the referral has been accepted, with the collection of information from all sources and the initial assessment of the client, so that the therapist may confirm that intervention is justified. At that point, the cycle of intervention commences with further gathering of information, assessment, and data analysis, so the therapist through clinical reasoning, and in partnership with the client, can frame the problem, select or confirm the treatment approach and decide on priority for action. Intervention continues, in the form of setting aims, planning intervention, carrying it out, reassessing, monitoring progress and evaluating the outcome, until the client is discharged.

2.9 Summary

Patient-centred decision-making is a broader concept that requires an understanding of the range of factors that come to influence how individuals, professional groups and organisations create opportunity for patient involvement. The key factors influencing patient involvement have major implications for the education of health professionals. Delivery of a quality health service will only possible when health professionals have the necessary level of awareness and preparation to relate effectively to patients and to influence the organizational changes necessary to bring about changes in client-centred practice.

The practice of occupational therapy, as with any other professional practice, is not carried out in disconnected bits and pieces. Conceptual models of practice specify a domain of interest and the assessments and treatments that are applicable when using the particular model. The choice of which model to use comes from both the therapist's knowledge about the problem as well as philosophy of health and occupational functioning. All conceptual models of practice used by occupational therapists must be compatible with the single official philosophic base of occupational therapy.

The process of intervention requires the occupational therapist to gather information concerning the patient and all aspects of his/her situation. Once action has been taken the results must also be evaluated. The therapist uses clinical reasoning to interpret data and to make the necessary judgements and decisions on the basis of it. The assessment, on the other hand yields a composite picture of the patient's functioning. Assessment looks at the individual as an actor engaged in activity (Cynkin & Robinson, 1990). It is equally important that occupational therapists investigate and use occupational performance assessment tools that are standardised and applicable to the clinical situation in which they work. A client-centred approach, as described before, ensures a flexible and accountable evaluation process (CAOT, 1991; Law, 1998; Sumsion, 2000; Sumsion & Smyth, 2000).

The purpose of the next chapter is to outline the BSc (Hons) Occupational Therapy Programme & Curriculum Structure.

Chapter 3

BACHELOR OF SCIENCE DEGREE (HONOURS) IN OCCUPATIONAL THERAPY PROGRAMME STRUCTURE AND CURRICULUM

3.1 Introduction

This chapter describes the Bachelor of Science (Honours) degree in occupational therapy curriculum with particular reference to the nature of clinical education that has a direct bearing on the facilitation of clinical reasoning abilities of students. This section further examines the development of clinical reasoning from a student's perspective during the fieldwork practicum. Furthermore, the Bachelor of Science (Honours) degree in occupational therapy curriculum structure forms the basis for the entire experience, including preparation, reflection during and discussion after the clinical placement.

We are entering a period in which the curricula of health care professions worldwide are undergoing dramatic transformations and experiencing significant structural changes. These changes are likely to shape the practice of the health care professional for decades to come. The role of a curriculum design is one of the focal issues in this transformation and clinical reasoning is the core of occupational therapy practice. The occupational therapy curriculum is responsible for guiding students to become effective clinical reasoners, who are able to identify the problem, decide on which is the most appropriate course of action, and predict the outcome of therapy for the client (Liu, Chan, & Hui-Chan, 2000; Patel & Kaufman, 2000; Ranka & Chapparo, 2000; Sadlo & Richardson, 2003).

With evolving theories, rapidly developing technology, and expanding practice areas, occupational therapy educators have been challenged to determine the necessary course content to prepare students for entry-level practice and as a consequence different models of fieldwork are presently being proposed. Our understanding of clinical reasoning development is currently being enhanced by worldwide research studies in occupational therapy and as a result more and more current thinking is focusing on the different forms of knowledge required for practice (e.g., Barnett, 1994; Eraut, 1994; Higgs & Titchen, 1995; Ryan, 2000). To cope with these changes, the occupational therapy curriculum is changing its structure to cope with today's need for client-centred practice-ready graduates. Therefore, practice-related and contextual problem-based learning is an approach that appeals to today's occupational therapy education (Sadlo, Piper, & Agnew, 1994; Sadlo, 1997; Vroman & MacRae, 1999; Martin, 2000).

In recognising the above changes, in 1991, the educational programme in Occupational Therapy at the former Hong Kong Polytechnic was upgraded from a full-time Professional Diploma, which was introduced in 1978, to a 3-year full-time Bachelor of Science degree programme. The six-year cycle to the present curriculum has represented a time of change, both in the educational programme and in its parent institution, including recognition of The Hong Kong Polytechnic University-level status in November 1994. The Bachelor of Science Degree in Occupational Therapy (Honours) programme was updated based on feedback received during the curriculum review process. A reorganisation of content within the newly identified subjects for the credit-based system reflects the revised curriculum model and the cohort of students who participated in the study followed this programme, making them the first graduating class with honours.

3.2 Context of the Study

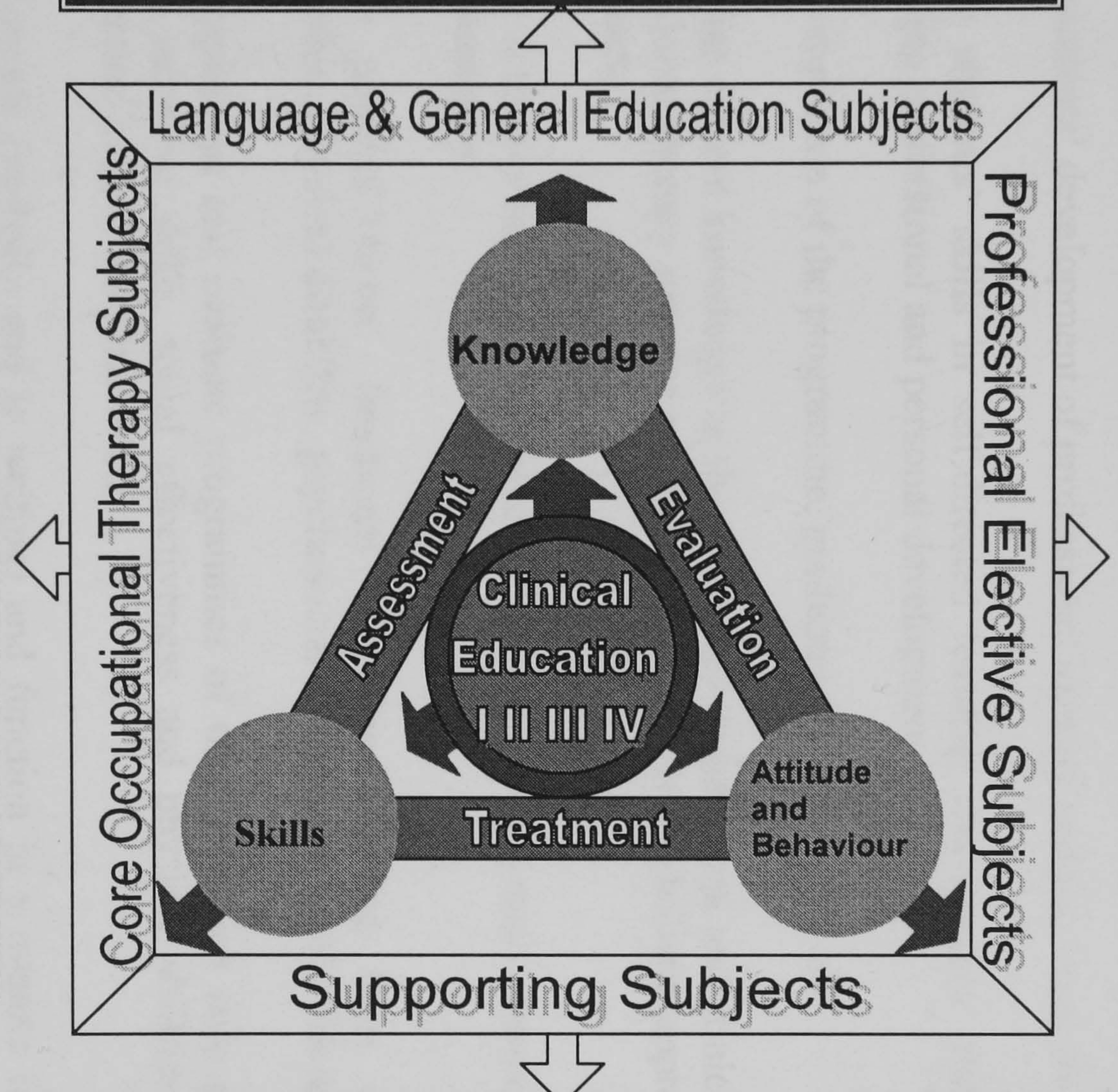
The BSc (Hons) degree in Occupational Therapy offered by The Hong Kong Polytechnic University has been in operation for more than 20 years. Changes in the programme content have paralleled international trends. The programme is a three-year, full-time programme comprising 104 credits for the academic component and 24 credits for the clinical education component, which occurs in major clinical settings in

Hong Kong. In fieldwork education, the curriculum is also moving in a direction consistent with world trends, with the responsibility for learning being shifted toward the students (Cohn & Crist, 1995; Raveh, 1995; Alsop & Ryan, 1996; Tsang, Paterson, & Packer, 2000). The programme is structured to allow for alternating periods of academic and clinical studies so that knowledge and skills acquired in The Hong Kong Polytechnic University will be applied and evaluated in tandem with the development of skills in practice. The relationship between clinical studies and academic work is based on a cyclic series of theoretical and practical exposure. Students have clinical placements in clinical education settings, which are spread across the academic terms and over the vacation period to achieve the integration of academic knowledge and clinical practice (The Hong Kong Polytechnic University, DCD, September 1999; Tsang, 2000).

There are three major strands of subjects for the undergraduate programme, i.e. core occupational therapy subjects, supporting subjects and professional elective subjects, which are inter-related and extend from year 1 to Year 3 as shown in **Figure 3.2**. In addition, the programme also includes language and general education studies subjects. Students are required to complete all the prescribed core subjects and supporting subjects. However, for the electives, students can take subjects offered within the department or faculty, or across other faculties, provided the subjects are deemed to be relevant for the programme and the total credit points are not less than that prescribed for the programme.

Figure 3.2

BScOT (Hons) curriculum structure



Language & General Education Subjects

- Elementary Putonghua & College Chinese
- English for Academic Purpose & English in the Workplace
- General Education I & II

Core Occupational Therapy Subjects

- Clinical Science in Developmental Dysfunction
- Clinical Science in Musculoskeletal Conditions
- Clinical Science in Psychiatric Conditions
- Human Occupations
- Environmental Issues in O.T. Practice
- O.T. for Developmental Dysfunction
- O.T. for Physical Dysfunction I & II
- O.T. for Psychosocial Dysfunction
- OT Theory and Process I & II
- Performance Components- Motor, Sensory, Psychosocial, Cognitive
- Vocational Rehabilitation for OT

Professional Elective Subjects

- Alternative Therapeutic Interventions for Stress Management
- Application of Assessments in Clinical Practice
- Application of Ergonomics in OT
- Current Trend in Child Assessment
- Groupwork for OT Practice
- Hand Evaluation and Rehabilitation
- Human Sexuality in OT Practice
- Issues for the Aged Population
- OT for Adults with Mental Handicap
- OT for the Management of Memory Deficits
- OT in Community-Based Practice
- Stroke Rehabilitations
- Therapeutic Intervention for People with Dementia

Supporting Subjects

- Clinical Neurology & Neuroscience
- Clinical Sciences in Medical Conditions
- Critical Enquiry I, II &III
- Foundation Psychology for Rehabilitation
- Health Care Management
- Human Anatomy & Physiology
- Physiology & Pharmacology in Rehabilitation

3.3 Aims and Objectives of the BScOT (Hons) Programme

The programme aims are:

- Equip students with the specific knowledge base and skills that are required for competent entry level practice of occupational therapy;
- develop students' understanding of the holistic nature of a person's health status and its implications for the delivery of health care service, with emphasis on rehabilitation;
- develop students' analytical thinking, problem solving, interpersonal and communication skills; develop students' ability to integrate knowledge, skills and attitudes to practice competently in occupational therapy;
- foster students' development of professional identity and accountability; and,
- develop students' skills in self-directed learning and positive attitudes towards continuing professional and personal development.

Upon the completion of the programme, graduates should be able to:

- synthesise current knowledge in the biological, behavioural and clinical sciences for occupational therapy practice with due reference to the holistic approach to health care issues;
- analyse activities and tasks essential to life roles in self-maintenance, productivity, and leisure/play;
- identify patients'/clients' functional problems resulting from developmental dysfunction, physical disability, psychosocial dysfunction and/or the ageing process;
- plan, implement and evaluate programmes of therapy which help patients/clients acquire adaptive skills, social effectiveness and physical abilities essential for participation in their own life roles;
- communicate (verbally and in writing) and function in a manner consistent with professional standards;
- contribute to the planning, organising, staffing, leadership and quality assurance of an occupational therapy unit;
- apply knowledge and interpersonal skills learned to work co-operatively as a member of the rehabilitation/multidisciplinary team which aims at reintegrating people with disabilities back to their families and into the community; and continue ongoing personal and professional development through participating in activities such as independent study, peer review activities, clinical supervision, continuing education and research.

3.4 Philosophy of Clinical Education

For developing clinical reasoning skills, it is crucial for students to master their knowledge base and establish their competence by integrating their theoretical knowledge into practice. Within the curriculum, the components of the clinical subjects and the fieldwork practice are important within this process (DH, 2001a; DH, 2001b; WFOT, 2002; COT, 2003). The clinical subjects provide the opportunity for students to apply what they have learned in terms of theories, clinical, technical knowledge and professional practice to actual case management. The fieldwork practicum therefore is regarded as the major channel through which occupational therapy students integrate knowledge into practice. In order to achieve this, a clearly articulated educational philosophy with an integrated fieldwork practicum should enable novice therapists to develop their appropriate clinical reasoning styles to match with their clients' needs, thereby beginning the continuum from novice practitioner to expert.

3.4.1 What is Clinical Education?

Clinical education is the guided integration and practice of knowledge and skills used in the delivery of occupational therapy services. Clinical education provides an opportunity for students to learn in the service delivery environment where facts can gain meaning, roles can be demonstrated and their self-concept can be developed. The experience aids them in making the transition from the role of a university student to that of a beginning therapist (Alsop & Ryan, 1996; Bossers et al, 1997; Cross & Hicks, 1997; Higgs & Jones, 2000; Ryan, 2000).

Clinical education is a vital part of the educational process within the curriculum of this course, which includes both academic and clinical components. The ideal setting to enhance clinical reasoning is the fieldwork education and this is one of the best ways to help students to transfer their academic skills to clinical settings are to teach them the clinical reasoning process. Fieldwork education may constitute up to one-third of the total basic curriculum. The World Federation of Occupational Therapists requires a minimum of 1,000 hours of fieldwork in entry-level occupational therapy courses. The BSc Occupational Therapy (Honours) Programme at The Hong Kong Polytechnic University constitutes a total of 24 credits, which is equivalent to 1,050 hours (The Hong Kong Polytechnic University, DCD, September 1999; Tsang, 2000).

3.4.2. <u>Overall Aims and Objectives of Clinical Education</u>

The overall aims of clinical education are to:

- provide students with the opportunity to consolidate, integrate, apply and evaluate knowledge, attitudes and skills learned at The Hong Kong Polytechnic University in occupational therapy settings;
- provide students with additional opportunities to develop the role of a professional member of a rehabilitation/multidisciplinary team;
- provide students with the opportunity to further develop such abilities as analytical thinking, problem solving and critical thinking, essential for ongoing personal growth and professional development.

Upon completion of clinical education, students will be able to:

- integrate and apply knowledge and skills learned at The Hong Kong Polytechnic University to occupational therapy settings.
- use communication skills, assessment and treatment planning, treatment implementation and programme documentation skills in occupational therapy practice;
- be aware of the importance in evaluating the effectiveness of occupational therapy practice;
- demonstrate an ability to liaise and to work collaboratively with other members of a multidisciplinary/rehabilitation team, patients/clients and careers;
- demonstrate professional characteristics including initiative, sense of responsibility, accountability, clinical problem solving and critical thinking skills;
- demonstrate attitudes and behaviours in accordance with the Supplementary Medical Professions Ordinance Code of Ethics.

3.4.3 Organisation of Clinical Education

The arrangement for Clinical Education throughout the three years of the programme is in terms of sequential clinical placements, Clinical Education I, II, III and IV It is considered mandatory that a student should achieve both specified educational aims and the vocational objectives (See **Appendices 3.4.3., 3.4.3a & 3.4.3b**), and obtains a satisfactory result in each clinical placement before progressing to the next higher level of clinical placement. To enhance student learning and better integration of the academic and clinical components of the curriculum, subjects are presented according to various clinical condition/dysfunction and then followed by clinical placements in relevant clinical settings (See **Figure 3.4.3**).

Figure 3.4.3.

Organisation of Academic & Clinical Education - BSc (Hons) in Occupational Therapy

	← September to mid January (*Christmas and New Year holidiay*)			→←Jan→←		Feb to early June			→←June→← to July	July to August	→←Aug - Sept →
	1st Semester (Week 1 – 17)					2nd Semester (Week 21 – 38)				**Summer term**	
Weeks	17			3		17 + 1 (*Chinese New Year Holiday*)			2 + 1	8	3
Year 1	14 wks Uni teaching Foundation Sciences & Introduction to OT	rev	exam	break	reg	14 wks Uni teaching Professional Foundation for Human Occupations	rev	exam	break Cl. Ed. I		reg
Year 2	14 wks Uni teaching Environmental Issues, Musculoskeletal Conditions & Psychiatric Conditions	rev	exam	break	reg	14 wks Uni teaching Medical-Neurological Conditions & Development Dysfunction	rev	exam	Break	Clinical Ed. II (8 wks)	reg
Year 3	8 wks Uni teaching Issues in contemporary OT practice, Psychosocial Conditions	Clinical Ed. III (9 wks)		break		Clinical Ed. IV (10 wks)	8 wks Uni teaching Health Care Management & Professional electives				

"rev" = revision/making up class
"exam" = examination
"reg" = subject registration
"Cl. Ed." = Clinical Education

3.5 Integration of Theory and Practice

Fieldwork is a core element of occupational therapy education and Clinical placements assist students to integrate theory and practice by providing opportunities for observation and practice of clinical skills in real clinical settings. Clinical placements also enhance students' clinical reasoning, problem solving and professional skills (Cook & Cusick, 1998; Bonello, 2001; Sadlo & Richardson, 2003). As clinical reasoning is the thought process that occupational therapists use during evaluation and treatment (Mattingly & Fleming, 1994; Dutton, 1995), teaching clinical reasoning is, therefore vital to the professional preparation of occupational therapy students (Royeen, 1995; Higgs & Jones, 2000; Ranka & Chapparo, 2000; Ryan, 2000).

3.5.1 Learning Outcomes – Development of Competence

The concept of competence within the health care professions appears vague and ill defined and debate continues around the definition of competence and the performance standards that students should be assessed (Cheetham & Chivers, 1999; Philips, Schostak & Tyler, 2000; Alsop, 2001). It is acknowledged that both a judgement and a definition of competence are subjective and thus a valid and reliable evaluation of clinical competence in occupational therapy and other health care professions remains a challenge (Polatajko, Lee, & Bossers, 1994, p21). What became clear through reviewing the literature were the many ambiguities that surround the challenging concept of competence (Eraut, 1994; Neary, 2000; Alsop, 2001; Hocking & Rigby, 2002; Duke, 2004).

Cognitive theorists approach the subject of thinking and the development of competence from a variety of perspectives. Some theorists focus on the individual acting as sole agent in the process of constructing and reconstructing meaning. Others focus on the socio-cultural context in which the individual lives and still others on both the individual and social contexts (Powell & Waters, 1996; Hocking & Rigby, 2002).

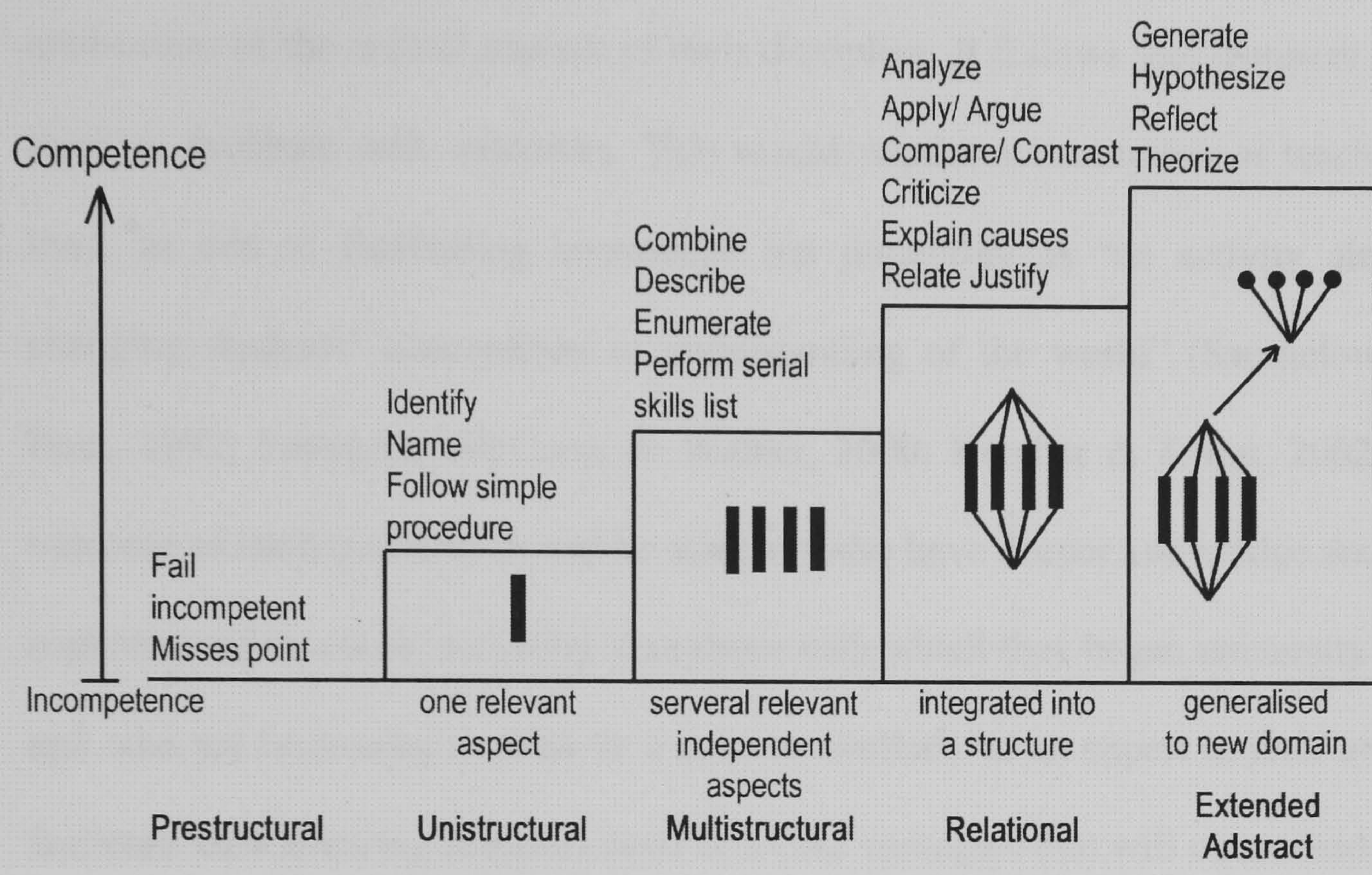
These theories have implications for teachers and learners. The cognitive theories suggest that teachers need to create environments in which shared meaning can develop, and individual meaning can be challenged. Furthermore, these theories also have a bearing on the development of clinical reasoning and learning strategies appropriate for students as well as clinicians. All this suggests that teachers should focus on the process skills that optimise learning that they should facilitate learners to gradually construct the representations of experts, moving them along the continuum from novice to expert using a supportive model of cognitive development.

A major difference between the expert and the novice is in the way that they organise their knowledge. Experts organise their knowledge in meaningful schemata or multilevel knowledge structures. Thus their knowledge is more likely to be accessible. For students or novices, it is the development of these knowledge structures that will have a significant on future learning and development of clinical reasoning skills (McCriddle & Christensen, 1995; Alsop & Ryan, 1996; Patel & Kaufman, 2000), which in turn affect their study strategies as well as the outcomes of learning (See **Chapter 6** for more details on Novice-Expert Continuum).

Though there are subject-specific differences in the development of expertise, Biggs & Collis (1982) found that generally students learn quite diverse material in stages of increasing structural complexity. Biggs & Collis (1982) proposed a structure of the observed learning outcomes, using the acronym, SOLO (Structure of the Observed Learning Outcome). The SOLO taxonomy (Biggs & Collis, 1982) is a qualitative measure, which is useful in defining the level of cognitive responses and suggests certain dimensions or characteristics of the levels (**Figure 3.5.1**). The cognitive dimensions are the indicative of ability to form schemata and the knowledge structures for integration of theory and practice.

Figure 3.5.1

SOLO (Structure of the Observed Learning Outcome) Taxonomy (Biggs &Collis, 1982)



The SOLO Taxonomy

Reference to the above (**Figure 3.5.1**), Biggs & Collis (1982) described five levels of the structure of observed learning outcomes. These ranged on the basis of the structural organisation of the knowledge in question in a particular mode, from incompetence to expertise in hierarchical order as follows:

1. Prestructural: incompetence, nothing is known about the area. The task is engaged but the learner is distracted or missed by an irrelevant aspect belonging to a previous or simpler mode of operation.
2. Unistructural: The learner focuses appropriately on the task but picks up one or very few relevant aspects of the task.
3. Multistructural: The learner identifies a several relevant features, but is independent of each other, and does not integrate them appropriately.
4. Relational: The learner now integrates the parts so that the whole has a coherent structure and meaning.
5. Expended abstract: As relational, but the whole is generated to a related domain of knowledge. The learner generalises the structure to develop abstractions, representing a higher mode of operation.

Higher education should lead ideally to higher order thinking for most graduates. This means that the preferred learning outcomes for all graduates completing university education should be understanding, integration and potential application of the crucial aspects of their discipline. It follows that lecturers should teach to facilitate such outcomes. This would require a conception of teaching, at least, as one of facilitating knowledge but preferably as "an activity aimed at changing students' conceptions or understanding of the world" (Samuelowicz & Bain, 1992; Entwistle, McCune, & Walker, 2000; Kember & Kwan, 2002). The outcome of such teaching should be students who have deeper knowledge and more sophisticated levels of reasoning than those with which they began university study, and who are beginning to think in a manner similarly to an expert in their area. To facilitate such thinking lecturers need to utilise strategies that will cause students to learn in such a way. It is suggested in that the use of adaptations of the SOLO taxonomy is one such way of influencing and assessing learning outcomes to facilitate higher order thinking. The comparison of SOLO with aspects of students' performance assessment in BSc (Hons) Occupational Therapy programme is discussed in **Table 3.7.2.**

3.6 Educational Philosophy for Clinical Education

Occupational therapy has relied on clinical education (fieldwork) as one of the important components of professional preparation to acculturate occupational therapy students to the profession ever since its inception. Clinical education is the essential bridge from classroom to service delivery settings; it is a common thread uniting all practitioners (Mattingly & Fleming, 1994; Cohn & Crist, 1995). Through clinical education, occupational therapy students are not only provided with opportunities to demonstrate their understanding of classroom materials, but also with experiences necessary to integrate and apply their knowledge and skills in a controlled practice setting with supervision (Kramer & Stern, 1994; Yau, 1995; Cross & Hicks, 1997; Craik & Austin, 2000). To reflect such belief, both academic and clinical education form an integral part of the BSc (Hons) in Occupational Therapy Programme at The Hong Kong Polytechnic University with proportionate allocation of academic credits.

It is mandatory that a student needs to achieve a satisfactory result in both specified academic and clinical objectives at each level before progressing to the next higher level of study (horizontal integration). The granting of the final award is based on the achievement of the overall academic and clinical objectives of the programme (vertical integration). The integration between various subjects' content areas also forms the basis for and focuses on the numbers and types of assessments conducted throughout different levels of clinical studies.

3.6.1 Levels of the Integration Process

The integration between academic teaching and clinical studies incorporates three basic levels of the integration process (Reay, 1986):

- Knowledge integration

  Students acquire in The HK Polytechnic University factual knowledge; e.g. anatomy, psychology and occupational therapy process, which needs to be reinforced in clinical settings.

- Conceptual integration

  Students learn in The HK Polytechnic University how to gather knowledge from several sources and put them together to form a coherent framework for professional practice, for example, the concept of selecting an appropriate treatment approach for a certain patients/clients group. Students then have the chance to see how this concept is realised in the clinical setting.

- Practice integration

  Students learn in The HK Polytechnic University how to translate knowledge, attitudes and skills into appropriate professional behaviors and practice in clinical settings.

3.6.2 Integration between Academic Subjects and Clinical Studies

3.6.2.1 Level I Subjects

Academic subjects taken by students before Clinical Studies I are as follows:

- In "Human Anatomy", "Physiology", "Foundation Psychology for Rehabilitation Professionals", and "Society, Politics & Culture", students acquire the foundation for understanding a person from the biological and psychosocial perspectives, and gain the key blocks of clinical knowledge and skills.

- Through "Occupational Role Development", students acquire knowledge in developmental psychology as well as role development throughout the lifespan.

- In "Occupational Therapy Theory & Process I", students study the historical development, philosophical beliefs, and ethical considerations, occupational therapists' roles and functions in local clinical settings; different models and guidelines for practice, techniques and culturally relevant activities commonly employed by occupational therapists in Hong Kong. Through the "Human Occupations" subject, students learn about occupations (daily living tasks, work and leisure) and tasks and activity analysis; and the occupational therapy intervention process.

- In "Communication and Helping Skills for Occupational Therapy Practice", students develop communication ability, interview skills and basic counseling skills which are essential for the practice of occupational therapy in various clinical and work situations;

- Through "Performance Component Studies" subjects, students gain knowledge of professional foundation sciences for human occupations and skills in conducting assessments and intervention strategies specifically for dysfunction in sensory-perceptual, motor and psychosocial performance components.

3.6.2.2 Clinical Education I

- The academic subjects in Level I prepare students for the acquisition of applied and clinical knowledge in key areas, as well as enable students to gain orientation to the delivery of OT service. Students are not yet expected to plan a complete assessment or a rehabilitation programme, though they may be given opportunity to observe, reflect, and perhaps try out assessment and treatment techniques under close supervision.

- "Clinical Education I" takes place at the beginning of Year I summer vacation. This subject provides students with the opportunity to identify functional problems encountered by people with disabilities, and the roles and functions of an occupational therapist, as well as to observe the occupational therapy intervention process within various clinical settings.

- More importantly, students will be guided to develop appropriate professional attitudes and behaviours, especially toward establishing rapport with patients/clients and staff of the occupational therapy unit, which form the basis for more advanced studies in Level II and III.

3.6.2.3 Level II Subjects

- In "Critical Inquiry I" and "Critical Inquiry II", students gain the concept of and methodology used in scientific inquiry and its application to health care research, which forms the basis for the development of critical thinking and problem solving abilities in occupational therapy practice;

- Through subjects, including "Clinical Sciences in Psychiatric Conditions", "Clinical Sciences in Musculoskeletal Conditions", "Occupational Therapy for Psychosocial Dysfunction I", and "Occupational Therapy for Physical Dysfunction I", "Clinical Sciences in Medical-neurological Conditions", "Clinical Neurology & Neuroscience", "Clinical Sciences in Developmental Dysfunction", "Performance Components Studies IV – Cognitive Component", "Occupational Therapy for Physical Dysfunction II", and "Occupational Therapy for Developmental Dysfunction", students gain competence in assessing, planning, implementing and evaluating occupational therapy interventions for patients/clients with problems associated with musculoskeletal, neurological, psychosocial, and developmental conditions.

- In the subject "Environment Issues in Occupational Therapy Practice", students gain knowledge and skills in addressing issues in the physical environment that may affect patients'/clients' reintegration into the community, through the use of environmental adaptation/modification and application of advanced or computer technology.

3.6.2.4 Clinical Education II

- Level II academic subjects facilitate students to acquire knowledge and skills to be directly applied in clinical placements. Following the integrating concepts, students will be given more opportunities to treat various types of patients/clients as well as reflect on their clinical practice. They will also be encouraged to assume responsibility for tasks related to negotiated objectives and develop the autonomy they will need as qualified practitioners.

- "Clinical Education II" subject takes place during Year II summer term. This eight-week clinical placement provides students with the opportunity to participate as contributing members of a multidisciplinary/rehabilitation team and to enhance their experience in adopting a holistic approach to client care.

- This placement provides students with the opportunity to consolidate and apply occupational therapy knowledge, attitudes and skills learned in The HK Polytechnic University to assess, plan, and implement occupational therapy intervention programmes for patients/clients suffering from common conditions in the fields of developmental dysfunction, physical disability, psychosocial dysfunction and/or the ageing process. Students will also be guided to evaluate and/ or modify their rehabilitation programmes as appropriate.

3.6.2.5 Level III Subjects

- The subject "Occupational Therapy Theory & Process II" guides students to critically evaluate the application of various occupational therapy theories and practice models in clinical practice. This enhances student's professional competency in assessing, planning, implementing and evaluating occupational therapy intervention programmes for clients. It also guides students to critically evaluate occupational therapy as a profession and to contribute to the upgrading of its professional status in Hong Kong. Students will also gain an understanding of contemporary issues that influence the practice of occupational therapy.

- The subject "Occupational Therapy Applied in Psychosocial Dysfunction II" consolidates students' knowledge and skills in assessing, planning, implementing and evaluating interventions for children and adolescents with psychosocial problems.

- The subject "Health Care Management" provides students with knowledge in professional service and interdisciplinary practice, as well as basic managerial knowledge and skills to enable them to contribute to the planning, organising, staffing, leadership and quality assurance of a clinical unit.

- The "Professional Elective" subjects provide options for students to advance their knowledge base and/or skills in specific areas of practice. Students can choose at least two Professional Electives (or 4 credits equivalent).

3.6.2.6 Clinical Education III & IV

- Level III of the clinical studies programme consists of "Clinical Education III" and "Clinical Education IV" subjects, which take place in the middle of first semester and the beginning of second semester of Level III study respectively. These subjects provide students with the opportunity to consolidate, integrate, and apply knowledge, skills and attitudes learned in the university to occupational therapy practice. Students are expected to take responsibilities to seek guidance, to update their knowledge and skills, and to develop independent problem solving skills, as well as to evaluate their own practice and the rehabilitation programmes independently.

- At this stage, students will be guided to evaluate, with respect to management theories and techniques learned, the appropriateness of basic managerial functions for managing independent occupational therapy practice and day-to-day administration of the occupational therapy unit.

- On the completion of their Clinical Education III & IV, students will become competent and reflective occupational therapists who are self-motivated and have positive attitudes towards continuing personal growth and professional development.

3.6.3 Mechanisms to enhance Integration of Theory and Practice

- New academic staff members and clinical educators should be fully oriented to the course syllabus, academic regulations, and expectations in academic performance and clinical education.

- Before the commencement of each clinical block, students should be given a briefing on the expectations of the clinical education block. Preferably, academic staff and clinical educators will jointly conduct the briefing.

- During clinical placements, visiting faculty members and clinical educators should assist students to relate theory to practice, to reflect on their clinical experience, and to evaluate the knowledge and skills learned in The Hong Kong Polytechnic University and clinical settings. At the end of each clinical block, student feedback or debriefing meetings may be conducted to achieve the above purpose.

- Clinical experience and university based learning is organised to ensure an integrated and progressive approach to the development of competency to practise. The collaboration between academic and clinical personnel is encouraged to enhance the exchange of knowledge and skills. Clinical educators will be invited to conduct lectures, tutorials and practicals, or joint research seminars at The HK Polytechnic University, while academic staff members are also encouraged to conduct clinical teaching or case studies in clinical educational settings. Exchange and circulation of teaching material, case studies, and research findings are encouraged. Such a joint approach aims to enhance theory to practice, link and aid standarisation of marking within clinical/fieldwork learning.

3.7 Clinical Education Assessment

A major concern of educators, both in occupational therapy and other related disciplines, has long been how to achieve more objective assessments of students' clinical performance (Cross & Hicks, 1997). Evidence from educational research into the nature and breadth of criteria used by educators to assess students' clinical performance, although often inconsistent (Blease, 1995), suggests that judgements are frequently inaccurate. Experiences during clinical placements have been found to have students' future career plans compared to factors such as job availability, university staff, university courses, and the status of the clinical area (McKenna et al, 2001; Tan, Meredith, & McKenna, 2004). The capacity of assessors to understand what they are actually judging in students' performance, what importance is attached to various attributes, or the extent to which evidence, personal values and assumptions contribute to decision making is not clearly understood.

Clinical reasoning is the reflective thought process that therapists undergo to integrate client evaluation information and to develop and implement intervention plans. Researchers agree that novice and experienced clinicians maintain noticeably different clinical reasoning skills (Thomas, Wearing, & Bennett, 1991; Schell &

Cervero, 1993; Robertson, 1996; Dutton, 1995; Strong et al, 1995; Unsworth, 1999, 2001; Mitchell & Unsworth, 2005). Although a great deal of literature exits on the expert-novice differences, the majority of literature focuses on "what is" and "how to" questions. One area of notable omission is the development of ways to evaluate clinical reflection and reasoning (Royeen et al, 1994). The model of supervision rests on the concept that the supervisor is the expert, the student the novice with little to offer. To evaluate the effectiveness of different teaching strategies for clinical reflection and reasoning, we need various ways to measure and evaluate the development and improvement of clinical reasoning skills.

It is well recognised that assessment is an important component of the teaching-learning process and as such it is used to measure learning outcomes. In order to achieve this, feedback about students' performance must be immediate and continuous (See **Table 3.7** below). Learning objectives should mirror the students' progression through the course, to the stage at which their practical and clinical reasoning skills are consistent with the achievement of honours degree standard. For CE II, III, IV, other than the generic objectives as stipulated in the curriculum (The Hong Kong Polytechnic University, DCD, September 1999), students are encouraged to negotiate their individual learning contracts at the beginning of each placement together with the clinical educators and visiting faculty members. This contract acts as a reference to the students and clinical educators to judge whether the learning objectives are met.

The above principles should apply to each period of clinical placement for all settings providing clinical education to occupational therapy students of The Hong Kong Polytechnic University. The following **Table 3.7** shows the assessment methods used in the Clinical Education I to IV:

Table 3.7

Clinical Education Assessment Methods

Clinical Education (CE I)	Clinical Education (CE II, III, & IV)
• The assessment is based on coursework and continuous assessment. • The structure and content of coursework varies according to setting. The components consists of a student's observation report of a client, an assessment report, report on identification of function vs. dysfunction of patients/clients, an activity analysis and a reflective journal. • The continuous assessment of students' performance includes professional attitude and behaviour, professional knowledge and skills. • The overall performance will be rated using an assessment form • At the end of placement, an overall grade in accordance with the guidelines stipulated in the Appendix is awarded to the student based on his/her performance in professional attitude and behaviours, professional knowledge and professional skills.	• The assessment is based on a continuous and qualitative assessment approach. • Clinical educators, in consultation with the visiting faculty members, will assess the performance of the students through structured observation of students' performance in professional attitude and behaviour, professional knowledge, and professional skills during each clinical placement. Achievement of the learning contract objectives may substantiate these observations. • Professional attitude and behaviour, professional knowledge, and professional skills required should increase in both quantity and quality as the students progress to higher levels.

(Source: Tsang, H. T. (2000). BSc (Hons) in Occupational Therapy, Clinical Education Manual, The Hong Kong Polytechnic University).

3.7.1 Grading of Clinical Education

At the end of each period of clinical placement, the clinical educator, in accordance with the BSc (Hons) OT Definitive Programme Document (The Hong Kong Polytechnic University, DCD, September, 1999) awards a grade to the students. The student has to achieve a grade C or above in order to pass each period of clinical placement. The following elements should be considered by the clinical educators before awarding the final overall grade to the student:

- Performance of the student in professional attitude and behaviour, professional knowledge, and professional skills;
- Progress of the student learning contract;
- Comments from the visiting faculty member;
- Based on the guidelines stipulated in the BSc (Hons) Occupational Therapy Definitive Programme Document (1999), a numeral grade point is assigned to each letter grade, as follows:

Grade	Grade Point
A+	4.5 **
A	4
B+	3.5
B	3
C+	2.5
C	2
D+	1.5
D	1
F	0

** The total GPA is capped at 4.0.

3.7.2 Use of SOLO Taxonomy to Grade Student Learning

The SOLO taxonomy is a useful matrix to use as the basis for the grading scheme and can be used to explain to students the emphasis of the subject and the desired learning outcomes for clinical reasoning and application of subject material (Biggs, 1999). The SOLO taxonomy can be applied in education in a number of ways. Although, it is claimed in the literature that SOLO refers primarily to its use in assessing levels or stages of cognitive structural thinking, this study found useful in applying to the levels of Dreyfus & Dreyfus (1986) model of skill acquisition, as the levels relate closely to the novice to expert continuum. Furthermore, the constructivist approach is evident in Biggs & Collis (1982) work, which supports the view that students must actively build on present knowledge, expand their repertoire of cognitive skills, and apply them in learning new material.

It is suggested that the SOLO taxonomy as a tool can also be utilised in each of the three Ps of the 3P model of learning (See **Chapter 8**), that is in presage, process and product. In the 3P model, presage includes *student* factors such as prior knowledge, abilities, ways of learning, value and expectations, and *teaching* factors such as curriculum, teaching method, climate and assessment (Biggs, 1993).

As shown in **Table 3.7.2** below, at the top end of the SOLO taxonomy, a student would be able to support ideas with evidence and logical reasoning, extrapolate from one situation to another, synthesise information, make connections, analyse, prioritise, evaluate, create, compare and critique sources of information to arrive at new conclusions, show evidence of inference, propose solutions to problems.

- If the student can demonstrate in his/her coursework or examinations that he/she has put in extra ideas beyond teaching, in such situations, according SOLO taxonomy, she/he has been able to show achievement of the level of extended abstract and his/her grade is worth A or A+. Such verbs as theorise, hypothesise, generalise, reflect, or generate will describe this level.
- The next level in SOLO taxonomy is the relational which indicates integration between facts and theory, action and purpose and is indicated by verbs like apply, integrate, analyse, and explain. If the students' work demonstrates the integration of theory to form a cohesive and cogent argument, students' work merits a B or B+.
- The multi-structural level involves the understanding of boundaries, but not of systems and includes several relevant but independent aspects and is indicated by verbs like classify, list, describe, or enumerate. The coursework or examination may show some understanding of the concepts being taught but does not go beyond a basic level and would receive a C or C+.

Table 3.7.2

Comparison of SOLO with Aspects of Performance Assessment in BSc (Hons) OT Programme (Guidelines for grading student in Clinical Education)

Performance	Grading	SOLO Taxonomy (Biggs & Collis, 1982)	Professional Attitude, Professional Knowledge and skills in Clinical Practice (Tsang et al. 2002)
Demonstrates proficiency in speed, quality, initiative and adaptability	A/ A+	In this level of extended abstract, students puts an extra ideas and effort beyond formal teaching. Student reached the level of extended abstract. Such verbs as theorise, hypothesise, generalise, reflect, or generate will describe this level.	Consistently outstanding Always shows strong initiative to expand own breath and depth of knowledge and experience (A) ***Outstanding*** Frequently shows strong initiative to expand own breath and depth of knowledge and experience (A+)
Needs minimal supervision in performing clinical duties	B/ B+	This relational level indicates integration between facts and theory, action and purpose and is indicated by verbs like apply, integrate, analyse, and explain.	Independent in most areas, Minimal supervision needed in some areas. Shows initiative to improve areas of weakness and enrich breath and depth of knowledge and experience (B+) Independent in some areas, Minimal supervision needed in most areas. Shows initiative to improve areas of weakness and enrich clinical experience (B)
Needs supervision in performing clinical duties	C/ C+	This multi-structural level involves the understanding of boundaries, but not of systems and includes several relevant but independent aspects and is indicated by verbs like classify, list, describe, or enumerate. Students may show some understanding of the concepts being taught but does not go beyond a basic level.	Full awareness of own weakness Responds quickly and makes marked changes in performance. Requires supervision in some areas (C+). Requires supervision in most areas On the whole has acquired a satisfactory level of safe performance. Responds quickly and makes changes in performance(C).
Requires instruction and close supervision for clinical practice Performance is inconsistent	D/ D+	This level is unistructural and requires showing minimal effort with one concrete, direct, relevant aspect in assignments. Student may receive a D or a bare pass.	Requires instruction and close supervision for clinical practice,Partial awareness of own weakness. Shows some improvement in performance after feedback (D+). Requires instruction and close supervision for clinical duties. May have committed 1-2 serious mistakes. Lack of awareness of own weakness (D)
	F		Requires instruction and close supervision for clinical duties. May have committed serious mistakes in safety and confidentiality, etc. Lack of awareness of own weakness Minimal evidence of changes in performance after feedback

(Ref: Adopted from Tsang, (2000). The BSc (Hons) in Occupational Therapy Clinical Educational Manual, The Hong Kong Polytechnic University, September 2000, Hong Kong.)

For the past three years, the researcher of this study used the marking scheme which incorporates the SOLO model for the subject Health Care Management with minor modifications. The researcher has found it useful in assisting students to actively take responsibility for their learning through understanding their own level of input and noting where they need to put more effort to achieve relevant learning outcomes.

The use of the SOLO taxonomy for assessment indicates that it is an effective means of distinguishing between relational and multistructural responses at least. The finer differences between responses and hence grading probably need to be determined on the kind and extent of knowledge responses. Although, SOLO taxonomy is a useful tool in higher education for assessing students' learning, further research in the adaptation and use to improve the quality of learning in tertiary education is warranted.

3.8 Summary

In this section, an attempt has been made to describe briefly how clinical education forms an important and integral part within the Bachelor of Science (Honours) Degree in Occupational Therapy curriculum. Clinical reasoning is the core of occupational therapy practice and as such the occupational therapy curricula is responsible for guiding students to become effective clinical reasoners. The clinical setting offers an ideal opportunity to test and revise clinical reasoning skills. Furthermore, the experience, which occupational therapy students gain in the clinical setting, offers the best opportunity to integrate skills learned in the practice and in the university laboratory with theory learned in the classroom. It is the responsibility of the clinical educator to enable such integration to occur.

In this section, it has also been shown how clinical reasoning teaching is widely regarded as an essential part of Occupational Therapy curricula and how it provides a framework for integrating students' learning for preparing them for their role as responsible health care professionals and for helping them deal with complex and variable elements of clinical practice. The key to facilitating reasoning rests with educators, both academic and fieldwork. Apart from being up-to-date with knowledge of the field they need to try creative and innovative ways of organising learning experiences and obtaining feedback from the students so that course modules can be modified and fine-tuned.

The SOLO taxonomy, developed by Biggs & Collis (1982) proposes a structure of learning outcomes, and thus provides a clear basis for a technology of testing within learning. This chapter includes a summary of the research and use of SOLO to date as a means of finding out what students know and believe about their own learning, and in particular assessing their learning outcomes.

The choosing of appropriate tests for assessment, the setting of relevant goals and provision of relevant intervention strategies based on models of practice are fundamentally important for clients' success in engaging in occupations or occupational performance in self-care, productivity, and leisure. This process of occupational therapy depends very much on clinician's clinical reasoning skills, which is described in the next chapter.

Chapter 4

CLINICAL REASONING IN OCCUPATIONAL THERAPY

4.1 Introduction

In the previous chapter, the BSc (Hons) in occupational therapy curriculum with particular reference to the nature of clinical education that has a direct bearing on the facilitation was clinical reasoning abilities of students was presented. This chapter presents occupational therapy research and theory in clinical reasoning to consider the nature of clinical reasoning and expands further the clinical reasoning models of practice to the development of novice-expert continuum within the emerging models of practice. It also explores the nature of reasoning about clinical inquiry and outlines the different approaches to reasoning and draws a distinction between the content and the process of reasoning, relating this to the literature in occupational therapy.

The current focus on clinical reasoning in occupational therapy is consistent with occupational therapy's continued growth as a client-centred profession. Clinical reasoning represents the essence of occupational therapy practice. The importance of clinical reasoning in occupational therapy is clearly established (e.g., Elstein, Shulman, & Sprafka, 1978; Rogers, 1983; Parham, 1987; Mattingly & Fleming; 1994; Dutton, 1995; Higgs & Jones, 2000; Ranka & Chapparo, 2000) can be viewed as descriptors of mental processes that become proficient through clinical experience (Benner, 1984; Dreyfus & Dreyfus, 1986).

Clinical reasoning is a complex and multifaceted process. Taking in this complexity, some practitioners are moving away from viewing their practice and voicing their reasoning in a purely scientific, technical and rational way. Previously this was the dominant view of practice; it focused on instrumental problem solving made rigorously by the application of scientific theory and technique.

4.2. What is reasoning?

Occupational therapists use clinical reasoning processes during evaluation and treatment. Clinical reasoning therefore is central to occupational therapy practice (Mattingly & Fleming, 1994; Dutton, 1995). With reference to reasoning, the education philosopher Dewey (1933) termed it "reflective thinking" and another expert, Schön (1991) describes what professional do when they think in practice situations as "reflection-in-action".

Reasoning can be thought of as reflection on perceived information. It may or may not lead to a conclusion or some kind of action. Clinical reasoning in its broadest sense connotes the internal thinking and decision-making processes associated with clinical practice. In the process of clinical reasoning, there is usually a problem. In this instance, the goal of the reasoning or reflection is to solve the problem. It is thought that reasoning follows a basic process common to all human beings faced with a problem (Newell and Simon, 1972).

Reasoning is affected by multiple factors. Today's practitioners face increasing amounts of disparate information demands for quality care and accountability, and expectations for academic scholarship and research. It has imperative that they can effectively reason through highly complex tasks, which are specific to particular situations; it is no longer possible to follow technical or generalised prescriptive routines.

4.2.1 Information-Processing Approach to Reasoning

Several different theoretical perspectives have helped provide an understanding of occupational therapists' clinical reasoning, one of them is the information processing approach which was first described by Newell & Simon (1972) in their seminal work examining how individuals with a great deal of experience in a specific area (domain expertise) reasoned during a problem solving task.

It is thought that reasoning follows a basic process common to all human beings faced with a problem (Newell and Simon, 1972). Although this basic process is universal, there are subtle variations in reasoning when directed to a particular goal. Newell and Simon (1972) regard human reasoning as a serial process. They "proclaim man to be an information–processing system ... when he is solving problems" (p9).

The research in the area of information-processing approach shows that the studies have tended to focus on tasks with defined domains, which predicts a correct solution. In occupational therapy, however, this is not possible, as problems do not fall into these kinds of domain. Indeed, Newell and Simon (1972) state: "the task environment ... determines to a large extent the behaviour of the problem solver, independently of the detailed internal structure of his information–processing system" (p788).

Elstein, Shulman, & Sprafka, (1978) in their extensive studies of medical problem solving observed that there were four major components to the reasoning process in doctors' medical problem solving. These were:

1. Cue acquisition, obtaining clinical information by observation or testing
2. Hypothesis generation, suggesting a number of possible diagnostic hypotheses
3. Cue interpretation, interpretation of cues according to hypotheses suggested
4. Hypothesis evaluation, where hypotheses are weighed up to ascertain the one most likely to be correct or the process is re-started.

In the occupational therapy literature, Rogers and Holm (1991) describes a process of diagnostic reasoning as one component of clinical reasoning. They identify problem sensing and problem definition as the two stages of diagnostic reasoning. The problem-definition stage begins with cue acquisition; followed by hypothesis generation, cue interpretation and hypothesis evaluation.

4.2.2. What is Clinical Reasoning?

Throughout the literature there are many terms that are used interchangeably in relation to the process of clinical reasoning. Although it is often assumed that they have the same meaning, the words carry connotations, which may influence the context in which these terms are used. It is therefore important to examine these terms, and clarify their meanings in the context of this study, before proceeding further.

The terminology used in the literature in the general area of clinical reasoning is inconsistent, and some terms overlap or have different meanings. Sometimes occupational therapists speak of clinical reasoning as the ability to give a reason for a clinical decision. But clinical reasoning is not necessarily equitable with the capacity to offer explicit reasons for action because, as Polanyi (1967) argued so well, even in science, we know more than we can say. Schön (1987), Benner (1984) and Dreyfus & Dreyfus (1986) are among those who have written expansively about the tacit nature of professional expertise.

The term "reasoning" refers to the many ways in which a person may think about and interpret an idea or phenomenon. This may range from a simple perception to a complex abstract construction and includes many forms of inquiry and interpretation (Fleming, 1991b). The term "clinical reasoning" refers to the thinking and processes associated with the clinical practice of health care providers (Higgs & Jones, 1995).

The terms "problem solving" refers to the mental process by which one sequentially identifies a problem, interprets aspects of situation, and selects a method to alleviate the problem whereas the term "decision making" refers to the process by which one makes a choice among two or more alternatives (Fleming, 1991a). The term "medical problem solving" seeks to describe the cognitive processes that physicians employ in identifying and solving patient's medical problems. Perhaps the most widely known work in this area is that of Elstein, Schulman, and Sprafka (1978). The term "medical decision-making" focuses on the application and development of sophisticated statistical methods to guide or model medical decisions. Expert systems, or the use of artificial intelligence, are used to model or evaluate a physician's identification of a clinical condition and treatment selection. Most of this work focuses on diagnostic skill (Kleinmuntz, 1984).

4.3. Models of Clinical Reasoning Skills

Most of the professional practice models convey different views about the respective roles of professional and patient, the goals of specific types of health care, and the beliefs and values that ought to underpin the practice. In view of this difference, there is a need to further investigate theories of clinical reasoning in order to establish its validity in relation to actual practice. This section presents an overview of the occupational therapy research and theory in clinical reasoning, as well as findings and views of many authors within and outside of occupational therapy, to consider the nature of clinical reasoning in occupational therapy.

4.3.1 Clinical Reasoning Research

Within the occupational therapy literature, clinical reasoning is a relatively new area of research and exploration. Early research in the field of clinical reasoning was initially conducted by medical educators (Elstein, Shulman, Sprafka, 1978; Barrows and Tamblyn, 1980; Barrows & Feltovich, 1987). These authors further claimed that physicians use a clinical reasoning process to make diagnostic and therapeutic decisions and as such they advocated using this model to teach medical students. The emphasis of this earlier research was based on information processing theory (Greenwood, 2000) and centred round the data gathering and development of hypotheses. The data gathering centred on the general themes of thoroughness, efficiency and accuracy of interpretation. It is interesting to report that none of the early research aimed at differentiating the qualities of a novice and expert practitioner.

In the medical education literature, medical decision-making is described as being a process of hypothetico-deductive reasoning. In critiquing the hypothetico-deductive reasoning models of Barrows, Elstein, and their associates, Janet Gale (1982) while recognising the potential value of these models as a representation of clinical reasoning argued that these models were too generalised in that the range of thinking patterns identified were seen as being characteristic of a mature adult thinking processes. Therefore, she concluded that it was not necessary to teach medical students these skills, but educational programmes should enable students to develop awareness of their reasoning skills and the ability to monitor their use of reasoning skills. There is evidence in the literature to suggest that physiotherapists adopt clinical reasoning processes similar to those of medical students (Dennis & May, 1987; Thomas-Edding, 1987; Jones, 1992).

Clinical reasoning research places an increasing emphasis on the essential connection between knowledge and clinical reasoning. Many researchers are now finding that the relevance and depth of knowledge, the content and structure of individual's knowledge bases (Bordage & Lemieux, 1986; Grant & Marsden, 1987; Norman, 1990) and the learners' ability to organise knowledge into meaningful patterns (Grant, Jones, & Maitland, 1988; Norman, 1990) are of major importance to clinical reasoning ability. With evolving theories, rapidly developing technology, and expanding practice areas, occupational therapy educators are challenged to determine the necessary content that balance between knowledge and clinical reasoning skills.

Curricular designs that emphasise problem solving have been proposed by many authors (See for example, Olsen, 1983; Sadlo, Piper, & Agnew, 1994; Vroman & MacRae, 1999; Marton, 2000; Sadlo & Richardson, 2003). These curricular designs deal with sequence and integration of knowledge, skills and attitudes. May & Newman (1980) specified a model for problem solving. They listed seven steps: 1) problem recognition, 2) problem definition, 3) problem analysis, 4) data management, 5) solution development, 6) solution implementation, and 7) outcome evaluation. The authors supported these seven steps with behaviours based on three well known cognitive, affective, and psychomotor taxonomies. The authors also advocated teaching the steps to students and organising learning experiences around them in the curricular design.

Olsen (1983) developed a problem-solving model similar to that of May & Newman (1980) in many ways. Olsen's model involved cause, problem, method, solution, product, modality, and goal. To compare Olsen (1983) and May & Newman (1980) models, both started with a problem identification step that appeared to identify the problem with chief complaint or diagnosis. The exact deviation of these models is not specified in the literature.

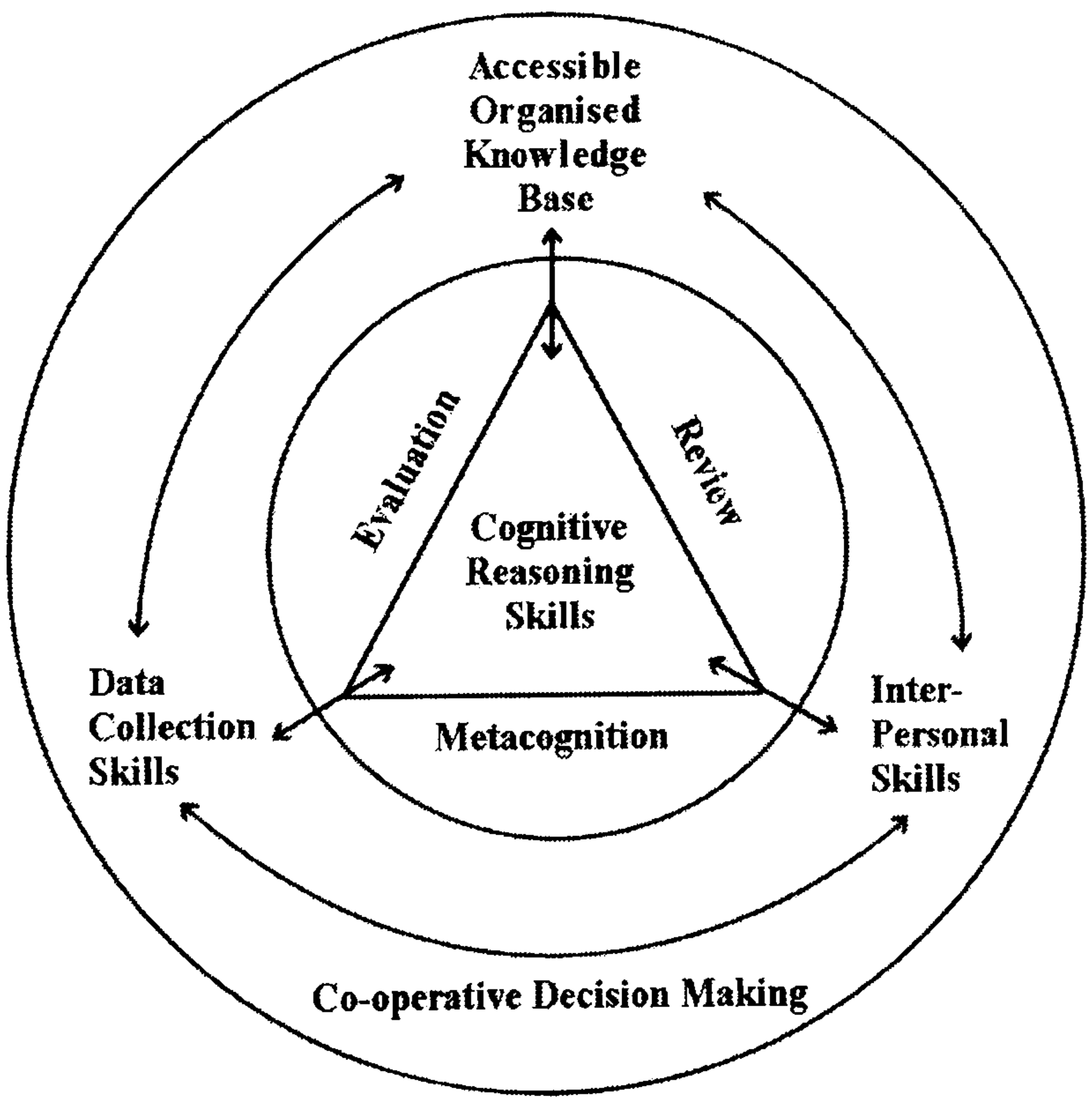
Elstein and associates (1978) took a different approach using both physician-educators and learning psychologists. The authors based on their study concluded that the clinical reasoning process consisted of four steps: 1) cue acquisition, 2) hypothesis generation, 3) cue interpretation, and 4) hypothesis evaluation. They further concluded that clinical problem solving is a hypothetical-deductive process. Despite controversy about Elstein and associates study, they are able to train medical students to improve their diagnostic skills using Elstein and associates' model.

It is clear from the above models that clinical problem solving models appear in the literature in several forms. In some medical models, there is considerable emphasis on making diagnosis and little reference to actual assessment, intervention and management. This is perhaps the greatest difficulty in the direct application of these models to occupational therapy, since the focus of occupational therapy education has traditionally been on therapeutics rather than on a diagnostic role (Higgs, 1990; Unsworth, 1999).

Higgs (1990) developed a model of clinical reasoning, which builds on the strengths of former models of clinical reasoning and adds essential elements not emphasised or included in these earlier models. As this model provides a construct within which to depict the domain of concern of occupational therapy, this study is adapted this model as a basis to study the clinical reasoning process. Higgs' model of clinical reasoning, in particular presents clinical reasoning as a process occurring continually throughout clinical practice, rather than being a means of arriving at major clinical decisions (diagnoses and treatment). Another feature of this model is that it introduces metacognition as an element of clinical reasoning, recognises the contribution of the clinician's knowledge base, interpersonal skills and data collection skills to effective clinical reasoning process (**Figures 4.3.1a and 4.3.1b**).

Figure 4.3.1a

Elements in Clinical Reasoning

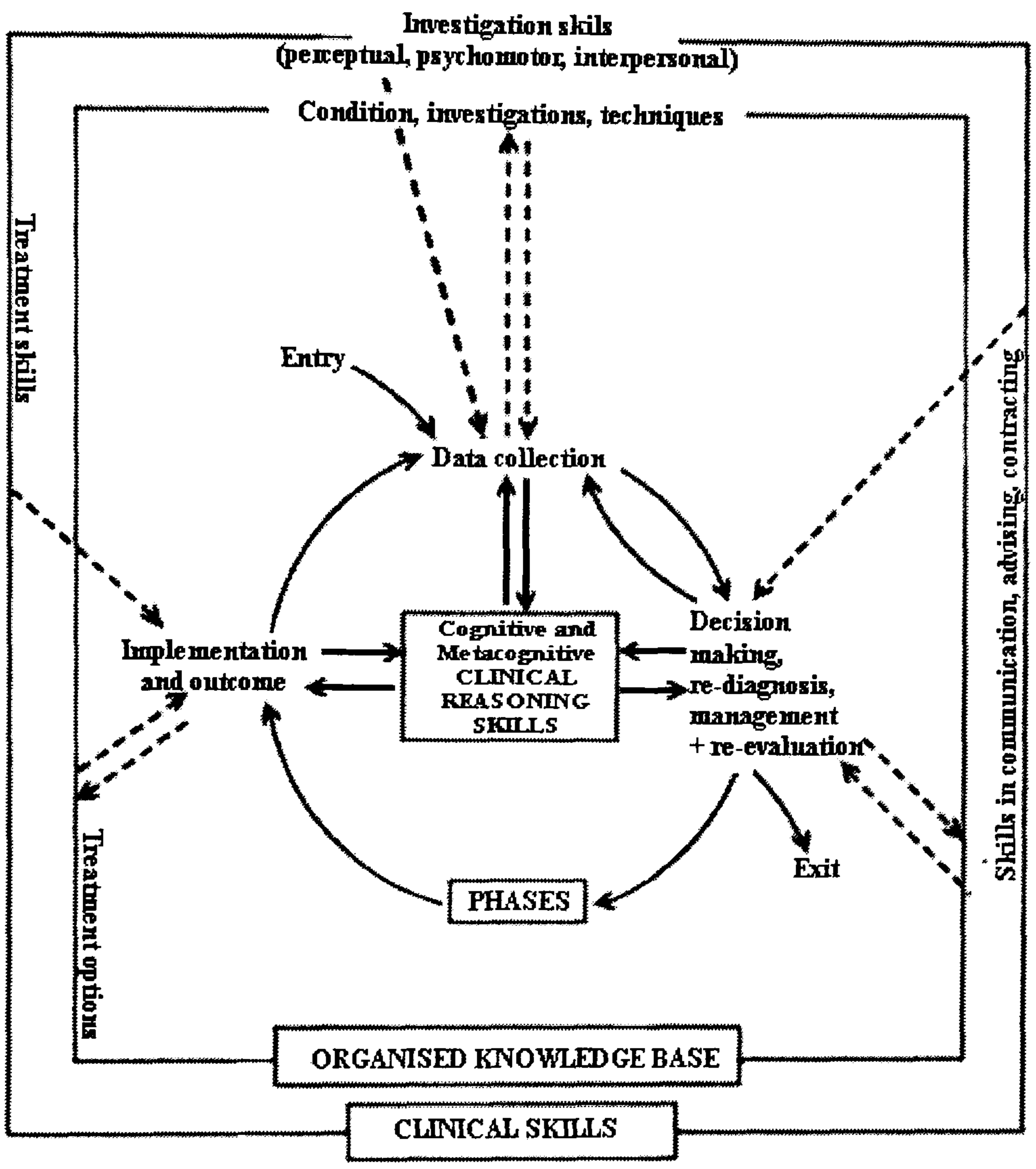


(Source: Adopted from Higgs, 1990, p15)

Figure 4.3.1a represents the factors involved in effective clinical reasoning. At the centre of the diagram are the cognitive reasoning skills (such as analysis, synthesis and evaluation of data collection), which enable the clinician to make clinical decisions about their clients. The other factors are shown in the outer circle of the model, which contain three important elements of cognitive skills of clinical reasoning; these are accessible, valid and organised knowledge base, interpersonal skills and clinical data collection skills.

Figure 4.3.1b

Model for Clinical Reasoning



(Source: Adopted from Higgs, 1990, p15)

The process of clinical reasoning is presented in **Figure 4.3.1b** as a cyclical rather than sequential process in which three major inter-related activities: data collection, decision-making and implementation occur. During clinical reasoning the clinician is seen repeatedly engaging in these activities through his/her involvement with any case or client. Driving these phases are cognitive and metacognitive skills of clinical reasoning which also draws upon and build the therapist's knowledge base, data collection skills and interpersonal skills.

Jones (1992) has addressed a number of the difficulties associated with the original models by adapting the Barrows and Tamblyn (1980) model to physiotherapy. The model has been expanded to include intervention and reassessment. Although, Jones (1992) presents clinical reasoning as a cyclical process, which emphasises the interrelationships between various phases of clinical reasoning and the high level of association of all phases with the clinician's memory/knowledge base, further research is required to develop a greater understanding of the reasoning process which therapists use in clinical practice and this study is trying to do this.

4.4. Influences on Clinical Reasoning

Clinical reasoning is a complex process occurring within a multidimensional context. The context in which clinical reasoning occurs plays an important role in the process of clinical reasoning, both in terms of the personnel who are involved and also in terms of the many environmental factors which need to be taken into consideration. Jones (1997) notes that the patients' values and beliefs, individual physical psychological, social and cultural presentation, and the environmental resources, time funding, or externally imposed requirements affect how the clinician will make decisions. The context of clinical reasoning comprises a number of elements, including:

4.4.1 Knowledge

The knowledge is important in shaping clinical reasoning by providing a means for therapists to understand what to attend and how to attend to it and the relationships between phenomena that causes order and disorder (Kielhofner, 1997). One of the critical factors pertaining to the clinical decision-making is therapists' scientific knowledge about disease process, human function and human occupation. Theories about occupational behaviour help therapists to explain and predict events or as Keilhofner (1997) put it to "name and frame" problems. Elstein, Shulman, & Sprafka (1978) reported in their study that clinical problem solving varied greatly across cases and was dependent on clinicians' knowledge in particular areas. This finding highlighted the importance of clinicians' organisation of knowledge rather than the process of reasoning, which has been emphasised by many authors throughout the literature (e.g. Patel & Groen, 1986; Bordage & Lemieux, 1991, Schmidt & Boshuizen, 1992; Arocha, Patel, & Patel, 1993).

Occupational therapy theory is part of therapists' unique body of knowledge. Theory serves to determine how problems are conceived and provides guidelines for the reasoning process in terms of what clients to accept therapy programmes and what assessment and intervention strategies to apply. Theoretical knowledge alone, however, is insufficient basis for effective clinical reasoning in occupational therapy. As Ranka & Chapparo (2000) remarked, occupational therapy has a theory base that is incomplete and as such therapists are required to make decisions in situations of uncertainty. Hagedorn (1992) also remarked that occupational therapy theories are loosely grouped in terms of their explanatory power and focus into paradigms, frames of reference and models. Under these circumstances, practical, intuitive knowledge is required. Such knowledge is tacit, founded in experience of clinical events (Rogers, 1983; Mattingly & Fleming, 1994; Unsworth, 1999).

The acquisition, organisation and complex interrelationships between rules, paradigms, frames of references and models are crucial in the development of novice-expert continuum, which will be explored further in other sections. As novice learners acquire theoretical knowledge they relate it to what they already know and what becomes true for them in terms of clinical mastery and existing value and belief set.

4.4.2 Therapy Context and Client Context

In many situations, organisational elements (e.g. human and non-human resources) exert considerable influence on therapy (Schell & Cervero, 1993). Within therapy contexts, therapists view themselves as autonomous individuals and reason according to their internalised values and theoretical perspectives, which may be consistent, or at odds, with the organisational influences (Ranka & Chapparo, 2000).

The organisational context may lay down powerful conditions and if practice, beliefs and values held by therapists fail to match with prevailing organisational contexts, therapy goals can come into direct conflict with organisational goals. The resulting dilemma for clinical reasoning is one of conflict between three elements, what a therapist perceives should be done, what the client wants done and what the organisation will allow. According to Schön (1987, p3), there is a dilemma confronting professional practice between the "high, hard ground of technical rationality" and "the swampy lowland, messy, (where) confusing problems defy technical solution". Technical rationality holds to a view of professional knowledge where "practitioners are instrumental problem solvers", who through well-selected technical and scientific means solve discrete, well-defined problems.

Benemy (1996) identified a number of causes of common errors in clinical reasoning performed inadvertently by therapists. These include early hypothesis generation, expectations and inaccurate assumptions made by the therapists regarding their client and an over-reliance on standard techniques of treatment. Other tangible factors influencing clinical reasoning include environmental contingencies such as group norms and time constraints. Factors such as time pressures, reduced client length of stay and workload demands and expectations of employers may also impact on the quality of clinical reasoning.

4.4.3 Development of Cognitive Skills

In occupational therapy there is a growing interest in students' awareness, learning and development of cognitive skills (Hislop, 1985; Shepard & Jensen, 1990; Higgs, 1992; Jones, 1992). Eraut (1994) wrote about knowledge creation (the creation of professional knowledge in practice), and suggests that conceptual knowledge becomes clarified and personalised during use and has limited meaning prior to use.

The organisation and structure of knowledge varies across cultural groups and differentiates novice learners from experts in a variety of domains (Benner, 1984; Chi, Feltovich, & Glaser, 1981; Unsworth, 2001). Systematic instruction and training were demonstrated to impact students' learning. While clinical expertise has been linking more to the clinician's organisation of knowledge than the process of clinical reasoning itself, cognitive skills and knowledge creation are interdependent. For example, the inquiry strategy of hypothesis testing plays a significant role in the acquisition of knowledge (Lawson et al, 1991). While the expert may not need to engage in hypothesis testing, it provides the means by which textbook clinical patterns can be tested, refined and new patterns can be learned (Barrows & Feltovich, 1987). Novice learners, who lack sufficient knowledge, will progress slowly in the hypothesis testing, where as an experienced clinician may be able to function independently more on pattern recognition. When confronted with a complex clinical problem, however, the experienced clinician, like the novice learner, will be dependent more on the hypothetico-deductive method of clinical reasoning (Barrows & Feltovich, 1987; Patel & Groen, 1991).

4.5 Clinical Reasoning in Occupational Therapy Assessment

Patients come to occupational therapy when they are not adequately performing their daily activities due to disease, trauma, and abnormal development, age-related or environmental restrictions. To regain a former level of performance or achieve more optimal one, the patient seeks the help of the therapist. The therapist's task, therefore, is to select an appropriate therapeutic action for the patient. In other words, decisions to be taken by the therapist are highly individualised. The ultimate question clinicians are challenged to answer is: what among the many things that could be done for this patient, ought to be done? This is an ethical question. A salient criterion of an ethical action is its agreement with the patient's valued goals. The clinical reasoning process terminates in an ethical decision, rather than in a scientific one, an ethical nature of the goal of reasoning projects itself over the entire sequence (Rogers, 1983).

The occupational therapy treatment plan details what a particular patient should do to enhance occupational role performance. The therapeutic action must be the right action for this individual. Treatment should be in concert with the patient's needs, goals, life style, and personal and cultural values. To ascertain the right action for each patient, clinicians are challenged to answer three clinical questions: what is the patient's current status in occupational role performance? What could be done to enhance the patient's performance? And what ought to be done to enhance occupational competence? These are the fundamental questions, which guide the clinical process.

The definitions of clinical reasoning suggested by the many authors (e.g., Elstein, Shulman, & Sprafka, 1978; Barrows & Tamblyn, 1980; Trombly, 1993; Mattingly & Fleming, 1994; Higgs & Jones, 2000; Ranka & Chapparo, 2000) regard clinical reasoning as part of the occupational therapy process that uses scientific deduction to match disease conditions to therapeutic interventions. However, with respect to the Model of Occupational Performance, clinical reasoning in occupational therapy should require a thorough understanding of clients' clinical conditions as well as their needs in the environment throughout the occupational therapy process (Mattingly & Fleming, 1994).

Mattingly and Fleming's (1994) view of clinical reasoning encompasses how therapists think and what therapists think about their practice as practice. The concepts and tools were borrowed from anthropology, philosophy and phenomenology. Their basic tenet holds that therapists think in more than one kind of way. Mattingly (1991a) states that her perspective is directed "not to a biological world of disease but to the human world of motives, values and beliefs – a world of human meaning" (p983). This phenomenological approach seems to emphasise the material that therapists reason about rather than the process of reasoning.

In assessing clients' conditions, occupational therapists conduct a variety of tests to identify a list of dysfunction. The therapists may start with functional assessments such as self-care evaluation, work assessment or assessment of the pursuit of leisure activities and by observing clients' performance to find possible deficits that limit independent functioning. Those possibilities are then tested directly by administering the selected tests. This list of dysfunction that results from these tests may include such things as the client's inability to walk, the use of only one arm for eating, and the inability to express himself or herself (Trombly, 1995; Schlosser, 1996; Zeidner & Endler, 1996).

The client's external resources refer to the availability of support and demand in the client's environment, including the client's financial situation and the amount of time he or she can afford in being dependent on others do perform various daily tasks. External resources form the essential part of clients' physical, social, and cultural environments. Occupational therapists gather information on clients' external resources by interviewing and interacting with clients and their families. Therapists may perform on-site assessment of clients' physical environments such as the home or other places the client would frequently be. Therefore, in exploring clients' external resources, both assessment and ongoing dialogue with clients and/or family members or interviews are used by therapists.

Because of the focus on clients' needs in their life contexts, occupational therapists are required to make decisions in situations of uncertainty (Higgs & Jones, 1995; Sumsion, 2000; Unsworth, 2004). For example, two men, one a manual labourer and one a computer company manager, both having suffered from stroke, their needs in motor skill and strength in occupational performance are different. Therapists are required to make decisions on the problems identified based on their life roles and needs. Hence, theoretical knowledge alone is insufficient to provide the basis for effective clinical reasoning; practical and intuitive knowledge which is the tacit knowledge founded in therapist' clinical experience is therefore essential (Benner, 1984; Mattingly, 1991a; Unsworth, 2001).

4.6 The Process of Clinical Reasoning

Clinical reasoning in occupational therapy has been studied since the early 1980's to gain broader understanding of how therapists make sense of clinical situations and how they decide on the process of therapy. Much of the work was stimulated by the work of Donald Schön (1983), who highlighted the importance of practical reasoning in the provision of healthcare service. Fleming (1991a) reported from the American Occupational Therapy Foundation Study (1988) that the experienced therapists utilised three tracks of reasoning called procedural, interactive, and conditional reasoning. She noted that these tracks were intertwined, viewing together provide an understanding of therapy as an evolving process. Mattingly (1991b) goes on describe a fourth, narrative reasoning as the central mode of reasoning in occupational therapy. Theorists have attempted to research and further explain clinical reasoning process in the occupational therapy literature using descriptors of procedural, interactive, diagnostic, scientific, pragmatic, narrative, ethical and conditional reasoning (Schell & Cerviro, 1993; Crabtree, 1998):

4.6.1 Procedural Reasoning

Procedural reasoning is used when therapists associate disease and disabilities with the particular procedures and treatment activities that are used to maximise clients' functioning (Mattingly & Fleming, 1994). For example, training will be given to clients for improving their reaching and grasping skills with upper limbs to compensate for one-sided neglect in order to enable them to put on upper limb garments. Therapists put emphasis on improving clients' functional capacities to an optimal level appropriate to their body dysfunction. Procedural reasoning to solve clients' problems and identify underlying causes is built on the hypothetical-deductive reasoning model that originated in medicine (Higgs & Jones, 1995). Elstein, Shulman, & Sprafka (1978) suggest a four-phase strategy in operating this model **(Table 4.6.1)**.

Table 4.6.1

Four-Phase Strategy Used in Procedural Reasoning (Elstein, Shulman & Sprafka, 1978)

	Phase	Process	Examples
1.	Cue acquisition	Therapists gather cues about clients	Clients' illness, age and gender, and problems in performance
2.	Hypothesis generation	Cues are formed into potential patterns and hypotheses are generated on the functional performance problems that clients would encounter.	Clients' inability to take care of self and go to work
3.	Cue interpretation	Therapists repeatedly check on the analysis of the cues and the potential usefulness of the cues.	After repeated analysis of the cues, a client who suffered from stroke may not be possible to resume the job of a policeman.
4.	Hypothesis evaluation	Hypotheses are reviewed and clients' occupational performance problems are selected and confirmed as the basis of planning for treatment.	Taking care of self such as putting on a coat, taking bath, would be the occupational performance problems selected for the client.

From the above **Table 4.6.1**, it is clear that therapists need to define client problems based on cues gathered from the results of the assessment and select appropriate treatment modalities to remedy clients' limitations resulting from dysfunction. In this way, any problems identified would be directed to the client's disabilities, thus linking the client's problems to the intervention process- that is, to apply tools and procedures of occupational therapy to the issues or problems identified through interactive reasoning and pattern recognition (Reed & Sanderson, 1999).

4.6.2 Interactive reasoning

Interactive reasoning is used when therapists intend to understand and interact with clients as a person including his or her feelings, preferences, interests, goals, lifestyles, coping skills and adaptive responses (Fleming, 1991a), instead of merely focusing on the disabilities. The therapist is thus better able to address the client's specific needs and preferences with appropriate treatment (Alnervik & Sviden, 1996). This collaborative relationship allows the therapist to understand a client's preferences in life style and values in his or her own cultures as relevant and meaningful. Such relationship enables the therapists to tailor-make treatments, which address the clients' specific needs and preferences. For example, a therapist identifies a client as, say, having difficulty in buttoning and using chopsticks due to the client's poor finger dexterity and strength. By communicating with the client, the therapist understands the client's preference for wearing pullovers instead of shirts with buttons, and he places a lot of value in using chopsticks and eating in a socially acceptable manner. In this scenario, the therapist would put a high priority in training in the use of chopsticks instead of buttoning. The therapist would further reconfirm the relevance of setting chopsticks training with the client. In return, the client would actively participate in the chopsticks training because it is perceived as relevant and meaningful.

The adoption of interactive reasoning by therapists is seen to be associated with professional competence (Mattingly & Fleming, 1994). With the effective application of knowledge in practice, therapists should be able to interact with clients, create choices for clients, individualise treatment and understand their experiences effectively. Since the adoption of interactive reasoning is associated with professional competence, junior therapists in their first few years of practice may not be comfortable in employing this clinical reasoning style (Mattingly & Fleming, 1994). Instead, they might prefer an interactive reasoning approach which deals with the disability or disease affects the client (i.e., the client's illness experience) and focuses on the client as a person (Crepeau, 1991; Fleming, 1991b)

4.6.3 Conditional Reasoning

Conditional reasoning is a process in which therapists attempt to understand clients as whole persons, and the impact of the disability in the context of their life world. Conditional reasoning requires therapists' "ability to understand and see" clients as they see themselves, and the "ability and energy to project a picture for a person's future" (Mattingly & Fleming, 1994, p197). Instead of just putting emphasis on observable problems and preferences of the clients, therapists using this reasoning style attempt to visualise clients' function and dysfunction in broader social and temporal contexts. There are three characteristics when adopting conditional reasoning:

- The therapist considers the whole circumscribing condition of the client, including the individual, the illness, the meanings the illness has for the individual and his or her family, and the social and physical contexts of the client.

- The therapist needs to anticipate in what way the conditions of the client can evolve in the course of the rehabilitation process. That is, the therapist should project images of how the client will progress, what residual disabilities the clients is likely to have and the effects of the residual disabilities on the client's future life.

- The client needs to participate, not only in the therapeutic activities, but also in constructing the images of his or her future conditions. For example, would a 58-year-old client want to resume in a worker role or would he or she choose to retire? This affects the therapist's treatment planning with the client. Therefore, the success or failure of reaching a point in life that approximates the future image of clients is conditional upon the client's participation.

4.6.4 Pragmatic Reasoning

Pragmatic reasoning is based on the concept of "situated cognition", an area of cognitive psychology, where thinking is seen to be shaped by the environment in which it occurs (Crabtree, 1998). Since clinical reasoning focuses on practical action, therapists are compelled to think about organisational constraints, resources, practice issues, values and attitudes issues. Recent studies seem to confirm that therapists are increasingly influenced by situations that occur in their practice (Strong et al., 1995; Ranka & Chapparo, 2000).

With pragmatic reasoning, a therapist considers the impact of personal and practice constraints on clinical decision-making (Schell & Cervero 1993). A number of authors have raised concerns about the effect of various organisational, political, and economic factors on the practice of occupational therapy (Neuhaus, 1998; Fondiller, Rosage, & Neuhaus, 1990). Neuhaus (1998) reports that the therapists are often challenged to consider the ethical dilemmas or implications of their work when they are required to incorporate pragmatic influences into their treatment planning. In such situations, Neuhaus (1998) advised the use of open discussion among peers to allow discussion of and reflection about the conflicts between values and the treatment environment.

4.6.5 Scientific Rationale

Two forms of scientific rationale identified by occupational therapy researchers are diagnostic reasoning (Rogers & Holm, 1991) and procedural reasoning (Mattingly & Fleming, 1994). These two processes involve a progression from problem sensing to problem definition and problem resolution. Procedural reasoning is already described earlier. Scientific rationale is the part of clinical reasoning associated with the therapist's ability to present a rationale for the chosen treatment approach (Rogers, 1986; Schell & Cerviro, 1993; Hooper, 1997).

Scientific rationale is also the decision-making process for selecting or changing a treatment approach and for understanding why a treatment approach may produce a certain result, based on the assumption that a cause and effect relationship exists in most treatment strategies. To improve clinical reasoning using this framework, clinicians need to follow the "scientific" methods more effectively.

4.6.6 Diagnostic Reasoning

Diagnostic reasoning focuses on the diagnosis. It aims at finding out the disability and underlying problems of clients. Underpinning all dimensions of clinical reasoning is the ability of the therapist to recognise clinical cues that is in the behavioural, psychological, cultural and contextual aspects, and their relationship to other cues and test or verify them through further examination and management. Experienced therapists use diagnostic reasoning, which may include hypothetical reasoning of cue acquisition, hypothesis generation, cue interpretation and hypothesis evaluation (Rogers & Holm, 1991). This incorporates interactive reasoning with pattern recognition, which is a type of problem solving based on the ability of the therapist to observe and interpret cues, the ability to observe phenomena, identify significant cues to determine whether there is a relation among the cues, and compare with present observation to a previously learned category or type (Fleming, 1991a).

4.6.7 Narrative Reasoning

Narrative reasoning refers to the therapist's thinking, which creates a story of where the patient is now and where he/she can get to in the future (Mattingly & Fleming, 1994). Narrative reasoning involves collection and reorganisation of the information of clients in order to form a complete occupational story of them. The story should include clients' premorbid and current status and their future plan. The therapist, with this skill, can understand their clients more fully (Fleming, 1991a). Therapists reason narratively when they are concerned with disability as an illness experience, that is, with how a physiological condition is affecting the person's life. It is concerned more with a client's experience of a diagnosis than the diagnosis itself. It yields the client's occupational history (e.g. client's life history told through preferred activities, habits and roles). The therapist and client incorporate the client's activity preference into intervention (Niestadt, 1998). Mattingly (191a, p986) suggested that to improve clinical reasoning, occupational therapists must "take their phenomenological tasks more seriously" by focusing on the meaning that disability has to the patient and addressing the motivational issues affecting patient performance.

Mattingly (1991b) believes that therapist's reason in stories by story telling and story creation. Story telling describes the therapist's understanding of the patient's way of dealing with disability and includes puzzling about how to handle the patient's problems. Story creation is the process of envisaging or imaging the future. To sum up, narrative reasoning deals with the client's occupational story and focuses on the process of change that is needed to reach an imagined future (Mattingly, 1991a; Clark, 1993).

The occupational story answers the following questions:

1. What activities and roles were important to this client before his or her injury or illness?
2. What valued activities and roles can this client perform now?
3. What valued activities and roles are possible in the future, given his or her residual disability?
4. Which valued activities and roles would the client choose as priorities for the future?

4.6.8 Ethical Reasoning

Ethical reasoning is particularly important when clients are vulnerable to fully express their personal needs. In such situations, therapists are forced to balance one value against another. Ethical issues include cost containment (Neuhaus, 1998), as well as reduced control over selecting appropriate clients and details of treatment. Hagedorn (1997) proposed interventions in relation to the moral and ethical basis of practice, and with regard to any medico-legal considerations as to the selection of goals and methods for intervention, advocated bringing ethical concerns and value judgments into the picture.

4.7. Teaching Strategies for the Development of Clinical Reasoning

Clinical reasoning is a complex skill which occupational therapy students and graduates need to develop throughout their careers. Effective clinical practice requires the ability to develop a sound knowledge base and clinical reasoning skills. As clinical reasoning is a fundamental component of occupational therapy clinical practice, teaching clinical reasoning is vital to the professional preparation of occupational therapy students (Royeen, 1995). What can be done to help occupational therapy learners acquire expertise in clinical reasoning? This section focuses on the task of teaching clinical reasoning skills. Teachers over the years faced with the formidable task of helping students develop their clinical reasoning skills need to understand the nature of clinical reasoning and how it develops and what are the strategies for teaching this complex skill. The importance of teaching clinical reasoning skills to students is evident in the health science curricula (e.g., Elstein, 1981; Neame et al., 1985; Tanner, 1987; Higgs & Jones, 1995; Rogers& Holm, 1991; Schwartz, 1991).

A number of theories, models and frames of reference have emerged to explain the purpose of occupational therapy, with some emanating from other professions (Hagedorn, 1992; Kielhofner, 1997; Reed & Sanderson, 1999). Because of this, teachers are faced with a unique question, "which model of clinical reasoning should one encourage their students to follow?" A sound plan for teaching encompasses elements of clinical reasoning, including knowledge, reasoning ability and metacognition within the model (Refshauge & Higgs, 2000). Various strategies for teaching these elements of reasoning have been described (e.g., Neistadt, 1987; Higgs, 1992; Cohn, 1993; VanLeit, 1995).

4.7.1 Curriculum Framework and Design

Clinical reasoning in occupational therapy may be taught as a separate subject within a curriculum or as an integral part of all areas/subjects within a curriculum. Shephard & Jensen (1990) with Everingham & Felletti (1999) emphasise the importance of using both explicit and implicit curricula to promote reflection in learning and the development of reflective knowledge and skills. Such abilities can help both novice learners and experienced clinicians to deal with what Schön (1987) labels "the indeterminate zones of practice" or uncertainty, uniqueness and value conflicts which characterise human situations (See **Chapter 7** on Curriculum Design and Framework for more details).

The challenge for educators is to select an educational philosophy or conceptual framework, which is appropriate for the subject to be taught and to authentically adopt "espoused theory" in practice. Barrows & Tamblyn (1980) developed a curriculum in neurology for medical students to illustrate how problem solving could be taught. Further, Barrows and Tamblyn (1980) also developed a number of methods for teaching problem solving and were very successful in teaching Elstein and associates' (1978) process of clinical reasoning and in teaching information in its useful context.

It is important to remember that simply participating in learning activities is not enough to promote clinical reasoning skills or generate new knowledge. Reflection is an important element in promoting deep and meaningful learning (Higgs, 1990). Every possible opportunity should be created to promote reflection and thereby foster learning and to develop students' ability to perform as reflective practitioners' (Schön, 1987). Appropriate educational strategies, some of which are described below, are important in the curriculum design.

4.7.2 The Learning Environment

Effective reasoning and decision-making abilities require knowledge using a deep approach (Higgs, 1990). Research in the area of student learning (e.g., Entwistle & Ramsden 1983; Biggs, 1987a; Gow & Kember, 1993; Marton & Säljö, 1997; Entwistle, 2000; Entwistle & Peterson, 2004) has identified contexts and curricula, which foster deep learning. Furthermore, curriculum planning needs to ensure that learning environments are created that will foster deep learning (See **Chapter 8** for more details on Students' Approaches to Learning).

According to Ramsden (1985) the effects of learning environments can be best understood if they are thought of as operating at the levels of the learning task, the teacher, the department or course and the institution. More conventional curricula are frequently divided into a "pre-clinical" component (or an on-campus programme which is likely to include the teaching of clinical as well as pre-clinical skills and knowledge) and subsequent "clinical" or "fieldwork" component.

The classroom setting allows for discussion of students' thinking and the potential effects their decisions may have, and encourages feedback from both peers and teachers. However, care must be taken when transferring skills from classroom to clinical settings. Furthermore, it is very important that clinical educators develop a clear understanding of the process of teaching clinical reasoning that is consistent with classroom teaching.

As well as developing reasoning skills and appropriate knowledge in the classroom setting (on-campus), students need to test the application of theory in clinical settings. Clinical education provides an integrated learning environment. During clinical education, students gain skills in many broad areas such as interpersonal communication, assisting patients with treatment, team work and reporting skills besides evaluating and summarising clinical information and making clinical decisions on the basis of this information.

4.7.2 Teaching and Learning Activities

The various strategies for teaching clinical reasoning skills that occupational therapists use in practice have been well explained in the literature (e.g., Fleming, 1991a, 1991b; Mattingly 1991a, 1991b; Rogers & Holm, 1991; Higgs, 1992; Cohn, 1993; Schell & Cervero, 1993; VanLeit, 1995; Neistadt, 1998). Learning activities, some of these are described below can occur in many forms, which provide experiential and personal knowledge in the educational and clinical settings:

4.7.2.1 Experiential Learning

The teaching/learning strategy involving an experiential learning in the form of combining a number of experiential learning activities such as the fish bowl technique, use of simulated patients/clients, role-play and a "hypothetical" panel discussion proved to be a useful learning method to facilitate clinical reasoning Skills (Higgs, 1990; Boud & Walker, 1991). Adult learning theory also encourages self-direction and interdependence in learning and reinforces the practice of lifelong learning by emphasising the need for ongoing development and critical evaluation of a learner's knowledge base (Higgs, 1990; Boud & Walker, 1991).

4.7.2.2 Peer Group Teaching

Peer group teaching is another method of fostering the development of clinical reasoning skills and knowledge. According to Higgs (1990), when learners attempt to create learning experiences for others to learn clinical reasoning, learners learnt a great deal about the nature of reasoning and about their own reasoning and knowledge.

4.7.2.3 Cognitive Mapping

A cognitive map is a visual representation of one or more areas of an individual's knowledge base and is unique to that individual. Cognitive maps can be formulated in many ways, such as flow charts, annotated diagrams, images or maps illustrating interconnected ideas (Novak and Gowan, 1984). Students learn much about their own knowledge by drawing such cognitive maps. It is also useful to explore and discuss other forms of knowledge which contribute to clinical reasoning such as subjective knowledge, which includes emotional responses and tacit knowledge, which is understood and often difficult to put into words (Carrol, 1988).

4.7.2.4 The Logs

Students are expected to turn in a log in which they record their feelings about a particular session. Ideally, there should not be a prescribed format for the logs. The clinical supervisor should return the logs promptly with written responses that attempt to address the issues raised. Students' feelings and thoughts should be further discussed in the clinical simulation sessions.

4.7.3 Evaluation and Feedback

The importance of evaluation and feedback in promoting learning and adequately assessing reasoning and knowledge is another consideration in planning curricula. To foster the development of clinical reasoning skills in students, nature of the assessment process, the method of assessment and how it is presented to the learner is very important. No one method of assessment can adequately evaluate clinical reasoning. A variety of methods are desirable. These methods include written tests, direct observation of performance in real or simulated situations, self-assessment and peer assessment.

What and how students learn is also influenced by what they are assessed upon and how they are assessed (Ramsden, 1984; Biggs, 1992; Tang & Biggs, 1996; Tang, 1998). It has been documented by Ramsden (1984) that it is easier to encourage students to adopt a surface (or rote learning) approach than a deep (or meaningful) approach and that the learning approach can be strongly influenced by the choice of assessment methods. Deep learning is fostered through assessment, which rewards understanding, such as essay writing, as opposed to examinations based on recall of information (Biggs, 1999; Entwistle, 2000).

While assessment routines may have the advantage of guiding the novice learner in data collection and in helping the experienced clinician to methodically assess difficult and problematic cases, when used uncritically they may be time consuming and can result in unnecessary and confusing data. Similarly, treatment protocols may be used as a routine as opposed to conducting an individual reasoning process for each client's condition, circumstances, abilities and needs in order to obtain an optimal treatment. In addition, to enhance the reasoning processes, it is incumbent upon both the teacher and the learner to explore the values or belief systems of the students, to ensure that they explore new ideas and process information in appropriate ways (Refshauge & Higgs, 2000).

4.8 Clinical Reasoning: Ethics, Science, and Art

Clinical reasoning is the heart of occupational therapy. Clinical reasoning in its broadest sense means the reflective, concurrent, creative, and critical thinking embedded in occupational therapy practice. Clinical reasoning in a way connotes the internal thinking and decision-making processes which are associated with clinical practice. According to Higgs & Jones (1995), it refers to the thinking processes associated with clinical practice rather than emphasising the decisions made or the actions or steps involved in patient management.

Despite the obvious importance of clinical judgement in the occupational therapy process, little attention has been given to explaining the thinking that guides the practice. Research in the cognitive field suggests that the cognitive processes are regarded as intuitive and ineffable (Rogers, 1983; Benner, 1984; Dreyfus & Dreyfus, 1986; Ryan, 2000; Unsworth, 2001). For example, when therapists are asked how they arrived at their treatment decisions, they commonly responded by saying, "I have never really thought about it." Or "I don't know how I reached that conclusion. I just know." Failure on the part of therapists to study the process of knowing and understanding that underlies practice precludes an adequate description of clinical reasoning. The scientific, ethical, and artistic dimensions of clinical reasoning will be elucidated as these questions are explored.

The ethical and scientific dimensions of clinical reasoning are closely intermingled. The methods used to answer ethical questions differ from those used in science. While accumulating data and testing hypotheses answer scientific questions, ethical questions are resolved by coming to grips with values amid making value judgements. To empower the patient to act as his or her own moral agent, the therapist provides the patient with the knowledge needed to participate effectively in decision-making process. Once the patient has determined the course of action, the therapist supports or confirms the decision. The treatment is carried out to achieve the stated goals and the clinical reasoning process ends.

4.9 Summary

"Clinical reasoning", is a broader term, which focuses on the cognitive processes associated with clinical management (Higgs, 1990). Clinical reasoning is also referred to as the process used by practitioners to plan, direct, perform, and reflect on client care (Schell, 1998). The terms such as, clinical decision making, clinical reasoning and clinical problem solving occur frequently in the literature and are used both distinctly and interchangeably. The whole reasoning process involves the integration of sensitivity, professional knowledge and thinking. "Clinical decision making" is commonly used in medical education literature and emphasizes the diagnostic decision-making process. "Clinical problem solving" on the other hand is frequently used in allied health and nursing literature to refer to steps taken in solving clinical problems.

Current researches on clinical reasoning are based on the results of the extensive research by Mattingly & Fleming (1994). The results of their studies further substantiate the need for therapists to understand the meaning of disability and the clients' needs from clients' point of view. Another study to investigate the elements that influenced occupational therapists clinical reasoning showed that clients' needs, therapists' internal belief about clients, and the lack of complete theoretical knowledge in occupational therapy created uncertainty in therapists in making clinical decisions (Higgs & Jones, 1995).

Multiple reasoning strategies come into play in the various phases of client treatment. Procedural reasoning is used when therapists think about the client's problems in terms of disease and human occupation. Narrative reasoning involves developing an understanding of the client as a person from the client's perspective. Conditional reasoning allows the therapist to visualise the future and consider therapy outcomes and the treatment required to get the ethical, pragmatic reasoning frame and decision-making in the personal and professional context. In practice, an occupational therapist could be using all of these reasoning strategies simultaneously when thinking about a client and treatment.

Clinical reasoning also includes the knowledge of procedures, interactions with clients, and interpretation and analysis of the evolving situation. This implies that knowledge includes skills as well as procedures. The procedures are the guidelines for action, the "know that" and the skills are the "know how" as suggested by Dreyfus &

Dreyfus (1986). The know-how mediates motor actions and is the by-product of knowledge in action and requires direct cognitive input (Bridge& Twible, 1997).

In becoming a competent occupational therapist, one needs to be aware of the three key components in clinical reasoning; knowledge, cognition and metacognition which, will shape how therapists' reason clinically. Knowledge of alternative perspectives and theories in clinical reasoning research is helpful in trying to understand what the critical factors might be and how they relate to each other. Furthermore, it is the therapist's ability to integrate new knowledge that can be facilitated by the adoption of a reflective and self-critical approach, which will in turn facilitate the growth of expertise in a beginning practitioner.

Understanding the development of clinical reasoning skills also facilitates evaluation of the profession's own reasoning and design of educational strategies and learning activities. Learning the clinical reasoning process is facilitated and assessed by a series of assignments, some of which may be connected to the in-class evaluation sessions and others may be outside the classroom. Some of these assignments focus primarily on knowledge acquisition, others focus primarily on affective responses, and a third group does both. In addition to the assignments, learning activities in occupational therapy can occur in many forms (e.g., small group learning, role playing, discussion groups, and practical skills in simulated clinical settings).

The scientific, ethical and artistic dimensions of clinical reasoning are closely related, and each dimension is needed to strengthen the course of action needed to understand the clinical entity of a patient. The ethical and scientific dimensions of clinical reasoning are closely intermingled. While scientific questions are answered by accumulating data, conducting experiments and testing hypotheses, ethical questions are resolved by making value judgements.

It is obvious that clinical reasoning is the centre of clinical practice and as such studying the development of clinical reasoning is important because it not only helps to enhance profession's own reasoning, but also the design of education curriculum (Jones, 1992). Since each profession has its own domains of concern, there seems to be some differences and similarities in the application of reasoning skills in their practice. The purpose of the next chapter is to explore knowledge and examine pertinent literature on clinical reasoning in three health care professions; occupational therapy, physiotherapy and nursing.

Chapter 5

DEVELOPMENT OF CLINICAL REASONING SKILLS IN OCCUPATIONAL THERAPY, PHYSIOTHERAPY AND NURSING PROFESSIONS

5.1. Introduction

In this Chapter, clinical reasoning skills and their development in three professions: occupational therapy, physiotherapy and nursing are compared. As clinical reasoning is a form of cognitive or thinking process that is used in clinical practice for client management and evaluation, understanding the development of clinical reasoning skills facilitates evaluation of the profession's own reasoning and design of its education activities. The literature review revealed that the clinical reasoning in the health care profession was first studied by medical educators (Higgs, 1992; Case, Harrison, & Roskell, 2000). Since then, continuous research examining differences between novices' and experts' clinical reasoning has been conducted in fields such as nursing (Benner & Tanner, 1987; Greenwood & King, 1995), physiotherapy (Embrey & Adams, 1996, Sheppard et al, 1999) and occupational therapy (Strong et al, 1995; Alnervik & Sviden 1996; Robertson, 1996; Unsworth 2001).

In all three disciplines – occupational therapy, physiotherapy and nursing, clinical reasoning process is the centre of clinical practice and the development of clinical reasoning skills not only help to enhance a profession's own reasoning, but also the design of its education curriculum (Jones, 1992). According to Dutton (1995), clinical reasoning is goal-oriented with its own goal and domain of concern, each profession fine-tunes the meaning of clinical reasoning to make sense of it. Clinical reasoning in occupational therapy is "primarily directed to the human world of motives and values and beliefs" (Mattingly, 1991a) because the main task of occupational therapy is to "treat 'illness-experience" i.e. how disease and disability enter the phenomenological world of each person" (Mattingly, 1991a, p983).

The research in occupational therapy and nursing appear to have paralleled each other, as there was a realisation in both professions that skills of clinical reasoning are built on experience. Benner (1984) notes that the clinical reasoning in nursing is considered as thinking process that enables them to "understand the significance of patient data, to identify and diagnose actual or potential patient problems to make clinical decisions to assist in problem resolution and to achieve positive patient outcome" (Fonteyn, 1998). The physiotherapy literature tends not to emphasise the development of management skills as much as diagnosis and technique and follows more or less the medical literature to a greater extent.

5.2. Reasoning Strategies

As mentioned in **Chapter 4**, clinical reasoning skills are fundamental to the practice of occupational therapy. Occupational therapist reasoning strategies have been studied from a variety of other perspectives (Rogers & Masagatani, 1982; Rogers & Holm, 1991; Ryan, 2000). In order better to understand clinical reasoning in occupational therapy, it is important to explore the differences between students and clinicians. The ultimate purpose of this section is to identify educational strategies that could be used to assist students to develop clinical reasoning skills.

Three core elements are essential to skilled clinical reasoning are the use of knowledge, the action of cognition or thinking, and the process of metacognition (Higgs & Jones, 1995). Jones (1997) notes that underpinning all dimensions of clinical reasoning is the ability to recognise clinical cues (e.g., behavioural, psychological, social, cultural, environmental) and their relationship to other cues, and test and verify their clinical patterns through further examination and management.

Clinical reasoning has been defined in many ways and by many authors. In this context, clinical reasoning, essentially is the thinking that underlines the action taken in clinical situations and is based on facts, principles and experiences. The student is expected to develop clinical reasoning skills as they go through the BSc (Hons) programme by combining theoretical information with clinical experience; however, these two elements of a programme – theory and practice – are often viewed as quite separate events by many students. From an educational standpoint, theory input can readily be controlled but clinical experience is a more unpredictable element.

According to Benner & Wrubel (1982), "transformation of preconceived notions and expectations encounter with actual practical situations". This clearly suggests that experience influences individuals in such a way as to modify their perception and understanding of all subsequent situations in a clinical setting. The ability of the student to make links with theory once an understanding of an area of practice has been gained through experience is also an unpredictable factor.

The assumption that clinical skills essentially consisted of a set of reasoning strategies that are largely domain-independent and that would enable those who acquired them to solve problems successfully, even problems that were new to them, led medical educators to develop problem solving and problem-based learning. van der Vleuten and Newble (1995) note that knowledge and the way that knowledge is stored, retrieved, and used differentiates the expert from the novice. Domain-independent reasoning skills and metacognition are a necessary part of a therapist's repertoire along with the appropriate knowledge base to solve health care problems.

5.3 Dreyfus Model of Skill Acquisition

Dreyfus & Dreyfus (1986) studied the five stages of skill acquisition, which they called as novice, advanced beginner, competent, proficient, and expert (See **Chapter 6** for more details). The Dreyfus & Dreyfus (1986) model of skill acquisition fitted very well with the other models, most relevant in this case being that of Benner (1984) who has amassed considerable data about the acquisition of nursing skill. The literature review suggests that the development of clinical reasoning processes in occupational therapy and nursing appear to be quite similar. Unlike physiotherapy, the literature review seldom mentions clearly these stages as such, but concludes with only two stages: novice and expert (Higgs, 1992; Jensen, Shepard & Hack, 1992; Jones, 1992; Jensen, Gwyer, Shepard, & Hack, 1999; Case, Harrison, & Roskell, 2000). Dreyfus & Dreyfus (1986) postulate that not all people achieve an expert level in their skills. In their opinion, only a very small fraction of beginners can even master the domain. They further stated that the learning process follows a continuum of the five stages (Benner, 1984; Dreyfus & Dreyfus, 1986; Dutton, 1995; Neistadt, 1996; Schell, 1998) as shown in the following **Table 5.3**:

Table 5.3

Dreyfus Model of Skill Acquisition

	Years of Reflective Practice	Characteristics
Novice	0	No experience, and therefore dependent on theory to guide practice. Uses rule-based procedural reasoning to guide actions, but does not recognise contextual cues, and therefore not skillful in adapting rules to fit situation. Narrative reasoning used to establish social relationships, but does not significantly inform practice. Pragmatic reasoning stressed in terms of job survival skills. Recognises overt ethical issues.
Advanced beginner	<1	Begins to incorporate contextual information into rule-based thinking. Recognises differences between theoretical expectations and presenting problems. Limited experience impedes recognition of patterns, consequently does not prioritise well. Gaining skill in pragmatic and narrative reasoning. Begins to recognise more subtle ethical issues.
Competent	3	Automatically performs more therapeutic skills and attends to more issues. Able to develop communal horizon with persons receiving service. Sorts relevant data and able to prioritise treatment in light of discharge goals. Planning is deliberate, efficient, and responsive to contextual issues. Uses conditional reasoning to shift treatment during sessions and to anticipate discharge needs, but lacks flexibility of more advanced practitioners. Recognises ethical dilemmas posed by practice setting, but may be less sensitive to justifiably different ethical responses.
Proficient	5	Perceives situations as wholes. Brings deeper store of experiences, which permits more targeted evaluation, more flexibility in treatment. Creatively combines different diagnostic and procedural approaches. More attentive to occupational stories and relevance for treatment. More skillful in negotiating resources to meet patient/client needs. Increased sophistication in recognising situational nature of ethical reasoning.
Expert	10	Clinical reasoning becomes a quick intuitive process, which is deeply internalised and imbedded in an extensive store of case experiences. This permits practice with less routine analysis, except when confronted with situations where approach is not working. Highly skillful use of occupational story making during intervention to promote long-term occupational performance satisfaction.

(Based on Dreyfus & Dreyfus, 1986 and modified in light of Benner, 1984; Clark et al, 1991; Slater & Cohn, 1991; Mattingly & Fleming 1994; Creighton et al, 1995; and Strong et al, 1995)

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5.3.1 Occupational Therapy and Nursing

In occupational therapy, experienced therapists have the capacity to reflect while students or junior therapists tend to depend on factual knowledge and rigid decision-making models (Cohn, 1993). It takes years of time and experience for the juniors to develop and advance their clinical reasoning skills, shifting from theoretical knowledge to practical knowledge (Schell, 1998). This is what the nursing literature said: "skilled performance has to be acquired through principles and theory learned in a classroom and the context-dependent judgements, and in real situations" (Benner, 1984). Therefore development of clinical reasoning skills goes through several stages from school to clinic.

5.3.1.1 Stage 1: Novice

In both occupational therapy and nursing, novices are those who do not have any practical experience (Benner, 1984; Schell, 1998). They are characterised by applying principles and rules rigidly into every client, despite the specific conditions of each case, and performing rule-governed behaviour, which is extremely limited and inflexible (Benner, 1984; Dutton, 1995; Neistadt, 1996). In other words, occupational therapy novices barely use procedural reasoning to solve a client's problem (Schell, 1998). They also use diagnostic reasoning but can only form one or two hypotheses (Fleming, 1991a). While in nursing, at this stage, context-free rules guide the nursing novice's action in respect to different attributes without situational experience, resulting in the inability to perform the most relevant tasks in actual situation (Benner, 1984).

Since novices in occupational therapy lack narrative reasoning in practice, they see a client fragmentally, and often break the whole situation down into its component parts. They rather use narrative reasoning to build up a relationship. They know pragmatic reasoning just in terms of job survival skill (Schell, 1998).

5.3.1.2 Stage 2: Advanced Beginner

The second stage moves to advanced beginner. With exposure to months of clinical practice, advanced beginners start to gain experience and use situational thinking, which enable them to take contextual information into account when dealing with a case, in addition to procedural reasoning (Schell, 1998). This means rules and principles are used more flexibly to fit a specific situation at this stage. In nursing, the contextual information is termed "aspect of the situation". These aspects include overall, global characteristics that can only be identified through prior experience (Benner, 1984). However, at this stage, advanced beginners of both professions share the same difficulty in prioritising problems and treatments (Benner, 1984; Dutton, 1995; Neistadt, 1996; Schell, 1998).

At the same time, pragmatic and narrative reasoning skills are gaining in the occupational therapy advanced beginner (Dutton, 1995; Neistadt, 1996; Schell, 1998). Similar to the advanced beginner in nursing, who can formulate principles that dictate actions in terms of both attributes and aspects, advanced beginners in occupational therapy are shifting between procedural and interactive reasoning (Fleming, 1991b).

5.3.1.3 Stage 3: Competent

With about three years of experience, occupational therapists and nurses should be advanced to the competent level (Benner, 1984; Schell, 1998). At this stage, situational thinking is mature and manifested by the responsiveness to contextual issues in planning. Although competent occupational therapists can prioritise treatments, they are inflexible in evaluating and changing the initial treatment plan (Dutton, 1995; Neistadt, 1996; Schell, 1998). Just like nursing, the plan of a competent nurse dictates attributes and aspects of the current and future situations, which are to be considered most important, but they also lack flexibility, as well as speed, in coping with and managing the many contingencies of clinical nursing.

The nursing literature review also suggests that a competent nurse begins to see the actions in terms of long-term goals or plans of which they are consciously aware and which can be ignored. The conscious, deliberate planning that is characteristic of this skill level helps to achieve efficiency and systematic organisation in the next level.

5.3.1.4 Stage 4: Proficient

Proficient occupational therapists and nurses, who usually have about three to five or more years of clinical experience, can perceive situations as wholes. They learn from experience, recognising familiar patterns and rule out what typical events to expect in a given situation by predictive reasoning skills, and how plans need to be modified in response to these events (Benner, 1984; Dutton, 1995; Neistadt, 1996). Through narrative reasoning, proficient occupational therapists individualise treatment by attending to client's occupational stories (Schell, 1998). They see the clear picture of client's whole situation, including physical, psychosocial and environmental aspects, through interactive and pragmatic reasoning (Neistadt, 1996).

In nursing, a whole picture is also formed after a deep understanding of the situation. This holistic understanding improves the proficient nurses' decision making (Benner, 1984). Besides, proficient occupational therapists can quickly design an initial treatment plan for a client by pattern recognition. Pattern recognition refers to automatic retrieval of information from a well-structured knowledge pool, which is built from clinical experience. This helps the therapist to speed up the treatment process (Roberts, 1996; Chapparo, 1997; Liu, Chan, & Hui-Chan, 2000; Ranka & Chapparo, 2000). In nursing, it is termed as intuition, which refers to the understanding without a rationale, based on background understanding and skilled clinical observation, without going through an analytical reasoning process. Various reasoning skills, including predictive reasoning, backward reasoning and forward reasoning are also used in nursing when the plan needs to be modified (Fonteyn & Fisher, 1995).

5.3.1.5 Stage 5: Expert

As shown in **Table 5.3** earlier, experience is a key to the expert. It usually takes no less than 10 years for a novice to come to this level. Based on their years of clinical experience, both occupational therapy and nursing experts can make accurate decisions in problem identification and imagine the client's future rapidly by pattern recognition, i.e. the intuitive grasp of each situation from previous experience (Benner & Tanner, 1987; Neistadt, 1996).

In occupational therapy, all reasoning skills have been deeply internalised and fully developed. Among all reasoning skills, conditional reasoning, which integrates different types of reasoning skills and expert therapists retrieve related information and manipulate them automatically when they come across a case. While in nursing, nurses develop a method of reasoning that provides them with an "intuitive grasp" of the whole clinical situation, without having to rely on the step-by-step analytic approach of the nursing process (Benner & Tanner, 1987), i.e. decision-making is based on their perceptual acuity-recognition ability.

5.4. Physiotherapy, Occupational Therapy and Nursing

From the physiotherapy literature review, most of the research focuses on discussing the clinical reasoning models and the teaching strategies. This review managed to capture only seven published materials that describe different stages of clinical reasoning development in the physiotherapy profession. It appears that "physiotherapy remains an area where research on such issues is limited" (Case, Harrison, & Roskell, 2000). As mentioned earlier, unlike occupational therapy and nursing which follows five stages, physiotherapy follows the development into two stages, novice or student and expert or experienced (Higgs, 1992; Jensen, Shepard & Hack, 1992; Jones, 1992; Case, Harrison, & Roskell, 2000).

5.4.1 Student or Novice

Students are those who have prerequisite knowledge of the domain (Jones, 1992). The physiotherapists' clinical reasoning skills in this stage are similar more or less to those of the novice and advanced beginner stages in occupational therapy and nursing.

Physiotherapy students' problem organisation is literal and fragmented since they do not have a clear concept of a problem element (Higgs, 19922; Jones, 1992). Due to the immature organisation skill, they cannot categorise the data systematically and so they always overwhelm with the excess irrelevant data (May & Newman, 1980). At this stage, students start to use the hypothetical-deductive and diagnostic reasoning to solve clinical problems (Jensen, Shepard & Hack, 1992; Jensen, Gwyer, Shepard, & Hack, 1999; Case, Harrison, & Roskell, 2000; Jones, Jensen, & Edwards, 2000). This approach is seldom used in occupational therapy and nursing. However, students rely on the slower hypothesis testing approach and backward reasoning, since they have insufficient knowledge and experience to recognise clinical patterns. Since students lack experience, they always use the governed-rule, mechanic and standardized treatment in their practices as novice occupational therapists and nurses do. They cannot integrate several frameworks for a specific patient. They can only apply one framework on a single practice (Jensen, et al, 1999; Case, Harrison, & Roskell, 2000; Jones, Jensen, & Edwards, 2000; Mitchell & Unsworth, 2005).

5.4.2 Experienced or Expert

Experienced physiotherapists are those who have specialised knowledge of the domain (Jones, 1992; Case, Harrison, & Roskell, 2000). The major difference between this stage and student stage is that experienced therapists have more clinical knowledge and practical experience. This proves the fact that experience is a must in transiting from the most basic to the most advanced level.

In this stage, experienced physiotherapists' clinical reasoning performance is similar to that of competent, proficient and expert stages described in occupational therapy and nursing professions. Their knowledge and problem organisation are more systematic, so that they can reason inductively and achieve a superior diagnostic accuracy (Jones, 1992; Jensen, et al, 1999; Case, Harrison, & Roskell, 2000). Similar to expert occupational therapists and nurses, experienced physiotherapists depend highly on pattern recognition since they have gained many years of experience from previous practices (Benner, 1984; Jones, 1992; Ranka & Chapparo, 2000). Furthermore, their procedural reasoning skill becomes more mature.

From the research done by Jensen et al, (1999), the experienced therapists use a more elaborate and organised framework in the treatment process. The proficient and expert therapists will be concerned not only with the diagnostic features of the patients but also the psychological aspect and environment of them. Despite differences, there are, however some similarities between the experienced and the student. Both of these stages depend highly on the hypothetical-deductive reasoning (Case, Harrison, & Roskell, 2000; Jones, Jensen, & Edwards, 2000). They always focus on the data or information, which support their hypothesis but neglect those, which oppose them.

5.5 Fostering Clinical Reasoning Skills

As clinical reasoning is essential for health professions in clinical practice, students should have started to develop the skills during their education and then continue throughout their careers. However, concrete technical skills have to be developed in students before they can move on to any analytical approach for practice and metacognitive activity (Cohn, 1993). Due to the different domain of concern of occupational therapy, physiotherapy and nursing, the strategies for fostering the clinical reasoning skills are somehow different as shown by the literature review.

5.5.1 Occupational Therapy and Nursing

In the nursing literature, Benner (1984) outlined teaching of the clinical reasoning skills and learning strategies based on the five developmental stages. Similarly, Neistadt (1996) prioritised the learning sequence of the skills in occupational therapy – basic procedural, narrative and interactive reasoning which have to be first developed, and then followed by pragmatic and conditional reasoning skills.

In occupational therapy, the novice starts to develop procedural, narrative and interactive reasoning (refer to **Chapter 4** for detailed description), which helps to clarify their ideas by answering what and why questions about their decisions, in order to articulate their reasoning process.

In contrast to occupational therapy, the novice and advanced beginners in nursing focus on remembering the rules they have been taught, thus they spend more time on aspect recognition. The instructor can provide guidelines for recognising such aspects so that it will be possible for the nurses to focus on the more advanced clinical skill of judging the relative importance of different aspects in the practice areas.

Starting from the competent stages, occupational therapists begin to develop conditional reasoning, which can be considered as the highest level of reasoning. Working with a consistent population of clients for weeks in fieldwork, novice students or junior therapists think in all dimensions when dealing with real cases (Neistadt, 1996). Working with cases with complex and conflicting information about diagnosis, perceptions, social, physical and cultural environment makes therapists use all types of clinical reasoning skills when devising a treatment plan (Neistadt, 1996; Liu, Chan, & Hui-Chan, 2000; Ranka & Chapparo, 2000).

For competent nurses, decision-making games and simulations give them practice in planning and co-ordinating multiple, complex patient care demands. Different from occupational therapists, case study in nursing plays a more important role in the proficient stage rather than the novice stages. Two kinds of case studies from their own practice can be used: 1) situations where they felt successful and thought their interventions made a difference; and 2) situations where they were not satisfied with their performance or felt in conflict about or confused by the situation. Similar with that of occupational therapy, incomplete "ill-structure" cases are more useful.

According to Benner (1984), expert nurses should document their expert clinical performance systematically in order to further facilitate their reasoning skills. This is because they usually have the limits of formalism – the inability to capture all the steps in the process of highly skilled human performance. They can benefit from systematically recording and describing critical incidents from their practice that illustrate expertise or a breakdown in performance. As they document their performance, new areas of clinical knowledge are made available for further study and development.

5.5.2 Physiotherapy, Occupational Therapy and Nursing

Some of the fostering skills used by the physiotherapists are similar to that of occupational therapy and nursing. To facilitate the students' clinical reasoning development, the syllabus should first be well designed. It should take balance on teaching the knowledge and problem solving skill (Norman, 1990). According to the clinical reasoning models, knowledge structure plays a significant role in thinking processes. Both the quantity and organisation of knowledge are important. Similar to the novice nurses, physiotherapy student should remember the material they have been taught. Besides, they should learn to organise knowledge systematically (Higgs, 1992; Jones, 1992; Case, Harrison, & Roskell, 2000). Next, teachers or experienced clinicians should guide the students to think, in order to increase their awareness of their own reasoning process (May & Newman, 1980; Olsen, 1983; Higgs, 1990; Jones, 1992). This can facilitate their metacognition, which is an essential element in the occupational therapy reasoning model. At the beginning, they should be given more prompting in the questions, while at the later stage, prompting should be gradually reduced. In order to provide more space for them to think, some broad questions are recommended (Olsen, 1983; Higgs, 1992).

The teaching activities should promote the active participation of students. Case studies and placements which are also used by occupational therapy and nursing are good choices. These can trigger their memory of experience and provide chances for them to practice their hypothetical approach. In addition, the supervisor or teachers should provide them with feedback and guide them to carry out self-reflection, which has the same function as writing a reflective journal for the novice occupational therapist. This process can help them to recognise the weakness and assets of their own reasoning style.

5.6 Summary

The review of literature has revealed a variety of concepts but limited formal research on clinical reasoning skill development in occupational therapy, physiotherapy and nursing. From the literature review, several contrasts were noticed across all three professions. Occupational therapists always use different types of reasoning skills when dealing with a case, shifting from one type of reasoning skill to another. While in physiotherapy, among all the different kinds of reasoning skills, therapists most often apply scientific, hypothetico-deductive and pattern recognition. Nurses heavily depend on intuition when they have gained enough experience.

The review also showed some similarities, particularly in the development of clinical reasoning skills. Both occupational therapy and nursing literature suggested five developmental stages from novice to expert, whereas physiotherapy literature did not mention these stages. Literature reviews from all the three professions believed that experience was a key to advanced clinical reasoning skill. Within the five developmental stages, both similarities and contrasts were noticed in occupational therapists and nurses. In fact, the development of clinical reasoning skills in physiotherapy was more or less the same as those in occupational therapy and nursing, in spite of the different stages of development and terminology used.

An understanding of the development of clinical reasoning skills and related implications for teaching these skills have been a challenge to occupational therapy educators and clinical supervisors throughout the profession's history. Clinical competence requires the application of sound knowledge through clinical reasoning and decision making in the clinical context. There is actually relatively little research that has directly examined the development from one stage to the next, particularly beyond entry-level into the profession. For this reason most health and social care educators, occupational therapists, physiotherapists, nursing have embraced the concept of teaching clinical reasoning, and have incorporated it into their curricula. It provides a framework for integrating students' learning, for preparing them for their future role as autonomous, responsible clinicians and helping them to deal with the complex clinical problems.

As noted earlier, Dreyfus & Dreyfus (1986) have developed a framework of professional expertise that has been applied to occupational therapy (Slater & Cohn, 1991). The focus of the next chapter is on the Dreyfus & Dreyfus Model of Skill Acquisition (1986) and how the model identifies characteristics associated with different stages of expertise in the novice/expert continuum. It is further hoped that the next chapter will throw some light on the nature of clinical reasoning, which when combined with an understanding of the novice/expert distinctions will lead to some logical implications that are supported by research in occupational therapy and in other health professions (Benner, 1984; Slater & Cohn, 1991).

Chapter 6

EXPERT AND NOVICE DIFFERENCES: THE DREYFUS MODEL OF SKILL ACQUISITION

6.1 Introduction

In this chapter, Dreyfus & Dreyfus (1986) five–stage model of skill acquisition is presented as an organising framework to distinguish expert-novice differences in relation to clinical problem solving strategies. It also reviews the relevant literature on the nature of competence and expertise in relation to the novice to expert continuum with a view to developing and expanding on these concepts of clinical reasoning strategies for application to occupational therapy principles and practice.

In recent years, occupational therapy in acute-care settings has grown so complex that it is no longer possible to standardise, make routine, and delegate much of what the therapist does. In a profession like occupational therapy where appropriate and quick decision-making is paramount for the fast-paced clinical environment, clinicians need a sound rationale for decision-making. Increased acuity levels of patients, decreased length of hospitalisation, and the proliferation of health care technology and specialisation have increased the need for highly experienced therapists. The complexity and responsibility of occupational therapy practice today requires long-term and ongoing career development. This, in turn, requires an understanding of the differences between the experienced therapist and the novice. Differing levels of competence are characterised by qualitatively different perceptions of the task, situation and mode of decision-making. The situation is seen increasingly as a complex whole within which only certain elements are relevant at a particular time. The Dreyfus model of skill acquisition offers a useful tool for doing this.

6.2 Dreyfus Model of Skill Acquisition

The Dreyfus & Dreyfus (1986) model of skill acquisition was inductively delivered by two University of California, Berkeley, professors – Stuart Dreyfus, a mathematician and systems analyst and Hubert Dreyfus, a philosopher – from their study of chess players, airline pilots, automobile drivers, and adult learners of a second language and observed a common pattern in all cases, which they termed the five stages of skill acquisition. As reported in the previous **Chapter 5,** Dreyfus & Dreyfus (1986, p35) laid out the five stages as novice, advanced beginner, competent, proficient, and expert, which represent the "changed perception of the task environment and mode of behavior that accompanies skill acquisition."

Like most skills, clinical reasoning can be graded along a continuum. Different points along the continuum are marked by certain characteristics that indicate an individual's skill level. The Dreyfus & Dreyfus model (1986) suggests that with increasing competence, practitioners progressively depart from a reliance on abstract principles and increasingly rely on past, concrete experiences to guide action. Dreyfus & Dreyfus (1986) also postulate that not all people achieve an expert level in their skills. In their opinion, only a small fraction of beginners can even master the domain. Dreyfus & Dreyfus (1986) model of skill acquisition fitted very well with the other models, most relevant in this case being that of Benner (1984) who has amassed considerable data about the acquisition of nursing skill.

Dreyfus & Dreyfus (1986) wrote of the "knowing how" (experience) and the "knowing that" (knowledge). While some activities require only the "knowing how", as in the automated action of riding a bicycle, many tasks are based on the application of theory and rules, which is the "knowing that". The application of rules, the "knowing that", may not however, provide all the answers for the poorly defined problem in the real world. Dreyfus & Dreyfus (1986) stressed that the "knowing how" is not easily accessible in the form of facts and rules and hence it is difficult to put what is learned into words. "Knowing how" is so much taken for granted that the extent to which it pervades activities is not appreciated except in situations where it is not there, as in the ill-defined "messy swamp". Practice is required to maintain and increase "knowing how", which may be lost through inactivity.

6.2.1 Novice-Expert Continuum

Over the past 15 years, research in health sciences has consistently shown that differences in the performance of novice and expert clinicians are predominantly due to their clinical reasoning abilities (Mattingly & Fleming, 1994; Strong et al, 1995; Robertson, 1996; Unsworth, 1999; Unsworth, 2001). Occupational therapists are concerned with problem solving with their clients around occupational performance difficulties and ways to overcome them. Thus, rather than diagnosing the client's problem, the way therapists think in action and reason has been consistently identified as the key differences between novice and expert occupational therapists (Higgs, 1992; Strong et, 1995; Collins & Affeldt, 1996; Robertson, 1996; Unsworth, 2001; Mitchell & Unsworth, 2005).

From the Dreyfus & Dreyfus Model of Skill Acquisition (1986), it is clear that human beings acquire a skill through instruction and experience. They do not learn suddenly from rule-guided "knowing that" to experienced-based "knowing how," Understanding the dynamic process of human skill acquisition provides the framework for the investigation of machine intelligence. The Dreyfus model postulates that, in the acquisition and development of a skill, one passes through five levels of proficiency as described in the following **Table 6.2.1.**

Table 6.2.1

Novice-Expert Continuum from Dreyfus Model of Skill Acquisition

Level	Description
Novice	Dependent on theory to guide thinking. Uses rule based procedural reasoning to guide actions but doesn't recognise cues and therefore is not skilful in adapting rules to fit situation. May be distracted by irrelevant information. Not able to sort evidence, not looking for evidence. Recognises overt ethical issues.
Advanced beginner	Still procedural, but can recognise some patterns of behaviour or symptoms, so does not prioritise data well. Incorporates contextual information into rule-based thinking. Recognises differences between theoretical expectations and presenting problems. Begins to recognise more subtle ethical issues.
Competent	Can gather and distinguish essential data. Procedural aspects more automatic, so able to prioritise problems and plan deliberately, efficiently, and in response to contextual issues. Recognises ethical dilemmas
Proficient	Putting it all together. Perceives situations as wholes. Combines different diagnostic and procedural approaches with flexibility and creativity. More attentive to occupational stories and relevance of treatment. More sophisticated in recognising situational nature of ethical reasoning.
Expert	Cognitive reasoning is quick and intuitive with solutions to ill-structured problems. Demonstrates clear understanding of issues. Able to criticise and re-evaluate solutions.

(Ref: Adapted from Dreyfus and Dreyfus (1986) modified in light of Benner (1984) and Biggs and Collis (1982).

Using the above model as a basis, an attempt will now be made to describe performance characteristics at each level of development.

6.2.1.1 Stage 1: Novice

Since beginners have had no experience of the situation in which they are expected to perform, during this stage, the novice learns to re-organise various facts and features and acquires rules for determining actions based on facts and features. The rule-governed behaviour is extremely limited and inflexible. When the novice recognises elements of situation without reference to the overall situation in which in the Dreyfus model are called "context-free".

Occupational therapy students enter a new clinical area as novices; they have little or no understanding of the contextual information learned from theory. Therapists entering a clinical setting, like students, also have little or no experience of the new client or the work context, and may therefore be limited to the level of novices. This point illustrates the situational, experience-based premises of the Dreyfus model, which distinguishes between the levels of performance based on the principles and theory learned in a classroom situation and context-dependent judgements and skills that can be acquired only through real situations.

The novice recognises various facts and features relevant to the acquisition of new skills and learns rules for determining actions based on those facts and features. Elements of the patient's disability to be addressed in occupational therapy are so clearly and objectively defined for the novice that they are recognised without reference to the several situations in which they occur (Dreyfus & Dreyfus, 1986). These elements are called *context-free*, and rules are applied regardless of what else is happening, that is, they are applied in isolation. For example, novice occupational therapists are taught how to assess joint range of motion, muscle tone, or balance and are given rules for how to conduct these procedures. They learn to identify what is normal and what is not, but generally do not consider other aspects of disability, for example, the effects of joint range limitations on function. Because novices have limited experience with the situation they face, they must be given rules to guide their performance. Consequently, they judge their performance by how well they followed the rules.

6.2.1.2 Stage 2: Advanced Beginner

The advanced beginner is one who has coped with enough real situations to note (or to have them pointed out to them by a mentor) the recurring meaningful situational components that are termed "aspects" of the situation" (Benner, 1984). Through practical experience in concrete situations with meaningful elements, the advanced beginner learns to recognise those new elements as "situational" which helps the learner to distinguish from "context-free" elements (e.g. learned from school or textbook) accepted by the novice. Rules for behaviour may now refer to both the new situational and the “context-free” environments (Dreyfus & Dreyfus, 1986), however advanced beginners are still not able to prioritise, thus they may be overwhelmed by multiple and competing tasks, what they perceive as too many things to do at once. Their work is shaped by a concern to organise, prioritise and complete the tasks (Benner, 1994). As with the novice, this will cause unnecessary anxiety that can be incapacitating in a clinical situation and eventually affecting their performance.

The difference between the novice and the advanced beginner could be in the development of situational thinking and awareness of the client’s perspective. Advanced beginners may not feel responsibility for managing a clinical situation with which they are not familiar, either not recognising the client requirements or comprehending the nature of the attendant risks and tensions integral to the situation. Once novices gain more experience with patients, they learn to consider additional cues, which enable them to consider elements that relate to the patient as an individual. For example, occupational therapists at this stage are beginning to consider patients’ occupational performance in the context of their patients’ expected discharge environment. Advanced beginners recognise the presence and absence of behaviour but are not yet able to attach meaning to it, because they are still searching for familiar patterns to assist in problem identification. At this stage, they are still unable to determine priorities. To further clarify this point, try to visualise a patient with spatial perceptual problems performing self-care. The advanced beginner may recognise spatial perceptual impairment in a patient performing self-care but fail to realise that the patient’s inability to learn compensation techniques for self-care may be due to a poor attention span as well as decreased motivation. The advanced beginner does not yet see the entire picture.

6.2.1.3 Stage 3: Competent

With more experience, a competent occupational therapist is consciously aware of which attributes and aspects of the current and future situations are to be considered as most important in the overall assessment of his/her clients. The competent therapist will no longer assess his clients in a rigid, prescribed manner, as would novices but will be able to plan his/her actions based on the needs and priorities. The competence is evidenced by the fact that the therapist begins to see his/her actions in terms of long-term goals.

A competent practitioner, according to Dreyfus & Dreyfus (1986), still "sees the situation as a set of facts" (p24). Not only do competent practitioners see more facts, but also they are also able to identify which facts or observations are relevant. This recognition of crucial facts allows the competent clinician to determine which aspects of a patient's conditions are most important at a given time. Although competent therapists are able to individualise therapy based on their broader understanding of a patient's problem and are able to handle multiple patient care demands with a feeling of mastery, they lack the flexibility and creativity that characterises more experienced therapists' work. Competent therapists rely on their own ideas and standards of practice. Moreover, competent therapists whose procedural skills are quite automated are able to prioritise problems and plan deliberately. They, however, lack the speed and flexibility of the proficient clinician.

Elstein, Shulman, & Sprafka (1978) found that the identification of cues and the generation of multiple hypotheses were two traits demonstrated by a successful competent clinician. In their opinion, competent therapists were also able to construct several hypotheses and hold them in abeyance in order to gather additional cues to evaluate the various hypotheses. Competent therapists are able to anticipate the need to formulate the hypotheses on a temporary basis.

6.2.1.4 Stage 4: Proficient

The proficient performer is one who perceives situations as wholes, rather than in terms of aspects. According to Dreyfus and Dreyfus (1986), this perception is the key to this level of reasoning. They note that this holistic perspective may not be "thought-out" but may present itself based on experience and recent events. Proficient therapists understand a situation as a whole because they perceive its meaning in terms of long range goals. Experience teaches the proficient therapist what typical events to expect in a given situation and how to modify plans in response to these events, as noted in the discussion of the schemata or "client scripts" of experienced therapists.

Proficient therapists perceive a situation as a whole rather than as isolated parts. They have a sense of direction and a vision of where the patient should go, and they are able to take steps towards that goal. Proficient therapists are able to recognise and deal with unfamiliar situations and consider options, because they have experience-based ability to recognise the nuances of a clinical problem. For example, a proficient therapist was able to adapt her handling of a baby addicted to cocaine when she realised that the baby was reactive to tactile input. Consequently, her treatment approach changed dramatically. Proficient therapists are able to see the whole condition. Experience helps proficient therapists identify what typical events to expect in a given situation and how plans need to be modified in response to these events. Proficient therapists can recognise when the expected clinical picture does not materialise.

For the proficient therapist, certain features of a situation stand out as a salient and others recede into the background. Once the important elements are identified, the proficient therapist then thinks analytically by combining rules and guidelines to make decisions. As therapy progresses, the salient features, treatment plans, and expectations are modified. No deliberation occurs – it appears just to happen as the therapist draws from similar experiences that trigger plans that worked in the past and may be reapplied to new situations. Experienced therapists have a mental library full of experiences, whereas novices' students do not (Benner, 1984; Dreyfus & Dreyfus, 1986)

6.2.1.5 Stage 5: Expert

Experts see situations as wholes, use past concrete situations as a paradigm and move confidently to the accurate region of the problem. At the expert level, the performer knows what to do based on maturity and practical experience. He or she no longer relies on rigid principles, procedures and rules to connect his/her understanding of the situation to an appropriate action. In Dreyfus & Dreyfus (1986) own words, "an expert's skill has become so much a part of him that he need be no more aware of it than he is of his own body." (p30). They are orderly in complex situations, able to apply theory in a global way, and see generalisations and patterns. Experts have learned to expect certain events and even selectively attend to certain aspects of a situation. According to Benner, this selective attention permits fluent performance (Benner & Tanner, 1987) so that they can be focused in inquiry, taking new evidence and quickly applying it to the current situations. Identifying missing data and questioning the accepted, they take nothing for granted. Strategies for assuring that they do not miss anything or are not using the wrong perspective would include a detached meditative reflection of an alternate perspective or by consulting others who may have a different view.

One difference between the proficient and expert therapist is in dealing with crisis. In a crisis situation, competence is not good enough. It requires mastery of one's emotional responses and the ability to imagine what will be required in what sequence for a range of clinical responses. While most expert performance is on going and non-reflective, when time permits and outcomes are crucial, an expert will think deeply and deliberate before acting.

While most expert performance is ongoing and non-reflective, when time permits and outcomes are crucial, an expert will think deeply and deliberately on intuitions before acting. The expert takes nothing for granted. With an enormous background of experience coupled with an intuitive grasp of each situation, the expert may still find it difficult to describe or "rationalize" knowing or "feeling" about a situation (Benner & Tanner, 1987).

In one of the studies, experienced therapists intuitively knew when to push a patient towards a high level of function and when to let go to avoid failure (Mattingly & Fleming, 1994). For example, an expert therapist intuitively knew when to set limits to increase tolerance for structured therapy. This intuitive judgment is based on correct identification of relevant cues at a particular time in the patient's therapy, and a variety of medical and physical and psychosocial factors are considered. Expert therapists recognised rules but moved beyond the rigid application of these guidelines based on an inner sense of knowing what to do next. "When things are proceeding normally, experts don't solve problems and make decisions; they do what normally works"(Dreyfus & Dreyfus, 986, p31). However, when confronted with obstacles or new situations, expert therapists demonstrated the analytic abilities described above.

6.2.2 Limitations of the Dreyfusian Model

Skills acquisition theory put forward by Dreyfus & Dreyfus (1986) recognises that proficiency and expertise are a function of repeated exposure to certain situations. These situations are recognised and responded to presumably because they hold some familiarity from past exposure to similar situations. Furthermore, the theory recognises that problem solving is a conscious and unconscious endeavour in response to the complexity of human issues and environment contexts. However, although expert therapists have a greater capacity to reason interactively and conditionally than their novice counterparts, it does not account for the point that these complex situations can trigger differing and sometimes incompatible responses, which the therapist must deal with. Given the difficulties associated with capturing and measuring clinical reasoning, it does not satisfactorily explain the aspect of the therapist's experience-making decisions based on professional ethics, ensuring the safety of the client while adhering to employers' policy, coping with the many team stresses that occur daily in health care that truly demonstrate a therapist's expertise.

6.3 Novice and Expert Differences

There is much to learn about occupational therapy practice and the evolution from novice to an expert clinician. There is a greater need to learn much more about the characteristics and actions of an experienced clinician in a variety of patient care settings. Other professions like teaching, nursing, physiotherapy, and medicine are investigating the main differences between novices and experts and looking at models of expertise (e.g., Benner, 1984; Strong et al, 1995; Robertson, 1996; Shepard et al, 1999; Unsworth, 2001; Mitchell & Unsworth, 2005). So,

- What are the stages of development for occupational therapy expertise?
- Who are the expert clinicians and what distinguishes them from a novice?
- Why do some clinicians seem more successful than other clinicians?
- How do expert clinicians learn their skills and accumulate necessary knowledge?
- How can the professional practice help the novice clinician develop into an expert clinician?
- What cognitive and behavioural processes do clinicians use to improve their clinical reasoning skills?
- How does knowledge of clinical reasoning skills help guide in the selection of potential students?
- How to design learning experiences that would help develop necessary clinical reasoning processes in novices?

The above questions formed the basis to discuss the nature of professional competence and the qualities of an expert clinician.

6.3.1 Development of Competence and Expertise

There is a long tradition of study of the phenomenon of the nature of competence and expertise within professional groups such as teachers, nurses, and physicians. Considerable research has been conducted in the area of thinking and reasoning and the nature of expertise in such diverse fields as nursing, psychology, artificial intelligence, programming, law, mathematics, engineering and physics (Benner, 1984; Glaser & Chi, 1988; Elstein, Shulman, & Sprafka, 1990; Jones, 1992). More studies have been reported previously and recently in physical therapy and occupational therapy by many (e.g., Thomas-Edding, 1987; May & Dennis 1991; Strong et al, 1995; Robertson, 1996; Eraut, 1998; Cheetham & Chivers, 1999; Neary, 2000; Alsop, 2001; Unsworth, 2001; Duke, 2004).

The concept of `competence' appears ill defined in the literature (Eraut, 1998; Cheetham & Chivers, 1999; Alsop, 2001). It is recognized that both a judgement and a definition of competence are subjective and as such, it is difficult to achieve as the ability to state explicitly what is being assessed (Alsop & Ryan, 1996; Seale, Gallagher & Grisbrooke, 1996; Neary, 2000). Much of the research focuses on what the expert practitioner knows and how this knowledge is related to the efficacy of action or clinical decisions. These studies focusing on the knowledge of the expert practitioner are frequently grounded in theories from cognitive psychology and include a broad range of investigations from composition of expert knowledge (Chi, Feltovich & Glaser, 1981; Patel & Groen 1986) to clinical reasoning and the decision-making process (Benner, 1984; Barrows & Feltovich, 1987; Thomas-Edding, 1987; Elstein, Shulman, & Sprafka, 1990; May & Dennis, 1991).

Research in a number of fields (e.g., Chi, Feltovich & Glaser, 1981; Boshuizen & Schmidt, 2000) has shown that content knowledge in reasoning is "content specific" implying that the reasoning process could not be separated from the content. An essential consideration in investigating the work of professional, therefore, is that skilful action is adapted to its context. That is, through repeated practice and reflection on practice, the professional develops relevant specialised skills (Schön, 1987). Schön (1987) uses the term "knowledge-in-action" to describe the knowledge that is embedded in the skilled action of the professional. The challenge for researchers is to "get inside the heads" of practitioners in order to see the world as they see it and understand the manner in which professionals think about, construct, and solve clinical problems. It is well known that experience is necessary, but certainly not a sufficient condition for expertise. In addition, we still know little about the process of how expertise is acquired, even though much research has been done on expert-novice differences, particularly in problem-solving or reasoning (Benner, 1984: Dreyfus & Dreyfus, 1986; Robertson, 1996).

Clinical problem solving has been the focus of several investigations concerning physicians' performance (Patel & Groen, 1986; Barrows & Feltovich, 1998; Elstein, Shulman, & Sprafka, 1990). In this research, expert and novice physicians' differences were attributed to the early generation of hypotheses and a testing of hypotheses until a fit was found with cues from the clinical data and disease presentation. The use of this hypothetic-deductive strategy, however, did not distinguish successful from unsuccessful clinical problem solving (Elstein, Shulman, & Sprafka, 1990). The differences were found primarily in experts' recall of meaning- full relationships and patterns, that is, in the structure of the knowledge rather than in a problem solving strategy applied to the clinical problem.

Researchers also claim that problem-solving expertise is case specific and highly dependent on the clinician's mastery of a particular content domain (Patel & Groen, 1986; Elstein, Shulman, & Sprafka, 1990; May & Dennis, 1991) used a questionnaire to gather data on cognitive styles from 400 American and 384 Australian physical therapists, who were considered by their peers to be expert clinicians. From their findings, they suggest that clinicians may use different cognitive processing styles for different clinical problems. For example, occupational therapists working with patients with orthopaedic disorders reported more frequent use of a receptive (suspending judgement until all possible data have been collected) data-gathering style and a systematic (performing and ordered search for information) information-processing style. Alternatively, therapists working with patients with neurological disorders reported more frequent use of a perceptive data-gathering style (seeing and responding to cues and patterns as a guide to data gathering) and an intuitive information processing style (keeping the total problem in mind and considering alternatives simultaneously).

6.3.2 The Nature of Professional Competence – What is expected of an Expert?

It is evident from literature that professionals learn and develop knowledge through practice and that experience is a requisite for expertise but is not the only factor that contributes to expert practice (Schön, 1991; Cervero, 1988). On this, Benner (1984) states

> Expertise develops when the clinician tests and refines propositions, hypotheses, and principles-based expectations in actual practice situations.... Not all knowledge embedded in expertise can be captured in theoretical propositions, or with analytic strategies that depend on identifying all the elements that go into the decision (Benner & Benner, 1979). However, the interactions, expectations, meanings and outcomes of expert practice can be described, and aspects of clinical know-how can be captured by interpretive descriptions of actual practice (pp3-4).

Several investigators have examined the basis of professional competence (for example, Alsop & Ryan, 1996; Seale,Gallaher, & Grisbrooke, 1996; Cheetham & Chivers, 1999; Bonello, 2000; Alsop, 2001). These researchers who studied the individual characteristics of expertise and novices in a variety of fields, e.g. nursing, occupational therapy and physiotherapy, have demonstrated that differences between expert knowledge and novice knowledge were related to the individual's ability to combine with experience, to be able to know what was important, and to recognise and appreciate the significance of critical cues (Elstein, Shulman, & Sparfka, 1978; Dreyfus & Dreyfus, 1986; Benner & Tanner, 1987; Unsworth, 2001).

Cross & Hicks (1997) suggests that the expert practitioners should be all things to all people, expert intuitive thinkers who take into account all the concerns of the client, listen and interpret the client's concerns and use expert professional knowledge and skills to facilitate the client's improvement in living quality. Jacobs et al, (1997), on the other hand notes that competence may be used to describe a person who is mechanically efficient and effective, or alternatively may denote a person's capacity to personify the values and aspirations of the profession. It is well known that an expert reflective practitioner combines all these skills and values to provide the best quality service.

There is still much to learn about professional practice, particularly investigations conducted within the natural practice environment. The wealth of knowledge embedded in the clinical actions of occupational therapy practitioners is currently not well understood. In order to learn more about who the expert clinicians are and how they develop, this study began to observe systematically and record what novice clinicians do in their clinical education settings when interacting with their clients.

In occupational therapy, studies show that expert therapists use pattern recognition and schemata to recognise dysfunction in relation to occupational, environmental or biomedical issues. In the following section, how the concepts of schemata and pattern recognition skills are developed among novices and experts are explored:

6.3.3 Development of Schemata and Pattern Recognition

Pattern recognition is a perceptual ability of a person to recognise relationships without specifying the components of the given situation. Expert clinician's superior ability to see meaningful patterns is not the result of superior perceptual or memory skills, but reflects a more highly organised knowledge base (Jones, 1992). Whereas, novices use more recall of surface features of a problem and have less developed and fewer variations of patterns stored in their memory. In a clinical situation, patients present patterns of responses that expert clinicians learn to recognise in their practice. Experts make inferences about clinically relevant information and chunk information into recognisable patterns. Context-free criteria are never sufficient to capture either essential relationships or subtle variations in the pattern.

Patterns, cognitive models or mental schema provide "meaning and structure to an otherwise chaotic influx of information and give coherence to experiences that would otherwise seem incomplete or fragmentary" (Schmidt, Norman, & Boshuizen, 1990). The cognitive models of human judgment treat pattern recognition either as a feature-detection system, in which a list of features held in memory is matched against the features presented by the patient, or as a template-matching scheme.

Novices and experts have access to the same information. The information gathered by more experienced therapists appears to be more clearly defined and organised. The novice may not see where to look or how to look for additional information. The novice may rely on black and white textbook patterns and lack information on the relationships and shared features across different clinical patterns

Once students or novices are exposed to real clients, they begin to take certain shortcuts in their reasoning. With continued exposure only knowledge relevant to the client will be activated. The expert can make use of abstract relationships, which assist to categorise similar and opposing bits of information in memory. Schmidt, Norman, &

Boshuizen, (1990) suggests that these abstract relationships, termed by novice student "propositional networks" which may be "causal, temporal, spatial, and part-whole", so may be viewed from different perspectives.

The novice does not have the repertoire of experience on which to base judgment. As suggested by Dreyfus &Dreyfus (1986), the novice practitioner develops through several stages of skill acquisition, starting with that of rule-follower able to recognise facts and features and make analogies, but unable to use this information flexibly or creatively or to deal with unfamiliar situations. Novices are less able to think quickly through a situation than are experts (Schmidt, Norman, & Boshuizen, 1990). This may be related to either the way in which information is stored in memory or the difficulty with decision making because of lack of automaticity. In the first explanation, information appears to be organized into a network of related facts, concepts, generalisations and experiences. The organised structures, called schemata, constitute our understanding of the world and allow individuals to store and access large bodies of information with enormous speed. The second explanation concerning automaticity suggests that automatic scripts allow experts to handle common routines almost without conscious thought -Schön's "knowing in action" (Schön, 1991) and Benner's "intuition"(Benner & Tanner, 1987).

Schemata do not automatically appear in a practitioner's mind. They are constructed though experience. This may be seen as a dual process of assimilation (fitting the new in with the old) and accommodation (changing the old mental organisation to incorporate the new) (Piaget, 1971). It is a process of perceiving and storing related information, which can be recalled and used as a kind of prototype when a suitable stimulant is presented (Greenwood, 2000). Practitioners may accumulate these patterns or schemata that represent cases they have seen (Roberts, 1996). Experts have the ability to think in and out of the box, backward and forward in time using the concept of problem space (Hagadorn, 1996).

Expert practitioners can model their skills and, through case discussion and demonstration of dealing with ill-structured problems, pass on some of their skills to less experienced therapists, but the skills and knowledge gained by the novice must then be internalised and become part of the novice's repertoire in order to be useful. Thus the technical rational approach of prescribing and proscribing all the practitioners' activities, used in many departments, may be seen as a way to cut down risks and ensure the safety of the client (Fish & Coles, 1998) and may be the foundation on which the novice can build his/her own repertoire with relative security. The problem with this approach in many departments is that the therapist may depend too much on information drawn from authority, not move beyond this adherence to specific protocol, and therefore may not develop his/her own reflective approach to practice

Experts' planning can be described as a process of combining from existing schemata to fit particulars of a given lesson. Because experts have well-developed and easily accessible schemata for aspects of teaching such as instructional activities, content, and students, they are able to plan quickly and efficiently. Novices, on the other hand, often have to develop, or at least modify and elaborate, their schemata during planning. Their schemata for pedagogical content knowledge seem particularly limited. While experts' knowledge structures include stores of powerful explanations, demonstrations, and examples for representing subject matter to students, novices must develop these representations as part of the planning process for each lesson. Further, because their pedagogical reasoning skills are less well developed than experts', this planning is often inefficiently carried out.

The novice may not know where to look or how to look for additional information. The novice may rely on black and white textbook patterns and lacks information on the relationships and shared features across different clinical patterns. Once a student or novice is exposed to real patients, he/she begins to take certain shortcuts in his/her reasoning he/she is no longer has to activate all possible relevant knowledge in order to understand what is happening with the patient. With continued exposure only knowledge relevant to the patient will be activated. The expert can make use of abstract relationships, which assist the categorisation of similar and opposing bits of information in memory. Schmidt, Norman, & Boshuizen, (1990) suggests that these abstract relationships termed by him "propositional networks" may be causal, temporal, and spatial, part whole, or family-type.

Experts, on the other hand, have the ability to think in and out of the box, backward and forward in time using the concept of problem space (Hagadorn, 1996). Over-reliance on a familiar condition schema, however, might lead a therapist to skimp on the information gathering and analysing process, and jump from pattern recognition to stereotypical solution. It is also possible that a wrong fit be made between pattern and schema, so that the problem is incorrectly named and framed.

6.4 Clinical Decision-Making: How Expert Clinicians Use Intuition?

As occupational therapy practice has become more and more complex and requirements for efficiency in health care continue to increase, the task of decision-making has also become more demanding for occupational therapists. Understanding the type of cognitive processes and thought models that occupational therapists use when solving problems in occupational therapy may be useful in occupational therapy practice and education. With this focus in mind, an attempt is made to identify the nature and role of expert clinical judgment.

As reported earlier, it is widely acknowledged that not everyone attains expertise during his or her clinical career. However, the majority of researchers in the health care professions (See for example, Benner & Tanner, 1987; Mattingly & Fleming, 1994;

Strong et al, 1995; Shepard et al, 1999; Higgs & Jones, 2000; Unsworth, 2001; Mitchell & Unsworth, 2005) agree that the key to understand expertise in health care professional is the clinical reasoning.

Clinical reasoning underpins all client-related thinking and decision-making in occupational therapy. It is the knowledge and experience that determines the orientation to problem solving and decision making that is characteristic of occupational therapy practice. In the literature review, two types of decision-making processes: analysis and intuition were identified (Cooksey, 1996: Hammond, 1996):

- Analysis is a step-by-step, conscious, logically defensible decision-making process. Key characteristics of analysis include slow information processing, use of sequential cues, use of logical rules, and task-specific organisation (Cooksey, 1996; Hammond, 1996).

- Intuition, on the other hand is an immediate recognition of the key elements of a situation and decisions are based on that recognition. Key characteristics of the intuitive process include rapid information processing, simultaneous use of cues, recognition of patterns, evaluation of cues at a perceptual level, and the use of the principle of weighted average organizing (Dreyfus & Dreyfus, 1986; Tanner, 1987).

Hammond's cognitive continuum theory of decision-making that dates from the early 1980s combines the characteristics of intuition and analysis. According to Hammond (1996), the most analytical mode that occurs is highly controlled experimentation and the most intuitive mode is an individual's opinion justified by the authority of experience. Cognitive processes occur along the intuitive-analytic continuum over time.

Dreyfus & Dreyfus (1986) use "intuition" and "know-how" as synonymous. They advocate that intuition must not be confused with irrational conformity, all the other unconscious and non-inferential means by which human beings come to decisions. In their minds, only intuition is the product of deep situational involvement and recognition of similarity. They have provided rich examples of intuitive judgment in their book "Mind Over Machine" in which the following six key aspects of intuitive judgment were included:

6.4.1 pattern recognition,
6.4.2 similarity recognition
6.4.3 commonsense understanding
6.4.4 skilled know-how,
6.4.5 sense of salience, and
6.4.6 deliberate rationality

It must be pointed out that in real life, however, the above six aspects cannot be separated. Indeed, they work together in a synergy in what seems to be a necessary combination of conditions for expert intuitive judgment.

6.4.1 Pattern Recognition

As suggested by Dreyfus & Dreyfus (1986), the novice practitioner develops through several stages of skill acquisition, from that of rule-follower able to recognise facts and features and make analogies but unable to use this information flexibly or creatively, or to deal with unfamiliar situations. It may be that novices require a list of features or criteria in order to identify a pattern, using a process described by analytical models. According to Jorgenson & Crabtree (1986), novices and expert differ in their capacity to recognise whole patterns.

6.4.2 Similarity Recognition

Benner & Tanner (1987) describes "similarity recognition" as an amazing human capacity to recognize "fuzzy" resemblances despite marked differences in the objective features of past and current situations. According to Benner & Tanner (1987), similarity recognition sets up the conditions for recognising dissimilarities thus opens lines of inquiry and makes problem identification possible in highly ambiguous circumstances.

Usually the proficient performer will be deeply involved in his/her tasks and will be experiencing it from some specific perspectives because of recent events. An advanced beginner, on the other hand recognises situational events, which he/she experienced several times in the past. No evidence, however suggests that the advanced beginner recognises whole situations by applying any rigid rules relating to salient features. Such intuitive ability to use patterns without decomposing them into component features is called by Dreyfus & Dreyfus (1986) as "the holistic similarity recognition".

6.4.3 Commonsense Understanding

Therapists deal with both illness and disease, but they do not limit their knowledge of pathology or physiological states. They have learned over time, to find a "grasp" or "understanding" of patients' illness and other related factors. Since they work in the realm of helping patients to cope with their illnesses, detailed personal histories and the contexts of the illnesses are important. Commonsense understanding therefore is a deep grasp of the culture and language, so that flexible understanding in diverse situations is possible (Benner& Tanner, 1987).

6.4.4 Skilled Know-How

According to Dreyfus & Dreyfus (1986), each individual is possessed with something called "know-how," which is normally acquired through practice and sometimes through painful experience. These authors further stressed that "know-how" is not easily accessible in the form of facts and rules and hence it is difficult to put what is leant into words. The know-how skills of all mature individuals are not innate; they need to be learnt to become perfect. Further more, practice is required for maintaining know-how skills. Otherwise, there is a possibility that these skills can be lost through inactivity.

6.4.5 Sense of Salience

An experienced therapist acquires ways of understanding, interpreting, and coping with patient's illnesses by taking care of many different patients with range of comparable adjustments and coping demands. Although, the standard assessment forms and checklists used by the clinicians are useful as a broad net, and as a way to avoid missing what may be important signs, and as a guide for beginning clinician, it can never replace the human expertise needed for making relevant observations about patients` illnesses. The complex, skilled observations are based on what is salient for a particular patient`s condition. The expert builds a case and forms a judgement based on the changing condition of a patient. The author of this dissertation feels that a sense of salience works better than a checklist of the understanding of the situation is correct. A checklist, in his mind may not be effective because it may not be possible to list all the possibilities. The expert clinician requires an in-depth knowledge of the patient in order to operate with a well-developed sense of salience. Lack of knowledge about illnesses may severely limit the ability to make any subtle changes in patient's condition.

6.4.6 Deliberate Rationality

With reference to their five-stage model, Dreyfus & Dreyfus (1986) states that there is more to intelligence than calculative rationality. To think rationally in that sense is to forsake know-how and is not usually desirable. If decisions are important and time is available, a more basic form of rationality than that of the beginner is useful. This kind of deliberate rationality does not seek to analyse the situation into context-free elements but seeks to test and improve whole intuitions.

Proficient and Expert clinicians have a deep web of perspectives that cause them to view a situation in terms of past situations. While the novice and the advanced beginner are taught how to respond to present situations, context-free rules can, in principle, also be provided for what to expect next in each objectively defined situation. Once the competent performer becomes involved in a given situation, he of course also remembers what happened next. That becomes the basis of the intuitive expectations of the proficient performer. While expectation seems to play an essential role in producing our ability to make sense out of a potentially infinitely complex environment, it also might produce tunnel vision.

6.5 Summary

The assumption that clinical skills essentially consisted of a set of reasoning strategies that are largely domain-independent and that would enable those who acquired them to solve problems successfully. van der Vleuten & Newble (1995) note that knowledge and the way that knowledge is stored, retrieved, and used differentiates the expert from the novice. Domain-independent reasoning skills and metacognition are a necessary part of a therapist's repertoire along with the appropriate knowledge base to solve health care problems.

In a profession like occupational therapy, where appropriate and quick decision-making is paramount for the fast-paced clinical environment, clinicians need a sound rationale for decision-making. The skills acquisition model proposed by the Dreyfus brothers (a mathematician and a philosopher) in the late 1970s, posited five levels of skill that human performance can attain. Dreyfus & Dreyfus (1986) laid out the five stages as novice, advanced beginner, competent, proficient, and expert, which represent the "changed perception of the task environment and mode of behaviour that accompanies skill acquisition" (p35). Their model informed further research by Benner (1984) on the nature of expertise in nursing. The Dreyfusian model suggests that with increasing competence, practitioners progressively depart from a reliance on abstract principles and increasingly rely on past, concrete experiences to guide action.

According to Dreyfus & Dreyfus (1986), someone at a particular stage of skill acquisition can always imitate the thought process characteristic of a higher stage but will perform badly when lacking practice and concrete experience. The Dreyfus model of skill acquisition represents a progression in the sense that a typical learner's best performance in a particular type of situation will initially stem from novice rule-following then from the advanced beginner's use of aspects through the five stages. Furthermore, according to the Dreyfus model, the novice and advanced beginner exercise no judgement, the competent performer judges by means of conscious deliberation, and those who are proficient or expert make judgements based upon their prior concrete experiences in a manner that defies explanation. They postulate that not all people achieve an expert level in their skills. In their opinion, only a small fraction of beginners can ever master the domain.

In the clinical situation, clients present patterns of responses that expert clinicians learn to recognise in practice. The expert no longer follows the rules set for the novice, but seems intuitively to respond to situations. The novice, on the other hand, may require a list of features or criteria in order to identify a pattern. As noted earlier by Mattingly & Fleming (1994), experts make complex skills look simple. They drew on their past experiences when planning and executing therapy and used this knowledge to anticipate client performance and modify or change the therapy plan as needed. These experts' traits were also documented by many researchers (for example, Hallin & Sviden; 1995; Benner, Hooper-Kyriakidis, & Stanard, 1999; Ersser & Atkins, 2000; Higgs & Jones, 2000). They concludes that more experienced therapists have a better understanding of client's point of view and therefore find it easier to allow the client to take charge of therapy than novice therapists.

It is shown that research with occupational therapists and other allied health professions have revealed a variety of clinical reasoning processes that differ between novices and experts. The clinical reasoning, which requires metacognitive analysis is a form of cognitive or thinking process used in clinical practice for client management and evaluation and as such clinical competence requires the application of sound knowledge through clinical reasoning and decision making in the clinical context. Understanding the development of clinical reasoning skills facilitates evaluation of the profession's own reasoning and design of educational strategies and learning activities. For this reason most allied health science educators have embraced the concept of teaching clinical reasoning and have incorporated it into their curricula. It provides a framework for integrating students' learning for preparing them for their future role as autonomous, responsible clinicians and helping them to deal with the complex clinical problems. The focus of the next chapter is on the nature of clinical reasoning and its implications for curriculum framework and design. The next chapter also considers some main curricular issues and how it develops, and the need to foster strategies for teaching these complex skills to students of occupational therapy during academic and fieldwork education.

Chapter 7

CLINICAL REASONING: IMPLICATIONS FOR CURRICULUM FRAMEWORK AND DESIGN

7.1 Introduction

The overall aim of the occupational therapy programme is to produce competent clinicians who are able to manage effectively the clinical problems presented to them in their practice. Therefore, the development of competence in clinical reasoning is an integral part of the occupational therapist's education and as such teaching clinical reasoning is widely regarded as an essential part of health science curricula. It provides a framework for integrating students' learning, for preparing them for their future role as autonomous, responsible health care professionals and for helping them to deal with the complex and variable elements of clinical practice. By making clinical reasoning a conscious and strategic part of their clinical practice, student novices and beginning therapists are encouraged to examine and express their opinions and ideas and to develop a greater awareness of how they reason and how their knowledge, values and beliefs influence their clinical reasoning.

The focus of this chapter is on the task of teaching clinical reasoning and examines the development of the reasoning process from a student's perspective during the fieldwork experience. It also describes the nature of clinical reasoning and how it develops, and need to develop strategies for teaching these complex skills to students during academic and fieldwork education. Some sections of the chapter are also concerned with helping students to gain understanding of the way in which the curriculum is organised and their relationship to the nature of clinical education that have a direct bearing on the facilitation of clinical reasoning skills.

7.2 Educational Philosophy for Curriculum Design

One would argue that the ideal choice of educational approach and framework for clinical reasoning programmes is adult learning. This is because both clinical reasoning and adult learning involve a complex, interactive set of characteristics and capabilities. According to Finger (1990), adult learning provides a means of achieving transformation of learners and their situation, since this approach helps learners find a "way out" of problem situations. Adoption of this approach, therefore, would enable students to learn through the experience of solving their learning problems while at the same time learning about clinical reasoning or the transformation of clinical problems into solutions.

Students rely heavily on the curriculum (e.g. stated goals, learning activities plan and assessment methods) to guide their learning. Students' perceptions of these can result in their adopting learning behaviour contrary to those intended by the teachers. In particular, learning behaviour and outcomes are influenced by the learners' perception of the demands of assessment (Ramsden, 1984). In designing and conducting assessment procedures, therefore, the nature of the assessment process and how it is presented to and perceived by the learners is important. There needs to be consistency between the goals of learning, the activities used, the feedback given and the assessment procedures implemented. If deep learning is desired to enhance the value as well as the breadth of the learner's knowledge, then learning activities, feedback and assessment procedures must all be consistently aimed at encouraging deep learning (Marton & Säljö, 1976; Entwistle & Ramsden, 1983; Biggs, 1993).

7.3 Which Model is Appropriate to Teach Clinical Reasoning?

The importance placed upon clinical reasoning by the health care professions is evident in the increasing occurrence of explicit teaching of clinical reasoning in health care curricula (Elstein, 1981; Neame et al, 1985; Tanner, 1987; Rogers & Holm,1991;

Schwartz, 1991; Higgs & Jones, 1995). Teachers are faced with the question, which model of clinical reasoning should I encourage my students to emulate? The choice could be hypothetico-deductive reasoning (Elstein, Shulman, & Sprafka, 1978), pattern recognition (Barrows & Feltovich, 1987), problem solving (Bashook, 1976), the phenomenological model adopted in occupational therapy (Mattingly, 1991a), models of backward reasoning and forward reasoning (Patel & Groen, 1991), models as in nursing which emphasise intuition (Benner & Tanner, 1987) or a combined model (Higgs & Jones, 1995). A sound plan for teaching encompasses elements of clinical reasoning, including knowledge, reasoning ability and metacognition within the model.

The teaching of clinical reasoning should be based on a "an understanding of how competent individuals proceed in determining what observations to make, in identifying health problems from those observations, and in deciding on appropriate actions; an understanding of the progression of such competence, from beginning level to the development of expertise" (Tanner, 1987, p155).

As occupational therapy academic programmes evolve, decisions about curriculum design and course content should be made carefully. Although several entry-level programmes are available, these schools should not be used in making specific curriculum or content decisions. For example, clinical reasoning may be taught as a separate subject within a curriculum or as an integral aspect of all areas/subjects within the curriculum. The first option has the advantage of drawing attention to this skill rather than diffusing it among the various other learning goals of the curriculum. However, the second approach has the potential advantages of reinforcing both reasoning and the integration of knowledge in all areas of learning, and promoting transfer of learning from classroom to clinical settings. More research in this area is needed to address this issue.

7.4 Explicit and Implicit Curriculum

Shepard & Jensen (1990) refer to explicit and implicit curricula. Both these forms of curriculum reinforce and direct students' learning. These authors, with Everingham & Feletti (1999), emphasise the importance of using both explicit and implicit curricula to promote reflection in learning and the development of reflective knowledge and skills. Such abilities can help learners (and clinicians) to deal with what Schön (1987) labels "the indeterminate zones of practice" or the uncertainty, uniqueness and value conflicts, which characterise human situations.

It is shown that mismatches between implicit and explicit curricula cause confusion and less than optimal learning. It is important therefore, for teachers to avoid what has been described as a discrepancy between "espoused theory" and "theory-in-use" (Bowden, 1988). In studying practice in a number of university programmes, Bowden (1988, p257) found that teachers wanted students to possess qualities such as problem-solving ability in their profession, lateral thinking, insight, integrity, perspective, self-motivation, ability to "self-learn", and an understanding of the structure of (relevant) knowledge. (Such outcomes are desirable in any clinical reasoning course). However, when investigating why students did not achieve these outcomes, Bowden (1988) identified that a mismatch had occurred between espoused theory (and its intended outcomes) and the way in which the students were actually taught and assessed. The challenge for the educator, then, is to select an educational philosophy or conceptual framework, which is appropriate for the subject to be taught and to authentically adopt this "espoused theory" in practice.

7.4.1 Teach All Modes of Reasoning

The different modes of reasoning Higgs, 1992; Jones, Jensen, & Edwards, 2000; Liu, Chan, & Hui-Chan, 2000; Ranka & Chapparo, 2000) should be given equal time in the curriculum. Thus, although we must teach the logic of problem solving we must also teach students interactive reasoning. Moreover, a focus on the teaching of reasoning requires a shift in the method of evaluation from a quantitative to a qualitative mode of measurement. For example, a videotape of a student working with a patient at the beginning and end of the semester provides a more reliable measure of interactive reasoning ability than does multiple-choice exams. Similarly, a case study that requires students to apply their knowledge is a more valid measure of reasoning ability than a test that measures factual retention of information.

7.4.2 Teach a Narrative Approach to Patient Evaluation

Because clinical reasoning requires the therapist to use a phenomenological approach in making sense of the patient's condition, students need to learn how to use a narrative reasoning mode when evaluating patients. For students to understand all of the aspects of the patient, they must learn about the patient's beliefs and values and develop an understanding of what disability means to that particular person's life. One way to elicit such information is through interviews that encourage patients to discuss their feelings about illness and disability. Another is to use evaluations that assess interests, values, and roles. Although students are generally well grounded in such evaluations as range of motion and muscle testing, ways of evaluating that can yield data about the meaning of disability are rarely emphasised.

By encouraging students' use of qualitative as well as quantitative assessments and by familiarising them with the phenomenological approach to understanding patients, one can promote the development of narrative reasoning. It could be argued that in doing so, we are educating students to use an approach that is not supported by third-party players. In response, however, we can pose the question, "who should be shaping occupational therapy education?" Since narrative reasoning is an integral part of the therapeutic process, occupational therapy curriculum can help to give this underground activity more credibility by teaching students narrative reasoning and ways to justify its use within the medical model.

7.5 Teaching Strategies for the Development of Clinical Reasoning

In the current health care climate, occupational therapists need to be effective and efficient enough in their clinical thinking to deliver quality client services in the context of constantly changing organisational structure. To function well in this changing environment, entry-level practitioners need to progress quickly to the competent therapist stage of clinical reasoning. In occupational therapy curriculum, the process of developing clinical reasoning requires that students gain skills in critically evaluating the presenting problems of clients, and planning and executing interventions (Fleming, 1991b). Although it is acknowledged that the development of clinical reasoning follows a continuum through the five stages: novice, advanced beginner, competent, proficient, and expert (Benner, 1984; Dreyfus & Dreyfus, 1986; Neistadt, 1996; Slater & Cohn, 1991; Dutton, 1995), educators are required to initiate this developmental process and help students to acquire the analytical and reasoning skills necessary for knowledge application while they are still in the academic setting. Furthermore, teaching strategies that are explicitly aimed at improving the clinical reasoning skills of occupational therapy students may speed up their ultimate progression through the five stages of clinical reasoning by helping them learn about their thinking and doing simultaneously during their clinical experience. (See **Chapter 6** on the Novice-Expert Differences for detailed explanation)

Because all occupational therapy curricula seek to teach clinical reasoning, the teaching strategies can be integrated into courses within any curricula. It is not necessary to offer specific courses on clinical reasoning. In fact, integrating clinical reasoning teaching throughout a curriculum is very effective in helping students connect all their course work with clinical reasoning skills and transfer their reasoning from the classroom to the clinic (Nieistadt, 1992; Higgs, 1992; Terry & Higgs, 1993; Watkins, 2004).

Relative to simulated clinical experiences; classroom-as-clinic methodology has been found to be effective in promoting students' diagnostic reasoning skills. In these experiences, students are asked to (a) generate tentative occupational therapy problem lists from preliminary diagnostic and social information about guest speakers with disabilities and (b) revise those lists after actually meeting and interviewing the guest speakers. Students are graded on the accuracy of their problem lists relative to those of an experienced therapist. Both lists relate directly to clinical practice – the first represents the mental hypotheses a therapist might generate after an initial chart review, and the second represents the summary problem list from an initial evaluation. This same format could be used with actors posing as clients (VanLeit, 1995) or with videotapes of clients being evaluated by experienced therapists.

Rogers & Masagatani's (1982) pilot study of therapists' clinical reasoning during the initial assessment of physically disabled patients revealed the difficulty therapists have in articulating the process used to determine functional problems and treatment goals. The authors state that this difficulty is generally attributed to the inadequate teaching of concepts and strategies of clinical problem solving during students' education for the occupational therapy profession. Learning the clinical reasoning process is facilitated and assessed by a series of assignments connected to the in-class evaluations sessions. Some of these assignments focus primarily on knowledge acquisition, others focus primarily on affective responses, and a third group does both. The pertinent method for teaching clinical reasoning certainly appears to be an effective way to connect classroom theory to clinical practice and well worth the extra educator effort it involves (Higgs & Jones, 2000; Liu, Chan, & Hui-Chan, 2000; Schuwirth, 2002).

The types of clinical reasoning that have been identified in the occupational therapy literature to date include narrative reasoning, interactive reasoning, procedural reasoning, pragmatic reasoning, and conditional reasoning. Although, ideally, an occupational therapist would use all of these types of reasoning during evaluation and treatment, generally speaking, facilitation of pragmatic and conditional reasoning is most appropriate toward the latter part of a curriculum, after students somewhat comfortable with their basic narrative, interactive, and procedural reasoning skills (Cohn, 1993; Dutton, 1995; Liu, Chan, & Hui-Chan, 2000; Ranka & Chapparo, 2000). Teaching strategies to promote student development of all these types of reasoning have been described in the medicine, occupational therapy, physical therapy, and nursing literature (See **Chapter 5** on the Clinical Reasoning skill differences between Occupational Therapists, Physiotherapists and Nurses).

Following are the few examples of different teaching strategies according to the type of clinical reasoning skill used (Refer to **Chapter 4** for further explanation):

7.5.1 Narrative Reasoning

Narrative reasoning aims to help students understand the narrative concepts of life stories. Asking students to write narratives, or stories, about persons with disabilities who they have met in Clinical Education I fieldwork setting, which takes place at the beginning of Year 1 summer vacation (See **Appendix 3.4.3a** for the Aims of Clinical Education I, II, III, & IV) or in classroom settings is another way to foster narrative clinical reasoning skills. This type of writing shifts students out of the "chart talk" (Mattingly & Fleming, 1994, p60) of medical terminology associated with procedural reasoning into a more client-centred story-telling mode.

7.5.2 Interactive Reasoning

The strategies for interactive reasoning are meant to heighten students' awareness of illness experiences, promote insights about their interactional styles and therapeutic qualities, or provide opportunities for them to practice therapeutic interactions with actual clients. Reading literature on disability experiences can help students understand how different persons experience illness. Students can use journals and reflective papers to become more aware of their feelings, their therapeutic capacities, and the feelings of clients (Neistadt, 1987; Crepeau, 1991; Tryssenaar, 1995).

Ideally, interactive reasoning in occupational therapy is used to form a partnership with clients (Fleming, 1991b; Peloquin, 1990). Students are helped to implement this collaboration in practice if they are given instruction about exactly how to involve clients and their caregivers in goal settings and treatment planning. Interactions with actual clients, in either classroom or Clinical Education I & II fieldwork settings, which take place during Year II summer term (See **Appendix 3.4.3a** for the Aims of Clinical Education I, II, III, & IV), have also been found to facilitate students' interactive reasoning skills.

7.5.3 Procedural Reasoning

Much of the occupational therapy curricula are focused on teaching students the procedural reasoning (i.e. the evaluation and treatment skills occupational therapists use in practice). The teaching strategies are meant to increase the effectiveness of that teaching by making it more directly related to clinical practice. A continuum of practice-related experiences is included, from paper case studies (Higgs, 1990; Schwartz, 1991), to simulated clinical experiences (Neistadt, 1992; VanLeit, 1995), to actual clinical experiences (Levine & Gitlin, 1990; Neistadt & Cohn, 1990).

Higgs (1990) described an interesting use of paper case studies in a physical therapy curriculum at the University of Sydney in Australia. Higgs found the paper case study assignment and ensuing discussions to be very effective in promoting students' diagnostic and procedural reasoning skills. Cohn (1989) suggested that videotaping students' interactions with actual clients and later discussing their clinical reasoning in those sessions, with reference to the videotapes, is an effective way to improve their procedural reasoning abilities.

Clinical Education II & III fieldwork settings, which take place in the middle of first semester and at the beginning of second semester in final year to achieve aims of Clinical Education I, II, III, & IV provide an opportunity for students to learn hands-on techniques with actual clients (See **Appendix 3.4.3a**).

7.5.4 Pragmatic Reasoning

The teaching strategies explained here for pragmatic reasoning seek to sensitise students to some of the practical issues of clinical practice (e.g., reimbursement, documentation, staffing and equipment resources) and their ethical implications (Neistadt, 1996; Neuhaus, 1998). The assignment includes a series of field trips where students meet and interview an actual client for whom they need to write a systems treatment plan. This assignment helps students expand their notion of a treatment plan to include consideration o the practical factors that can affect their work with clients.

7.5.5 Conditional Reasoning

The teaching strategies for conditional reasoning are meant to give students experience with integrating narrative, interactive, procedural, and pragmatic reasoning in the planning or implementation of treatment. Clinical Education III & IV fieldwork settings (See **Chapter 3)** can allow students to work with some of the same clients for several weeks so that they can develop an appreciation for client change over time are particularly effective for promoting conditional reasoning.

7.6 Teaching Clinical Reasoning: A Case-based Approach

The clinical reasoning case study can be used as an effective teaching tool in occupational therapy educational programmes (Neistadt, Wight, & Mulligan, 1998). The case studies can be formulated by students or educators and used as teaching tool in clinical settings or in classes where occupational therapy intervention planning for clients with specific diagnoses is taught.

Although, problem-based learning (PBL) and case-based instruction are instructional techniques that are successfully implemented in a variety of disciplines (Sadlo, 1997; Vroman & MacRae, 1999; Martin, 2000; Maudsley, 2005), there is a difference in the way that students approach the problem presented. As opposed to problem-based learning, case-based learning generally involves initial instruction and preparation (Kamin, Deterding, & Lowry, 2002; Lysaght & Bent, 2005). Clinical problems are presented first in the learning sequence before any background preparation has occurred. Students are required to identify what information they consider to be central to the case, what they already know and can apply to the case, and what they need to learn to precede with analysis of the case.

A variety of approaches to presenting case-based information have been described in the literature. Types of case studies noted in the literature are paper cases, videotape cases, simulated client cases, and real client cases (VanLeit, 1995; Neistadt, 1996; Thomas et al, 2001). The clinical reasoning case study is a new type of paper case study that illustrates the occupational therapist's thought processes by providing specific client information under the headings of narrative, interactive, procedural, pragmatic, and conditional reasoning (Neistadt, 1998). Furthermore, using case studies as the medium for learning, participants are encouraged by tutors to "think out loud" as a problem unfolds (Kassirer & Kopelman, 1991; Thomas, 1992). Students can practise using the heuristics and applying hypothetico-deductive methods in resolving real-life problems that yield a clear picture of the client.

Case studies come in different forms; replay of videotaped interviews between individual students and real patients, or paper-based or computer simulations. The following section will discuss some of these methods:

7.6.1 The Paper Cases

Written or paper cases are commonly used in the BSc (Hons) Occupational Therapy curriculum at The Hong Kong Polytechnic University. Although, paper cases primarily develop students' procedural reasoning abilities, narrative and pragmatic reasoning may also be important depending upon the particular content of the case (VanLeit, 1995; Neistadt, 1998). A paper case is presented in small chunks, the way that a therapist might actually encounter the problem in clinical practice. Paper cases stimulate students' procedural reasoning abilities and direct them toward issues that must be discovered in the problem case and generate appropriate solutions. Information presented in a case incrementally engages the student (or clinician) in problem framing and setting (Schön, 1987), and the student must decide what information is needed to proceed with assessment or intervention.

7.6.2 The Videotape Case

The videotape case presentation uses videotape of a client-performing task, discussing thoughts and feelings or both. This type of case provides students with client information that helps them to develop narrative or conditional reasoning abilities in addition to procedural skills. This type of case gives the students more lifelike details about a client and it is much easier to develop a story concerning a client who has seen in action. The videotape case provides a starting point for further learning and discussion and offers a more complex picture of a client than does the paper case (VanLeit, 1995).

7.6.3 The Simulated Client Case

The Simulated Client Case is a wonderful way for students (or therapists) to try out different communication styles and learn the skills of "reflection in practice" (Schön, 1987) that are crucial to actual practice. Simulated client cases provide students with an opportunity to interact with a client, thereby providing opportunities for students to practise interactive reasoning as well as other clinical reasoning skills (Neistadt, 1998). Students may also receive immediate feedback from their peers, the group facilitator, and the simulated client concerning their performance.

7.6.4 The Real Client

Real clients who are willing to share themselves with students promote learning in all areas of clinical reasoning. The students' contact with a real client with stimulated questions that require scientific and procedural reasoning as well as pragmatic reasoning facilitates to solve unanswered questions and dilemmas. Learning about a client's journey through illness and recovery may also facilitate development of narrative and conditional reasoning (VanLeit, 1995; Neistadt, 1996).

7.7.5 The Computer Simulations

Computerised exercises, while less able than videotapes to replicate the behavioural dimensions of clinical encounters, still show considerable promise in tracking and evaluating the logic and interpretive skills used by students in solving problems (Myers & Dorsey, 1994). While the most valid and reliable means of formally assessing (as opposed to teaching) clinical reasoning skills are yet to be determined (van der Vleuten & Newble, 1995), it is likely that structured analyses of observed "think out loud" reasoning exercises may prove, in the first instance, to be the most feasible and useful.

7.7.6 Future Research

Many of the teaching methods suggested above will sound familiar to many faculty members in occupational therapy programmes. What may not sound familiar is the description of these learning experiences in terms of the types of clinical reasoning they are likely to facilitate. By specifically naming the types of reasoning they are trying to help students develop, occupational therapy educators can help them become aware of their own clinical reasoning skills and lay the foundation for the continued development of occupational therapy graduates' clinical reasoning abilities.

It is likely that the case-based approach employed in the BSc (Hons) Occupational Therapy course at The Hong Kong Polytechnic University was the trigger in terms of guiding students through each level of clinical reasoning. The case itself appears to serve as a medium for students to "learn by doing" (Schön, 1987) through provision of clinical problems to be addressed using a structured format of reasoning process. Both academics and clinical educators may wish to use the clinical reasoning case studies for a number of purposes; the case studies could be used as a way to organise client information given to students for developing skills in intervention planning and could be used in a problem-based learning curriculum The researcher of this study, however opines that the use of clinical reasoning case studies in conjunction with problem-based and other educational methods needs to be developed and tested further to see whether these case studies have wider applications for teaching clinical reasoning and intervention planning to occupational therapy students.

7.7 Clinical Reasoning: Implications for Fieldwork Education

"Practice education is central to the curriculum as a means of achieving the programme outcomes, namely fitness for award, practice and purpose" (COT, 2003, p5). The BSc (Hons) Occupational Therapy curriculum taught at The Hong Kong Polytechnic University closely follows this principle. In many schools around the world (WFOT, 2002), curricula are frequently divided into a pre-clinical component and a subsequent "clinical or fieldwork" components. The pre-clinical component of the BSc (Hons) Occupational Therapy curriculum at The Hong Kong Polytechnic University includes the teaching of pre-clinical skills and knowledge subjects. In the classroom settings, students can explore alternate treatment decisions and examine many detailed aspects about knowledge use and evaluation. The classroom settings also provide opportunity for encouraging feedback from both peers and teachers. To enhance the transfer of knowledge from the classroom to the clinical settings, both teachers and clinical educators must develop a clear understanding of the process of teaching clinical reasoning.

On-campus pre-clinical teaching in occupational therapy curricula commonly addresses the basic and applied sciences (e.g. Anatomy, physiology, psychology) and the clinical sciences (e.g. neurology, orthopaedics, medicine) which form essential part of the clinician's knowledge base. In addition, students study specific subjects such as paediatrics, geriatrics, occupational therapy theory and practice, performance components, human occupations, occupational therapy applied to specific conditions, etc. In these clinical subjects structured learning activities can be implemented which are aimed at promoting the development of clinical reasoning skills and practice knowledge and the integration of knowledge students have gained from life experiences, and developed throughout their curricula (See **Chapter 3** on the BSc (Hons) in Occupational Therapy curriculum structure for more details).

7.7.1 Clinical Education Context

In order to ensure that occupational therapists are well prepared for their central role in the delivery of health care services they must develop effective clinical reasoning skills. Clinical education placements not only assist students to integrate theory and practice but also enhance their clinical reasoning, problem solving and professional knowledge (Alsop, 1993; Cook & Cusick, 1998; Bonello, 2001.). As well as developing reasoning skills and knowledge in the classroom, students need to test the application of this knowledge in appropriate contexts. Such skills are best tried and tested in the real-world experience of clinical practice. The clinical setting is a complex learning environment, which offers the best opportunity for students to integrate skills learned in practice and in the university laboratory with theory learned in the classroom.

It has been found (Norman, 1990) that the context in which learning occurs has a profound effect on students' ability to recall learning, with recall occurring best in situations similar to that in which it was learned. During clinical placements much of the daily activity of occupational therapy students relates to clinical problem solving, since students are continually seeking, absorbing, interpreting, evaluating and summarising clinical information, and making clinical decisions on the basis of information. Entwistle & Ramsden (1983) in their research concerning student learning have identified that contexts and curricula which foster deep learning are characterised by freedom in learning, less formality, good teaching input, a good social climate and clear goals. Surface and rote learning approaches are more likely to occur where there are heavy workloads.

According to Ramsden (1985) the effects of learning environments can be best understood if they are thought of as operating at the levels of the learning tasks, the teacher, the department or course and the institution. In problem-based learning curricula, all of these levels may well be co-ordinated to reinforce the learning of clinical problem solving skills and knowledge throughout students' learning experiences. In health science curricula such as occupational therapy, some authors recognized the contributions of the case method approach to "deep learning" (Neistadt, Wight, & Mulligan, 1998; Lockyer, Gondocz, & Thivierge, 2004).

7.7.2 Duration and Position of Placement

The duration and position of fieldwork placements within courses is a critical factor in promoting the development of specific reasoning abilities (AOTA, 1991; Cohn, 1993; Kramer & Stern, 1994). Usually, in the designing of placements, both academics and fieldwork educators work together and share roles. The argument for longer periods of placements is that students will experience working with an organisation in depth. They will begin to understand the occupational therapy processes needed to work in a new environment. Fish & Coles (1998, p. 29) describes this situation as follows:

> ...professional practice is able to be characterised in terms of artistry and ... this view brings with it a range of ways of seeing practice and theory, and uncovers a major obligation for professionals to try to understand better the principles (and not just the actions) on which their practice rests and to recognise fully and be able to articulate the nature of it. With increasing knowledge of the development of reasoning ability, some schools are scrutinising and re-ordering the pattern of placements (Amort-Larson, 1997; Dickson, 1998).

The crucial factors that seem to recur in discussions about fieldwork are:

(a) the depth of the learning experiences,
(b) approaches to integrating knowledge and practice, and
(c) provision of time for reflection during placements.

Some course content needs to be relinquished to make space for the above outcomes to be achieved and a new design of placement is emerging (Ryan, 2000).

7.7.3 Assessment

What and how students learn is also influenced by what they are assessed upon and how they are assessed (Ramsden, 1984; Tang & Biggs, 1996; Biggs, 1999). It has been demonstrated (Ramsden, 1984; Biggs, 1987a; Kember, 1996) that it is easier to encourage students to adopt a surface (or rote learning) approach than a deep (or meaningful) learning approach and that the learning approach can be strongly influenced by the choice of assessment methods (Tang & Biggs, 1996; Scouller, 1998; Biggs, 1999; Boud & Higgs, 1999; Entwistle, 2000). Deep learning is fostered through assessment, which requires understanding, such as essay writing, as opposed to examinations based on recall of information (Watkins, 1984; Biggs, 1999; McCune & Entwistle, 2000). Teachers, therefore need to reevaluate the purpose of assessment and to re-interpret assessment as a holistic process acknowledging the inseparable link between learning and assessment (Boud & Higgs, 1999). They need to consider the effects of assessment and the strategies used in order to promote optimal learning.

7.7.4 Models of Fieldwork Placement

Another way of understanding the development of reasoning comes from models, which describe the development of expertise in practice. The most notable include models, which derive cognitive development (Perry, 1979), skill acquisition models such as that of Dreyfus & Dreyfus (1986) and the behavioural development model of occupational therapy competence (Frum & Opacich, 1987). Understanding such models will enable fieldwork educators to facilitate clinical reasoning development in their students and to enhance their own reasoning.

In recent years, programmes have moved away from block placements with one supervisor for one student, to other alternatives (Thomas, Penman, & Williamson, 2005). This shift is the result of re-emergence of an occupational focus for the profession is changing the basis of practice from a medical model to a socio-political (community) model (Baum 2002). Different models of supervision present students with different learning opportunities and as such various ways of reasoning and reflecting are employed and the placements often span an academic year or two semesters. Students often work single handed, in pairs or groups at various placements. From clinical reasoning research studies, many arguments can be drawn which militates against the usual model of fieldwork placement in occupational therapy, where one student works with one therapist usually in one setting. The premise underlying this way of working is that students receive individual attention and have a consistent role model to follow. There are several disadvantages to this system and many formative learning opportunities for developing clinical reasoning abilities are lost. Some of the factors to be considered are:

- The clinical educators' primary responsibility is with the patient/client and not the student. Therefore the amount of time spent with the student is limited and actions are primarily concerned with planning procedures and doing formative and summative assessments with the students.

- The crucial relationship between clinical educator and student must be one of trust; if this factor is missing the student has little chance to change the educator's opinion without causing some degree of disruption in the placement.

- The student's knowledge is strongly influenced by the knowledge of one educator and by the content and nature of the programme that is offered. Both these factors could limit the learning experience.

- There is little or no peer support or exchange of ideas at the time of the experience.

- Most methods used to promote reasoning and reflection requires the student to share feelings. However, because the educator is both educating and assessing, students may feel inhibited about voicing their feelings or concerns to that educator.

For the reasons described above, different fieldwork arrangements would seem more appropriate for the following reasons:

- Working in groups of two or four, students may have their learning facilitated by one or several therapists, giving insights into other perspectives.

- Group visits can be discussed jointly immediately after they have occurred. This way of working allows for self-assessment, peer assessment and collective assessment, which can provide considerable support for both the clinical educator and the students.

- Group work can also help by exposing faulty reasoning processes. Inquiry based learning methods can be encouraged by a professional who withdraws as the students' confidence develops. Planned and structured carefully, the group approach can increase students' depth of understanding, promote self-direction in their learning and reduce the time spent with the educator (Molineux, 1998).

Within the usual model of one student working with one therapist, clinical reasoning and reflection can be enhanced by working together in slightly different ways, as suggested in the student-centred text by Alsop & Ryan (1996). According to these authors, different interaction methods may be adopted developmentally according to the readiness of the student. For instance, an advanced student could work alongside educators and the pair could share their reasoning so that the students gain insight into the experienced reasoning processes of the clinical educator (Alsop, 1993: Cook & Cusick, 1998). According to Eraut (1994), this sharing rarely happens.

Other interaction strategies include student shadowing the therapist and undertaking guided observation and discussion. Students have found it helpful to plan an intervention alone and then have the clinical educator check the details before implementation. This freedom allows the student to develop personal working strategies and may also help the educators to learn new approaches to clinical practice and to teaching.

7.7.5 Common Reasoning Errors and the Role of the Tutor in Reasoning Exercises

The promotion of learners' abilities to generate knowledge and use knowledge appropriately to perform clinical reasoning is not an easy task. It requires both, teachers and clinical educators developing an understanding of these complex abilities and planning educational programmes, which help students to acquire them (Higgs, 1992; Alsop & Ryan, 1996; Neary, 2000). Traditionally, expert reasoning has been regarded as an intuitive art, non-specifiable and unteachable, and totally reliant for its development on prolonged trial-and-error experience in real clinical settings (Benner, 1984; Hammond, 1996). However, using authentic case studies coupled with "think out loud" formats led by competent tutors, the reasoning process can be deconstructed to reveal the teachable heuristics embedded within it. This approach enables students more quickly to acquire the critical thinking skills and attitudes necessary for making more accurate clinical decisions. Despite several models/approaches being available for teaching clinical reasoning skills, errors in reasoning occur for three principal reasons:

1. faulty perception or elicitation of cues,
2. incomplete factual knowledge(about a disease process or clinical condition) or
3. misapplication of known facts to a specific problem.

The first deficiency is one of basic clinical skills while the second is one of content knowledge. Each is readily identified and acknowledged by both tutor and student in the setting of case studies and corrected by clinical skills teaching and problem-based learning. The third involves incorrect use of heuristics and, while familiar to an experienced clinician, its causes and remedies are not so easy to elucidate.

As explained above, a number of common errors have been characterised which need to be recognised and explicitly discussed with students in reasoning exercises (Dawson & Arkes, 1987; Kassirer & Kopelman, 1991; Riegelman, 1991). The critical role of the tutor in facilitating development of students' reasoning skills is important and cannot be over-emphasised. This role can be made more effective if tutors:

- insist on using a "thinking out loud" format to problem solving which makes the use of reasoning process (of both student and tutor) explicit and transparent;
- emphasise problem-specific reasoning rather than the recall of unconnected facts or performance of irrelevant routines;
- keep the reasoning process focused on the problem at hand while exploiting opportunities to redress identified gaps in factual knowledge or deficiencies in use of heuristics;
- deliberately challenge strongly supported hypotheses (playing the devil's advocate) to highlight the need always to consider alternative explanations;
- adopt a didactic teaching role only when expert knowledge is critical to the resolution of a problem and the opportunity cost to the student of obtaining it from other sources is inordinately high; and
- provide accurate, specific and constructive feedback to students about their use of reasoning heuristics at opportune times.

7.8 Summary

The key to facilitating reasoning rests with educators, both academic and fieldwork. Apart from being up-to-date with knowledge of the files they need to try creative and innovative ways of organising learning experiences and obtaining feedback from students so that modules can be fine-tuned. According to Dickson (1998) it is essential to have clarity of purpose regarding each particular fieldwork experience, so that both the means and ends are quite clear and the rhetoric and assignments reflect these goals.

In recent years, a considerable amount of research has been undertaken comparing the comprehension and problem solving of experts, intermediates and novices in domains of knowledge (Chi, Feltvich & Glaser, 1981; Robertson, 1996;

Unsworth, 2001). Researchers agree that novice and experienced clinicians maintain noticeably different clinical problem skills (Dutton, 1995; Robertson, 1996; Unsworth, 2001; Mitchell & Unsworth, 2005). To teach students and novice clinicians to think like experienced or more expert occupational therapists, researchers and educators have begun to explore ways to teach and improve clinical reasoning skills (Schwartz, 1991; Royeen, 1995; VanLeit, 1995; Neistadt, 1996). Roger's model (1983) for teaching clinical reasoning appears to be an effective way to connect classroom theory to clinical practice and well worth the extra educator effort it involves. Further research is needed to examine the actual clinical carryover of this teaching approach in comparison with other models.

The use of clinical problems as the framework of a curriculum allows students to apply their existing knowledge and clinical experience to the management of clinical problems. Their simulated experience in solving the clinical problem replicates the process, which occurs during clinical practice. The reality of the clinical setting has many advantages for the exploration of clinical reasoning in action, even though it incorporates constraints such as time pressures and potential dangers to the patients. During clinical education, students can gain skills in many broad areas such as inter-personal communication, assisting patients with movements, teamwork and writing skills, as well as the technical skills of their discipline. Finally, the role of patients in teaching and providing feedback is a further advantage of clinical settings. It is necessary, therefore, that health science curricula actively utilise both classroom and clinical settings for this purpose.

It is not reasonable to expect occupational therapy students to graduate as competent, proficient, or expert therapists. Those levels of clinical reasoning require years of clinical experience and continuing education. However, it is possible for students to enter practice as novices or advanced beginners who are capable of progressing to higher levels of clinical reasoning if their academic preparation for higher level fieldwork has given them as awareness of the types of reasoning they will be using in practice. This awareness of clinical reasoning concepts can help students to learn about their thinking and doing clinical practice simultaneously, intensifying the learning derived from clinical experience.

As noted, educators, academics and clinicians in many parts of the world are only recently becoming aware of the importance of developing clinical problem solving skills, so its importance has not yet been fully realised. The researcher of this study opines that there is an enormous potential for discovery and learning about this exciting aspect of clinical reasoning study. The lack of understanding of the learning of clinical reasoning process among occupational therapists led to growing interest among researchers in exploring representations of knowledge and processes separately.

As a member of a health care profession, occupational therapists are required to take responsibility for their actions. To do this they need to be capable of performing competently in autonomous, professional capacity, which includes effective reasoning and decision-making abilities, to be able to maintain competence and generate knowledge throughout their careers. They also need to be able to respond to the changing needs of the community (Higgs & Jones, 1995; Ranka & Chapparo, 2000). The successful enactment of this behaviour requires the ability to learn using a deep learning approach. Research in the area of student learning (See for examples, Marton & Säljö, 1976; Entwistle & Ramsden, 1983; Biggs, 1987a; Entwistle, 2000; McCune & Entwistle, 2000) has identified that contexts/curricula, which foster deep learning, are characterised by freedom in learning, less formality, and good teaching input, a good social climate and clear goals. Surface or rote learning approaches are more likely to occur where there are heavy workloads. Based on this, the next chapter considers various students' approaches to learning and examines ways of fostering the development of knowledge and reasoning competence in occupational therapists.

Chapter 8

STUDENTS' APPROACHES TO LEARNING

8.1 Introduction

Deep learning and attributes of autonomy, responsibility and critical analysis are championed in Western countries. They are also valued in traditional Confucian belief, which places great value on education both in terms of learning and as a process itself. Unfortunately, Confucian traditional belief appears to be contradicted by reports of Asian students as "rote learners" who are passive and complaint (Samelowicz, 1987; Kember & Gow, 1991; Watkins & Biggs, 1996; Kember, 2000). The research on student learning has shown the importance of shifting the focus from learning approaches to learning conceptions in developing and improving the outcomes of student learning. The purpose of this chapter is to consider various students' approaches to learning, the influence of contextual and personal factors on approaches to learning, the relationships between approaches and learning outcomes and the links between the approaches and understanding. This section starts with a brief retrospective of earlier research affecting current definitions of the approaches to learning, particularly, a deep and surface approach dichotomy with a debate about how differing learning processes lead to qualitatively different outcomes.

8.2 Approaches to Learning

Approaches to learning have been the subject of a great deal of research over the past few years. There is now a substantial literature, which describes the various ways in which the learning environment, and particularly assessment procedures and teaching methods, affect the quality of student learning (See for example, Biggs, 1989, 1994b; Ramsden, 1992; Laurillard, 1997; Entwistle, 1998; Kember, 1998; Scouller, 1998; Trigwell, Prosser, & Waterhouse, 1999; Kember, 2000; Entwistle, McCune, & Walker, 2000). According to Biggs (1987a), there are two components in a student's relationship to academic learning: his or her *motives* for learning and ensuing *strategies* for going about learning. Students' motives influence their strategies of learning (Biggs, 1992) but teaching and learning environment (or context) also influences their choice of strategy. The students' overall approach to learning thus depends upon two factors: students' motivation, and the learning/teaching environment (Kember et al, 1997). Students' preferred approach to learning and preferred learning environment are two important components of classroom learning to consider before learning takes place (Biggs, 1992). Motives and strategies tend therefore to be congruent with each other; they combine to form *approaches* to learning.

It is assumed that a student has a fairly stable set of motives for school learning, which determines a basic strategy for handling a range of learning tasks. Thus, the surface motive and surface strategy together comprise the surface approach, the deep motive and deep strategy the deep approach, and so on. This metacognitive process of goal perception and self-regulation is called "metalearning" (Biggs, 1988).

An approach to learning was first described by Marton & Saljo (1976) as essentially a way of handling a task, in order to achieve a desired end. In their initial study, the task was reading a text, which students went about in basically two different ways, called "surface" and "deep" approaches. A student adopting a surface approach intended to meet requirements minimally, on the other hand, a student adopting a deep approach intended precisely to comprehend content, seeing the facts and details as there to help to arrive at that meaning. To these two approaches, Biggs (1987a) and Entwistle & Ramsden (1983) added an "achieving" approach where students motivation is to obtain the highest possible grades and so strategies are adopted which he or she believes would maximise those grades.

8.3 Some Common Approaches to Learning: Historical Background

In developing his Study Process Questionnaire (SPQ), Biggs (1976) drew his descriptions of contrasting learning processes from work on cognitive psychology. Factor analysis of this inventory suggested the existence of distinct study processes, which have subsequently been identified as "deep" and "surface" approaches to learning. A qualitative research by Marton and his colleagues (1976) in Gothenburg helped to clarify the meaning of this distinction, and introduced the term "approach to learning". Subsequent quantitative and qualitative research within the everyday university context has been developed further by other studies (See for example, Biggs, 1987a, 1993; Tait & Entwistle, 1996; Marton, Hounsell & Entwistle, 1997).

Biggs (1979) and Ramsden (1979) added to these descriptions of students' approaches to studying by including an achieving or strategic approach to studying. This approach derived from an intention to obtain the highest possible grades, and relied on organised studying and an awareness of assessment demands. Their work also suggested that each of these three approaches was related to a distinctive form of motivation – intrinsic (deep), extrinsic and fear of failure (surface) and need for achievement (strategic).

Besides studies on approaches, particularly its main focus on a deep approach in relation to understanding, some other studies also mentioned features like learning styles and strategies, and developmental personality and characteristics. Furthermore, Sternberg (2004) based on his theory of mental self-government, he used the two terms `thinking styles` and `learning styles` as synonyms. Pask (1988) found that students used distinctively different strategies – holistic and serialist – which seemed to reflect more consistent, underlying learning styles – comprehension learning and operation learning. A holistic strategy and comprehension learning starts from a broad view of the task and constructs a personal, and often idiosyncratic, organising framework to support understanding (Entwistle, 1997).

The development of the theory underlying the work of many, and the evidence for it, is presented in Biggs (1987a). Briefly, a series of factor analyses of secondary and tertiary samples of students; questionnaire responses to items addressing an information processing model of learning (Biggs, 1971) have consistently produced three dimensions of study processes now labelled surface, deep, and achieving. Very similar dimensions have also been identified by Entwistle, Hanley, and Hounsell (1979), Entwistle and Ramsden (1983); Watkins (1983); and Entwistle and Kozeki (1985).

As explained above, some teaching environments make it easier for many students to "go deep" than others, so that the mean of a class of students' responses to learning inventories, such as the Study Process Questionnaire (Biggs, 1987c), can be taken as an indication of good or poor teaching. Nevertheless, some students for whatever reasons tend consistently to adopt a deep, or a surface approach to their learning, so that the questionnaire responses may remain fairly stable over time (Biggs, 1993)

8.4 Influence of Contextual and Personal factors on Approaches to Learning

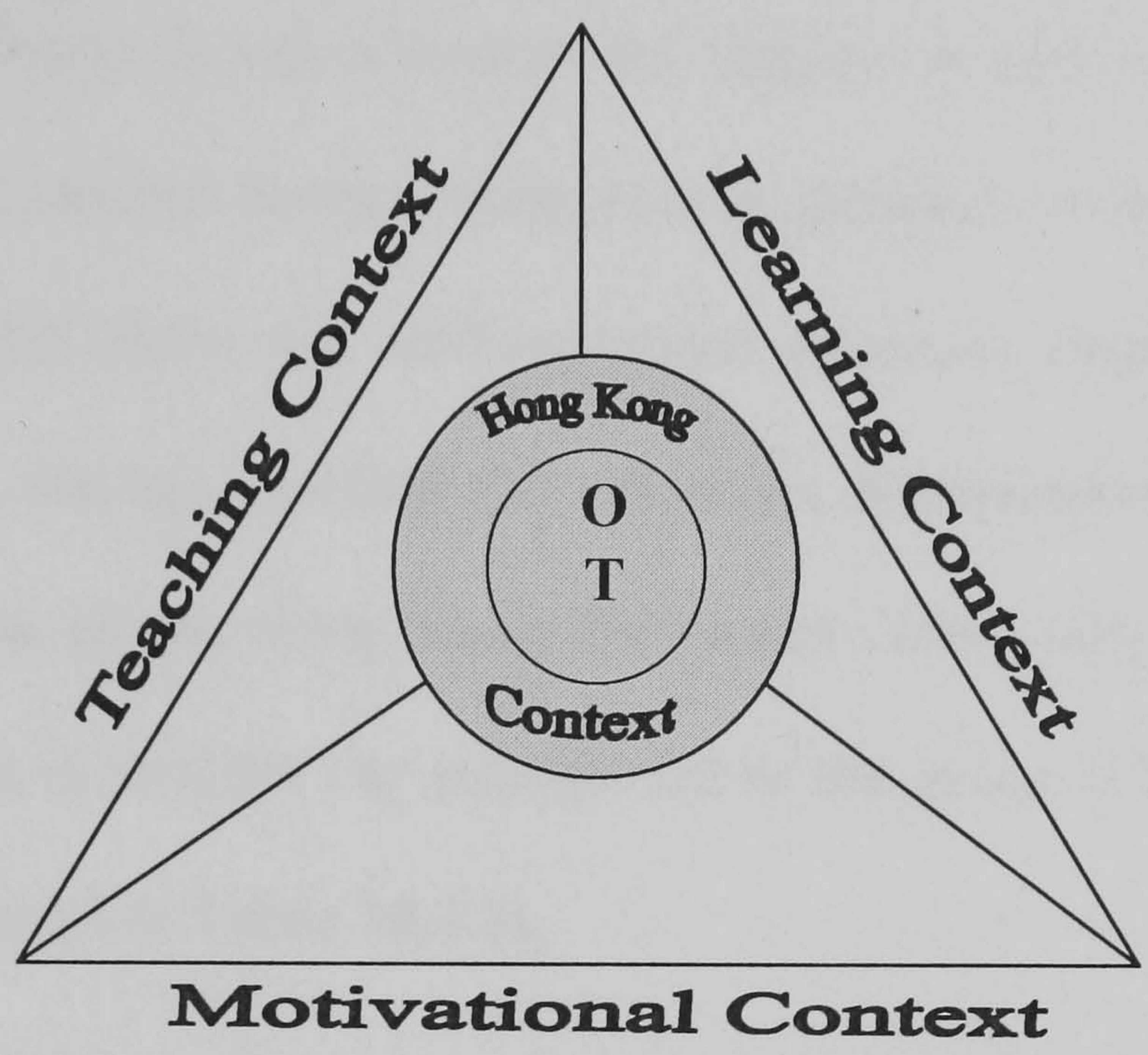
While instruments such as Learning Process Questionnaire (LPQ) and Study Process Questionnaire (SPQ) index students' characteristic orientations towards learning, they are affected by context. This section will elaborate on how Hong Kong students' approaches to learning reflect the local context and what contextual factors might be expected to play a part in this.

8.4.1 Hong Kong Students

To understand fully the Hong Kong student, it may be appropriate to consider learning from a Confucian perspective (See **Figure 8.4** below). When it comes to learning, Chinese learner is more pragmatic, taking in every detail such as personal ambition, family values, peer support, material reward and other interests (Kember & Gow, 1990; Salili, 1996).

Figure 8.4

The Hong Kong Context



According to Biggs, (1991), Asian students are perceived by some as relentless rote learners, syllabus dependent, passive, and lacking in initiative. Such comments were also endorsed the stereotype of Asian students studying in Australia (Ballard & Clanchy, 1997; Bradley & Bradley, 1984; Samuelowicz, 1987). It was also reported that Hong Kong students enrolling in the tertiary institutions would exhibit tendencies to passivity and non-participation. There is also some evidence that, in common with other countries like Australia and United Kingdom, the tertiary educational environment in Hong Kong may encourage the adoption of inappropriate approaches to learning. Interview data from Tang (1991) and Kember & Gow (1990) research showed that Hong Kong students do not simply rote learn unprocessed information but attempt to understand the new information in a systematic step-by-step fashion first. Once each part of the task is understood, they memorize the 'deeply processed product' (Biggs, 1991). 'Deep memorising' as a means towards understanding (Tang, 1991) might seem to be equivalent to a surface approach. However, since students reliance only on the memorisation may be appropriate and even necessary in some situations, and it should not be equated with rote learning of unprocessed information.

8.4.2. Occupational Therapy Students

As reported in the Introductory **Chapter 1**, all students in this study are Chinese and they speak Cantonese. It was also reported that the student cohorts for this study comprised of 80 occupational therapy students who enrolled for the study at the end of their first year of the three-year undergraduate (Honors) degree in Occupational Therapy programme, having satisfied the minimum requirements for entry into the Bachelor's programme of the Hong Kong Polytechnic University (PolyU), where the medium of instruction is English The average age of the group is 18, and all are native Cantonese speakers (refer to **Table 10.2.2).**

With regard to the admission procedure, 85% of the students enter into the programme via JUPAS (Joint University Polytechnic Admission System) and the remaining 15% students join via non-JUPAS as mature or other category students and these are clearly stipulated in the PolyU prospectus. Students are usually aged 19 or 20 years except mature students who are above 26 years of age. It is PolyU policy to encourage students to speak in English in classroom situations at all times.

In relation to Hong Kong students family structure, The Hong Kong Polytechnic University students tend to live at home with their parents and families during their years of study. Family expectation for success in study is very high. In Hong Kong as in most Chinese societies, there is a cultural responsibility to the family (Bao, 1998). In Hong Kong society, parents attach greater importance to taking a collective decision when deciding a course or a career of their children. This may be a causal factor in the determination of high motivation for performance for students in the Hong Kong school system (Salili, 1996).

It is suggested strongly that changing the learning environment, in particular the task students are required to engage in, can have a major influence on how and what students learn. In the next section, the importance of situations in which learning occurs and the Hong Kong students perceptions of the academic environment, that is, how students respond to the context of learning defined by the teaching and learning contexts.

8.4.2.1 The Teaching Context

Teaching style is one of the contextual variables, which affects approach to studying (Entwistle & Ramsden 1983; Biggs, 1996). The interview data by Entwistle & Ramsden (1983) show that, in addition to course structure, the quality of teaching and attitudes of lecturers influence students in their approach to studying. Occupational therapy students through their 'Students Feedback Questionnaire' in fact echoed this factor, which is one of the most important feedback mechanisms being used in the PolyU at present. The students also reported other factors, such as commitment to teaching and relationship with students during researcher's interview with occupational therapy students is to be the most important categories, which emerged from focus group interviews (See **Table 10.6.1**).

Observation by the researcher of this study suggests that occupational therapy students tend to work cooperatively in small group situations but do not respond to direct questions in lecture situations. However their study behavior tends to be collaborative and cooperative in seeking understanding. This in a way endorses the constructivist beliefs of the Confucian tradition. In the Confucian tradition, there is a belief in skill development prior to exploration, allowing for creativity to be based on foundation. It is student-centered in that students may be engaged collectively in the academic environment in task-oriented problem solving in a warm social atmosphere/learning climate where there is an emphasis on student activity and where high cognitive level outcomes are expected (Salili, 1996).

According to Biggs & Watkins (1996) students are used to a hierarchical relationship with the teacher, but this does not exclude a warm and caring approach. It incorporates respect and acceptance; students are not passive learners as reported earlier but use receptive learning skills in the classroom and elaborative learning with peers outside the classroom. Students appear to view their teacher as the `expert' and prefer the teacher to provide the `best' solution. This behavior on the part of Chinese learner was shown clearly in the Moore & Fitch Inventory of Learning Preferences (See **Table 10.4.3**).

8.4.2.2 The Language Context

Hong Kong students like any other Asian students who are studying in a second language frequently face considerable challenge and occupational therapy students are no exception. Hong Kong students not only must they master the content and concept of their discipline, and do so through the medium of a language which they may not fully command, but frequently they must do this within an educational and cultural context quite different from their own. Occupational therapy students in particular face another problem in that they not only need to develop their own awareness of personal values but their approach to dealing complex healthcare issues in the light of their experience of disability. These personal, cognitive, linguistic and cultural challenges may interact to restrict, or at least modify the nature of learning.

There is clear evidence in the literature that students learning in a second language are likely to encounter a number of sources of difficulty, above and beyond those inherent in the material that they are studying. Biggs (1990) investigated the effect of the language medium of instruction (LMI) on the way students typically approach their learning and addressed the question of whether teaching academic content in second language (L2) medium lead students to adopt a rote-reproductive approach to learning. There are two possible explanations for the strengthening of Biggs (1990) findings:

- The first concern is about the English language ability of the students. As reported, the first language of the sample is almost invariably Cantonese. From the researcher's experience, occupational therapy students' use of English is very much restricted to formal interaction within the classroom. As the population of Hong Kong is almost all Cantonese speakers, English is used outside of class so little that few students have acquired the level of fluency in the language, which qualifies it as a second language. Rather, the limited use of English in Hong Kong in general means it is effectively as auxiliary language (Luke & Richard, 1981) rather than a second language.

- The second explanation is that as a result of schooling and/or cultural tradition, the Hong Kong students have a high regard for authority and are therefore comfortable with a regulated approach to study (Ho, 1986; Murphy, 1987; Dunbar, 1988; Tobin et al, 1989).

One factor of note however, is that learning in a second language may lead to a surface approach as students have to focus on well-defined `important' topics, though this may be debated as the findings of this study demonstrated that the student cohort of this study, who are Hong Kong Chinese, scored higher on deep approaches to learning than did Australian students (Biggs, 1990; Salili, 1996). Biggs (1990) also reported that although intuitively one would expect that the use of English would encourage a surface approach, much depends on the language competence of the student. Kember & Gow (1990) explained this phenomenon as a survival strategy, noting that Chinese students learning in a second language are highly focused and selective in their learning.

8.4.2.3 <u>The Motivational Context</u>

The context of learning as an important determinant of motivation and learning from a Confucian perspective has a complex character that goes beyond motivation in the Western culture. The Chinese learner is more pragmatic about learning, taking into account personal ambition, family face, peer support, material reward and interest (Yang, 1986; Ho, 1991; Biggs, 1996).

The negative picture of Southeast Asian learners provided in the literature contrasts sharply with evidence from university statistics which indicate that when English-language proficiency is not an issue, Asian students tend to obtain better results in their courses than local students. Many academic staff may explain the high academic achievement of Asian students in terms of stronger achievement motivation and extremely hard work compared with local students. But research in Hong Kong has revealed that there is more to explanation than simply motivation and hard work, and that the assumption about Chinese students' learning in Hong Kong (Kember & Gow, 1990; Biggs, 1991; Watkins, Regimi, & Astilla, 1991) and of Singaporean students enrolled at a Western Australian university (Volet & Kee, 1993; Volet, Renshaw, & Tietzel, 1994; Volet & Renshaw, 1995) have challenged the stereotyped view of Asian students as reproductive and surface learners, excessively focused on isolated facts and details, and lacking the experience and skills for interacting in group discussions.

8.5 Approaches to Learning: Levels of Understanding

In the original work on approaches to learning, Svensson (1997) was particularly concerned about the nature of the outcome of learning. Instead of "deep" and "surface" (Biggs, 1987a) which focused on intention and process, he preferred to use the terms "holist" and "atomist", which also indicated the way knowledge had been structured. Referring to the original experiment, he said:

> Within that investigation, the difference between a holistic and an atomistic approach was found to be the most crucial difference between interactions with complex learning materials. The difference is one between merely delimiting and ordering parts of the material interacted with, compared to integrating parts by use of some organising principle... To be skilled in learning ... means to be deep, holistic and complete in approach and understanding... The most important aspects of this is the open exploration and use of the possibilities inherent in the material, allied to a consideration of relevant previous knowledge. It is this kind of exploration of relevant knowledge and of relevant principles of organisation that represents skill in learning in the deepest sense (Svensson, 1997, pp64-68).

When comparing Svensson's (1997) work with that of Marton and Säljö (1976), Svensson (1997) included both process and outcome in his description of the approach, Marton and Säljö (1976) on the other hand described the approach to learning as proceeding, and being responsible for, the outcome. Thus, an intention to understand leads to the processes required to understand, and those processes culminate in a particular level of understanding.

In the original experiment, Marton and Säljö (1976) had found an empirical association between approach and outcome. Entwistle, Hanley, & Ratcliff (1979) in their Lancaster study, responses were coded to indicate outcome (in terms of level of understanding, integration, and knowledge of main points) and approach to learning (based on the characteristics of deep and surface approaches).

In his study, Fransson (1977) had found differences in the learning outcomes of students, which he attributed to both the amount of effort and the involvement shown during the learning process. Bringing these aspects together with the findings from Lancaster study (Entwistle, Hanley, & Ratcliffe, 1979) had suggested the links between approach and outcome as shown in the following **Table 8.5a**:

Table 8.5a
Approaches to Learning and Levels of Understanding

Approach to learning	Levels of understanding
Deep active	explains the author's conclusion and examines how it was justified
Deep passive	Summarises the main arguments accurately, but without considering evidence
Surface-active	Describes the main points made without integrating them into an argument
Surface passive	Mentions a few isolated points or examples

Source: Adapted from Fransson, 1977, p250, and Entwistle, 1988, p85.

In most of the Gothenburg studies, the outcomes of learning were produced within a naturalistic experiment, unaffected either by time constraints or by assessment pressures. Whether the reason for incomplete learning is a lack of effort, as Fransson (1977) suggests, or lack of time, the effect will be the same. The two factors covering a deep approach found in the Lancaster study (Entwistle, Hanley & Ratcliffe, 1979; Entwistle, 1988), described previously, provide tentative evidence that this type of difference does not occur and suggest a more elaborate description of the links between approach, process and outcome as shown in the following **Table 8.5b**:

Table 8.5b

Approaches, Processes and Outcomes of Learning

Intention	Approaches/ Style	Process		Outcome
		Stage I	Stage II	
Understanding	Deep Approach/ Versatile	All four processes below used in alteration to develop a full understanding		Deep level of
Partial Understanding	Comprehension learning	Building overall description of content area	Reorganizing and relating ideas to prior knowledge	Incomplete through globetrotting
	Operation learning	Detailed attention to evidence and to its provenance	Relating evidence to conclusions, critically	Incomplete through
Reproducing	Surface Approach	Memorisation	Overlearning By routine Repetition	Surface level of
Achieving	Strategic, well-organized understanding	Any combination of the six above processes considered to be necessary in carrying out the perceived task requirements successfully		High grades with or without

Source: Adapted from Entwistle, Hanley, & Hounsell, 1979, p376.

The original version of the above **Table 8.5b** implied that operation learning was rooted in an intention to reproduce, whereas it is now clear that this style of thinking makes an essential contribution to understanding, particularly in the science subjects (Entwistle & Ramsden, 1983; Entwistle & Entwistle, 1997; Entwistle, 2000). When operation learning is carried out either casually, or without effective use of comprehension learning, however, it may well become indistinguishable from a surface approach.

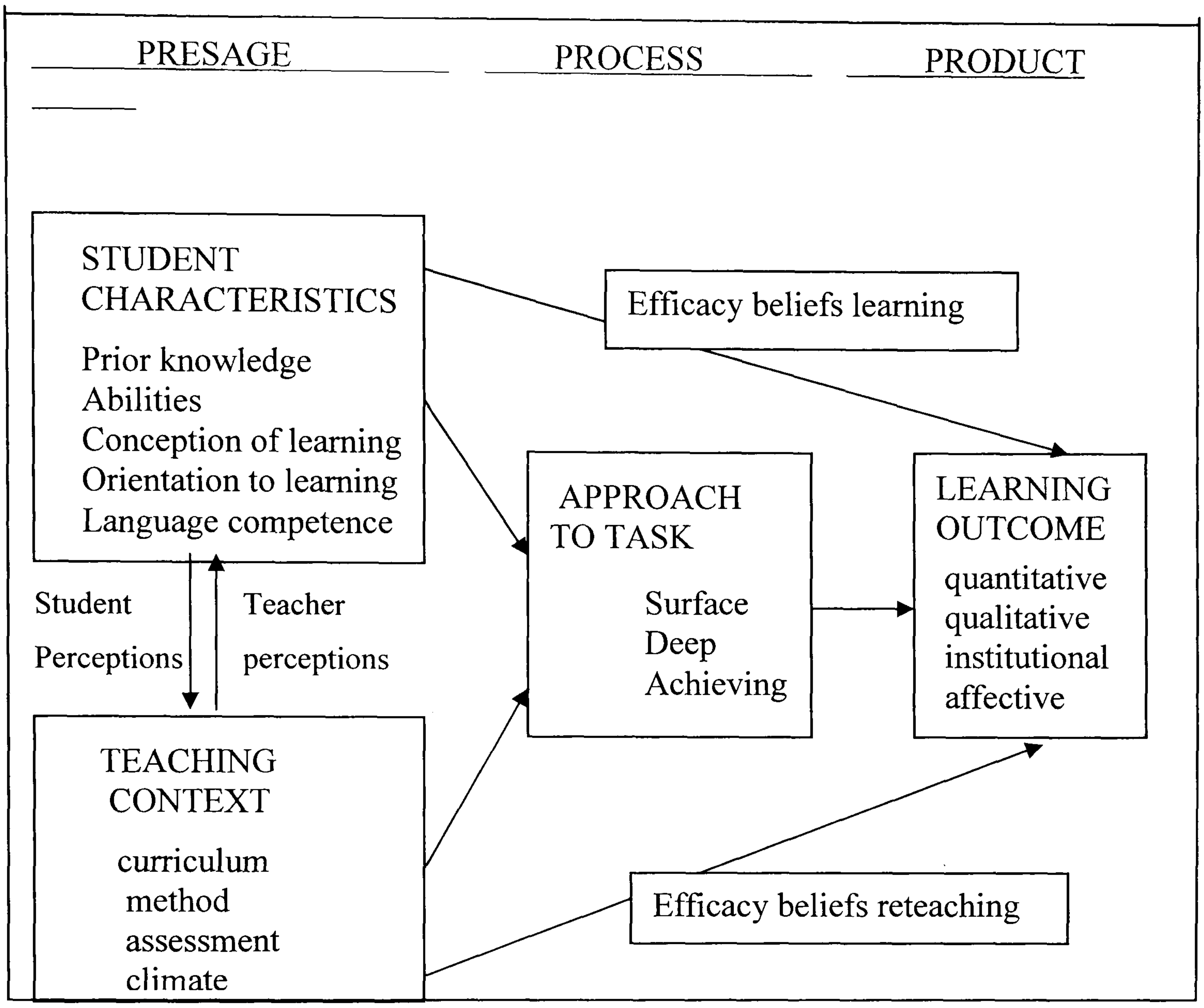
8.5.1 3P Model

Students learn for a variety of reasons; those reasons, and the contextual components in which they are placed, determine how they go about their learning; and how they go about their learning will determine the quality of the outcome. Sheppard & Gilbert (1991) from their study concluded that the meaningful learning outcomes were more likely to be associated with courses in the departments, which explicitly considered alternative conceptions of knowledge. Together these strategies suggest a relationship from teaching conceptions, through approaches or strategies for teaching, to student learning approaches, which will turn influence student learning outcomes.

How students conceptualise learning before it takes place; how learning is being actually achieved; and how well learning has been achieved constitute a complicated relationship as shown in the following 3P model (**Figure 8.5.1** below). The 3P model as developed by Biggs (1993) is an adaptation of a linear model proposed by Dunkin & Biddle (1974). Since its introduction, Professor Biggs had elaborated and modified the 3P model over the past 20 years. The 3Pmodel represents an integrated system, comprising three main phases (each begins with "p": hence the "3P" model).

Figure 8.5.1

3P Model (Presage, Process and Product in Student Learning)



(Source: Adapted from Biggs, 1993).

Presage factors exist prior to learning and comprise:

- *The student context* contains many possible presage factors, which in the present context would include: traditional conceptions of learning and teaching imbibed from early youth, language competence in the medium of instruction, cultural values and expectations concerning towards certain approaches to learning (See below)

- *The teaching context* refers to factors located in the classroom or the institution: for example, course structure and content, methods of teaching and assessment, and institutional rules and routines surrounding the management of learning.

- *The process* by which the particular learning task is handled derived from the way students interpret this teaching context in the light of their own preconceptions and motivations, and the nature of the task in question. The extent to which they use rote memorisation or higher cognitive processes is located at this stage, as elaborated below.

- *The product* of learning may be described quantitatively (how much is learned), qualitatively (how well it is learned), and institutionally, which draws consciously on both, in the form of the grades awarded. Affective outcomes relate to how students feel about their learning.

The 3P model has considerable implications for educational development and quality assurance schemes (McKay & Kember, 1999). The 3P Model and its underlying beliefs about teaching have a marked influence upon the teaching approaches adopted, which in turn affect student learning approaches and outcomes. However, both educational development activities and quality assurance mechanisms usually focus upon teaching approaches and take no account of the conceptions of teaching which underpin the approach.

The most common educational development activities are workshops, consultancies and short courses, which focus upon teaching methods and developing teaching skills. Quality assurance activities such as Peer review panels, Student feedback questionnaires also monitor teaching approaches since these can be reported, measured and examined. The model also shows that quality assurance influences the curriculum design, which in turn affects the teaching approaches. These are also affected by student presage variables.

8.5.2 Conceptions of Learning: Memorisation and Understanding

Students enter higher education with beliefs about learning derived from their previous experiences of education and also from their own feelings about the nature of learning. Säljö (1979) introduced the idea of a hierarchy of such conceptions, which again could be reduced to an underlying dichotomy between memorisation and reproducing, and understanding through personal transformation of the material.

More recent research has suggested, however, that the distinction between memorising and understanding may not be clear-cut at least in some countries (See for example, Entwistle & Ramsden, 1983; Biggs, 1991; Lee, 1996; Meyer, 2000; Mugler &

Landbeck, 2000; Watkins & Biggs, 2001; Entwistle & Entwistle, 2003; Marton, Wen, & Wong, 2005). Some of these researchers drew attention to the paradox of the Asian learner who concentrates on memorising study materials and yet typically does well, even in assessments designed to tap understanding. In addition, using the SPQ, Biggs (1994b) showed that students in Hong Kong had higher scores than Australian students on the deep approach. The apparent paradox could then be explained as a failure of Western educationists to recognise important cultural differences in the ways students learn in "Confucian heritage cultures". Biggs (1994a) made the crucial distinction between memorising in a routine manner (which is a surface approach) and memorising intended to ensure accurate recall of material already understood, which he described as "deep memorizing". Because the intention is still to understand, repetition, as a process of reinforcing understanding is not a surface approach, it is simply a strategy to ensure thorough understanding.

The process of developing through understanding has been explored further using phenomenographic analyses of the conceptions of learning held by students in different countries (Marton & Booth, 1997). They bring out clearly the emphasis on understanding which, Asian students describe as "memorising".

> In the process of memorising, the text being memorised is repeated several times which may be outwardly suggestive of rote learning. However...(Teachers) explained that, when a text is being memorised, it can be repeated in a way which deepens the understanding... (This) process of repetition contributes to understanding, which is different from the mechanical memorisation, which characterises rote learning. (p35)

8.5.3 The Impact of Teaching Beliefs on Students' Approach to Learning

In the early 1990s several groups of researchers were working quite independently to examine the beliefs about the teaching of university academics. Some of the groups had noted that research into student learning had established a relationship between student conceptions of learning, learning approaches and learning outcomes.

The search for a parallel relationship between lecturers' conceptions of teaching, teaching approaches and possibly student learning approaches and outcomes appeared to be logical development.

There is now a considerable body of research suggesting that task requirements affect the kind of learning students undertakes. This work emphasises the inter-relationship between the nature of the teaching context, students' preferences for learning in particular ways, their on-line strategies for learning, and the nature of outcome (e.g. Biggs, 1993; Marton, Hounsell, & Entwistle, 1997; Marton and Säljö (1997). According to Samuelowicz & Bain (1992) "Teaching is transmission of concepts and skills in such a way that students can acquire them … that sounds a very rudimentary sort of approach, but think there is a body of knowledge and skills that students need to start off with" (p101). This conception focuses upon transmitting knowledge but recognises that if the knowledge is to be caught it needs to be presented clearly.

As described earlier, in 3P Model, Presage factors exist prior to learning, and are of two kinds: those pertaining to the student and those to the teaching context. Students bring to the classroom learning-related characteristics: abilities, expectations and motivations for learning, conceptions of what learning is prior knowledge, and so on. The teaching context refers to factors located in the classroom or the institution: for example, course structure and content, methods of teaching and assessment, teacher's personality, their own beliefs and conceptions of teaching, and institutional rules and routines surrounding the management of learning. The students are immersed in the teaching context, and interpret in the light of their own preconceptions (prior knowledge, abilities) and motivations.

The approaches to learning tend to be characteristic of students over time, but the teaching context may exert a considerable influence at any given moment. Time pressures, heavy assessment by teachers of the kind are likely to encourage all students – even those with a prediction towards deep learning – to complete the immediate task by using surface strategies. Deep approaches can be encouraged where the context encourages intrinsic motivation and attributions of ownership and self-efficacy, learner activity rather than passivity and particular kinds of peer and teacher interaction (Biggs & Telfer, 1987; Biggs, 1989). Deep and achieving approaches may also be induced by intervention, as in some forms of study skills training (Biggs & Rihn, 1984; Edwards, 1986). The implications are therefore quite far reaching for teaching. An approach to learning can thus be discussed at two levels of generality:

1. At its most general, a student's "approach" can refer to the way that individual characteristically goes about most tasks. This meaning of approach is an *orientation*, describing trait-like qualities of a person, and is located at the presage stage.
2. An "approach" can describe how a student handles a particular task at a particular time. These strategies are determined in part by the constraints of the context, and are located at the process stage.

Usually, a degree of consistency between the two could be expected, but characteristically surface students could be fired by enthusiasm on a particular task to respond deeply; more likely, time or other pressures will paint a deep into a surface corner. It is in fact easier to induce a surface reaction because with it, meaning is created by virtue of the structure the student can bring to the task.

Changing student conceptions is not an easy process and perhaps needs establishment of a sympathetic and supportive environment (Kember & Kwan, 2002). The role of the teacher is recognised by those holding this conception as that of helping the student to learn. They accept that they do have a responsibility towards students' learning and that they can influence outcomes. The emphasis is on student learning outcome rather than upon defining content. Teaching becomes a process of helping students towards desired outcomes.

8.6 Assessing Approaches to Learning and Learning Environment: Measuring Instruments

One of the main achievements of Professor Biggs has been to develop measuring instruments to assess approaches to learning based on a clear theoretical rationale grounded in the reality of how students actually go about the learning tasks set in their classrooms and lecture halls (See Biggs, 1987a, 1993). Approaches to learning are measured by two instruments, the Learning Process Questionnaire (LPQ, for secondary students; Biggs, 1987b) and the Study Process Questionnaire (SPQ, for college and university students, Biggs, 1987c). This study is concerned only with SPQ.

8.6.1 The Study Process Questionnaire (Biggs, 1987c)

The SPQ, like the LPQ, was developed to reflect the findings of both quantitative and qualitative research into how students study. Both research paradigms have confirmed the two most basic approaches that students tend to utilise which were first identified in qualitative research by Marton & Säljö (1976). As reported discussed earlier, students who are learning because of extrinsic motivational factors or fear of failure tend to adopt superficial strategies, and students who are interested in what they are studying are likely to adopt strategies, which help their understanding of the material. These contrasting ways of studying are known as the "surface" and the "deep" approach, respectively. While students tend to be relatively consistent in terms of which of these approaches they adopt, they also modify their approach depending on their perceptions of course requirements and other factors (Biggs, 1987a; Entwistle & Ramsden, 1983)

The SPQ contains 42 items (**Appendix 9.4.1**) equally and systematically divided among the three approaches to learning (deep, surface and achieving) into six motive and strategy scales (**Table 9.4.1.1**). The SPQ has many research uses and its scale and subscale scores can be used either as independent variable, for classifying subjects, or as dependent variables, for assessing outcomes. There are many examples of classroom research where it is important to know what kinds of students are affected, or are unaffected, by an intervention; or where it is important to be able to find out what approaches to learning are significant, or not, performing a particular task adequately. The details of the SPQ item construction and how the test is conducted is discussed in the Methodology **Chapter 9**.

8.6.2 The Inventory of Learning Preferences (Moore & Fitch-cited in Woods, 1994)

As noted earlier, students learn for a variety of reasons and that learning styles and strategies are closely inter-related and are inseparable. A preferred learning style is part of the profile that a student brings to a course. Although it may be further developed and altered during the course of study, it is within the intrinsic study preferences of the individual learner. Learning styles are developed over a number of years in such a way that a learner will benefit more from a learning experience that suits the individual style than from one that is opposed to the preferred style (Lai & Biggs, 1994; Honey & Mumford, 2000; Entwistle & Peterson, 2004).

Research into student learning and his/her preferred learning style have shifted in recent years to focus on the learner himself/herself, with emphasis on his/her perceptions of the learning environment, learning approach, and learning outcomes which are interrelated (Coffield et al, 2004). Students preferred approach to learning and preferred learning environment are two important components of classroom learning to consider before learning takes place (Biggs, 1992).

There is now a set of concepts used to suggest a framework of influences on the quality of learning, some of which stem from the student's own experience, while others describe aspects of the teaching-learning environment being provided by teachers. While there would not be general agreement about which concepts to include, several probably would attract broad support. Students' prior educational experiences are reflected in their conceptions of learning (Säljö, 1979; Marton & Säljö, 1997; Kember

& Kwan, 2002) or epistemological beliefs (Perry, 1979; Hofer & Pintrich, 1997). The literature review revealed no study has attempted to identify the difference in perception of learning environment of students with different learning approaches. This study has introduced a perspective in identifying how deep-biased, surface-biased and achieving biased students perceive their ideal learning environment

In this study, the Moore & Fitch questionnaire (cited in Woods, 1994) was decided to use because it had been used previously to assess students' perceptions of learning (Wood, 1994) and their attitudes to learning. The ILP questionnaire requires students to select ten items that best describes their ideal learning environment (For full description, refer to **Chapter 9** on Methodology).

It is appropriate to report here that the researcher of this study presented his preliminary findings resulting from the current study using the Moore & Fitch Inventory of Learning Preferences (cited in Wood, 1994) on occupational therapy students' approaches to learning and their most ideal learning preferences at one of the Teaching-Learning Conferences in Hong Kong (Dasari & Lai, 2001), full results and its implications will be discussed in **Chapter 11**.

8.6.3 Application of the SPQ to Teaching and Learning

The SPQ can be used to explore causal models linking personality factors, approaches to learning, and learning outcomes in different cultures. The instrument is in fact embedded in a theory of learning, which has strong implications for teaching practice (Biggs & Telfer, 1987, Biggs, 1989). Briefly, the theory suggests that teaching should be so arranged as to minimise those factors that are known to encourage a surface approach and to maximise those that encourage deep and achieving approaches.

Research in Australia, the United Kingdom, and Hong Kong, using questionnaires such as the SPQ, has indicated aspects of the learning context which are both controllable and encourage superficial learning strategies. These factors include assessment methods, which are perceived as rewarding reproduction of facts (Thomas & Bain, 1984; Tang & Biggs, 1996; Tang, 1998) formal teaching methods (Ramsden, 1984); excessive workloads (Lee, 1993); and a restrictive learning environment (Ramsden, 1984; Chan & Watkins, 1994).

As Ramsden (1992) makes clear, to be most effective a university teacher needs to understand how his or her students learn. One of the problems, which have been identified with the teaching of Chinese students both at home and abroad, is that their lecturers often misperceive these students as rote learners (Watkins & Biggs, 1996). Balla, Stokes, & Stafford (1991) report how the responses of City University of Hong Kong students to the SPQ could be used in workshops to highlight such misperceptions leading to improved approaches to teaching. The provision of SPQ and LPQ norms for Australian (Biggs, 1987a) and Hong Kong students allows the individual teacher to compare his or her students' approaches to learning to typical students in the same educational system.

8.6.4. Evaluating Teaching Effectiveness

While the SPQ could be used as an element of formal evaluation procedures for formative or summative staff decisions, it has been mainly used to examine the effects of changes in educational evaluations such as change in the assessment system (Tang & Biggs, 1996). In Hong Kong, repeated applications of the SPQ have been used to monitor the progress of innovations in a formative way to decide what further changes may be necessary in the spirit of action research as well as providing objective evidence of the effectiveness of the innovations for summative purposes (Kember & McKay, 1996). These authors point out that the SPQ should be used as one element of an evaluation package and not relied on as sole indicator.

Because questionnaires such as the SPQ tap approaches to learning, which reflect how students are adjusting to the learning environment, they are encountering, they can be used as an indicator of teaching effectiveness at various levels as shown below:

8.6.4.1 University-wide level – Longitudinal Study

Longitudinal studies have tracked students' approaches to learning at two universities in Hong Kong (Gow & Kember, 1990; Stokes, Balla, & Stafford, 1989). Both studies used the SPQ to show rather disappointingly that deep and achieving motives and strategies tended to decrease as the students progressed through their tertiary studies. Similar results were found in Australia using ASI (Watkins & Hattle, 1985) and the SPQ (Biggs, 1987c) and for nursing students in Hong Kong (Chan & Watkins, 1995). Such findings can prove a useful focus for a university considering the quality of learning they are providing for different faculties or departments and thus possibly highlight areas where further staff development may be necessary.

8.6.4.2 Programme/Course level

The SPQ can also be used to reflect the influence of a particular course on student learning. If used in this way the respondents should be asked to answer each item with respect to the course of interest to the investigator, rather than their approach in general (the normal instructions for the SPQ).

8.6.4.3 Language of Instruction

An important policy issue for a number of non-Western countries is whether students should be taught in their native language or some other language, usually English. The SPQ can be used to investigate the effect of the choice of the language of instruction on student approaches to learning. Gow, Kember, & Chow (1991) have shown that Hong Kong students with low proficiency in English are likely to increase the likelihood of adopting a deep approach. A study by Watkins, Biggs, & Regmi (1991) confirmed these findings for both Hong Kong and Nepalese students.

8.7 Assessing Approaches to Learning: Cross-Cultural Comparisons

The previous section has provided evidence that the SPQ, like its school equivalent the LPQ, can be used validly to assess student learning in a number of countries differing in terms of cultural values, ethnicity, and educational system. Hong Kong is one non-Western country where the SPQ has been widely used in both applied and more theoretical research to aid our understanding of student learning and teaching effectiveness. The purpose of this section is to compare the appropriateness of using the SPQ in both Western and non-Western cultures.

Various studies have been conducted including the well-known International Education Achievement (IEA) to know what are being learnt in different countries (Gow et al, 1989; Kember, 1999; Watkins & Ismail, 1994; Sadler-Smith & Tsang, 1998; Dart & Burnett, 2000; Watkins & Biggs, 2001). Regardless of what measurement tools were used, the focus was nearly always on the outcome of learning and there was much less information known about why international differences occur in such outcomes. To achieve such insights into this area requires intensive research into the range of factors, which influence how students learn, and the outcomes they achieve.

8.7.1 The Study Process Questionnaire: A Cross-Cultural Perceptive

The development of measuring instruments to assess approaches to learning is based on the research carried out into how Australian, British, North American, and Swedish students learn (Marton & Säljö, 1976; Entwistle & Ramsden, 1983; Biggs, 1987a; Smith, Miller, & Crassini, 1998). A more fundamental question is whether instruments like the LPQ/SPQ can be presumed to measure the same constructs when applied to different cultures (Biggs, 1991).

To day, much more is known about the teaching/learning complex and how quality learning outcomes can be achieved because of the intensive research carried out in Western countries using both quantitative and qualitative methods by many authors

(See for instance, Ramsden, 1992; Marton, Housell, & Entwistle, 1997; Schmeck, 1998). A common cry from even developing countries such as India and the Philippines, which have been relatively successful in their educational progress in quantitative terms, is that the quality is lacking. So there is an urgent need for research to be conducted in non-Western countries to investigate whether Western findings can be generalised to also apply to them. It may well prove necessary to conduct subsequent research to find out the factors affecting quality of learning in particular non-Western countries.

8.7.2 Approaches to Learning: Non-Western Cultures (Asian)

Since this study is concerned with the Hong Kong Chinese students, it is appropriate to ask whether the constructs of conceptions of and approaches to learning at the heart of the Student Approaches to Learning position, which is the theoretical basis for the SPQ (Biggs, 1987a, 1993), are relevant to this group of students, and to other non-Western cultures and is the SPQ reliable and valid for use in such cultures?

8.7.2.1 Chinese Learner (Hong Kong and China)

There have been a number of qualitative investigations of the learning approaches and conceptions of Chinese Learners in Hong Kong and China (For example, Kember & Gow, 1991; Watkins & Biggs, 1996; Kember, 1999; Smith, 2000; Wong, Wen & Marton, 2002). These studies have partially supported the conceptual validity of the constructs underlying the SPQ for Chinese students, as deep, and surface approaches to learning were clearly identifiable in their descriptions of how they went about tackling actual learning tasks. However, it is also clear that memorisation and understanding are more closely interwoven in the experience of learning of many more Chinese than Western students where these concepts are often seen virtually as opposite. Indeed, Kember (1996) has proposed that a new approach to learning may be needed for Chinese students involving an intention to both memorise and understand.

With Chinese students the main difference is between memorisation and memorising with understanding (Watkins & Biggs, 1996).

The literature review revealed some more studies involving Chinese students. Gow et al, (1989) suggests that a "narrow" approach characterises Hong Kong tertiary students, on the basis of a second order factor analysis of a group of Hong Kong Polytechnic students' responses to the ASI (Entwistle & Ramsden, 1983), which has aspects both deep and surface. This approach is characterised by the sequence "understand-memorise-understand-memorise..." on tasks that are clearly defined by the lecturer. In another study, Tang (1991) based on her study carried out with Hong Kong Polytechnic students on the effects of two modes of assessment on students' approaches to studying concluded that deep and surface approaches used by her students were in much the same way as they are in Sweden, UK, or Australia. Furthermore, while some "deep" students stressed the importance of both understanding and memorising as Gow et al, (1989) also found.

8.7.2.2 Non-Western Cultures (Nigerian/ Nepalese Students)

There are several studies, which support the proposition that the concepts underlying the SPQ are relevant to Nigerian Students (Omokhodion, 1989; Watkins & Akande (1994). Considering the findings of the Nigerian studies together with United Kingdom Open University students (Marton, Dall'Alba, & Beaty, 1993), it appears that the approaches to learning and quantitative and qualitative conceptions of learning identified in Western studies and forming the theoretical basis for the SPQ are relevant studies.

8.7.2.3 Nepalese Students

Research with Nepalese students has more seriously questioned the cross-cultural validity of the constructs underlying the SPQ. Comparisons of LPQ and SPQ scale scores of Nepalese school and university students indicate that they possess deeper approaches to learning than comparable students from Australia, Hong Kong, and the Philippines (Watkins & Regmi, 1990; Watkins, Regmi, & Astilla, 1991). However, several subsequent qualitative studies have questioned the validity of such comparisons. In particular, a content analysis of the open-ended responses of 333 master degree students (Watkins & Regmi, 1992) indicated that the view of learning as rote-memorisation and/or reproduction frequently reported by Western students was virtually absent in Nepalese responses. Further support for these findings came from in-depth interviews carried out in Nepal with 45 Masters Degree students (Watkins & Regmi, 1990). Analysis also showed that few of the Nepalese students had anything but very superficial insight into their learning processes, typically used superficial learning strategies, and achieved a low quality of learning outcomes. The above results cast doubt on the conceptual validity of the SPQ for Nepalese students.

8.8 Relating Learning Approaches to Clinical Reasoning

As previously reported, in today's rapidly changing health care environment, occupational therapy practitioners need to be flexible thinkers, skilled in clinical reasoning. The clinical reasoning concepts can be viewed as descriptions of mental processes that become proficient only through clinical experience (Benner, 1984; Dreyfus & Dreyfus, 1986). Teaching students to organise their clinical observations according to clinical reasoning concepts may accelerate their progression to expert levels of practice as clinicians. This section outlines briefly the phenomenon of clinical reasoning in relation to students' approaches to learning.

As members of a health profession, occupational therapists of today need to be capable of performing competently in an autonomous, professional capacity, of maintaining this competence, and need generating knowledge throughout their careers. They also need to be able to respond the changing health care needs of the community. Effective reasoning and decision-making abilities can enhance the likelihood of an individual successfully achieving these outcomes. As suggested, continued knowledge acquisition is of fundamental importance for effective reasoning by responsible health care professionals. Furthermore, success in the above behaviours requires the ability to acquire knowledge using a deep learning approach.

Clinical competence requires the application of sound knowledge through clinical reasoning and decision making in the clinical context. For this reason, most health science educators have embraced the concept of teaching clinical reasoning, and have incorporated it into their curricula. Teaching of clinical reasoning should be based on "an understanding of how competent individuals proceed in determining what observations to make, in identifying health problems from those observations, and in deciding on appropriate actions; and an understanding of the progression of such competence, from beginning level to the development of expertise" (Tanner (1987, p155).

It is important to remember that simply participating in learning activities is not enough to generate learning or new knowledge. Many learners are not fully aware of their interactions in which they are participating or in the full potential of their social, psychological and material environment as a source of learning (Boud & Walker, 1990). Learning experiences need to be processed through reflection, by attempting to make sense of the experience, and by relating this experience to previous learning. Reflection is an important element in promoting deep, meaningful learning. Opportunities need to be created before, during and after learning activities (Boud, 1988; Boud & Walker, 1991). Furthermore, there needs to be consistency between the goals of learning, the activities used, the feedback given and the assessment procedures implemented. If deep learning is desired to enhance the value as well as the breadth of the learner's knowledge, then learning activities, feedback and assessment procedures must all be consistently aimed at encouraging deep learning (Marton & Säljö, 1976; Entwistle & Ramsden, 1983; Biggs, 1993).

As discussed earlier, research in the area of student learning (See for example, Marton & Säljö, 1976; Entwistle & Ramsden, 1983; Biggs, 1993) has identified that contexts/curricula which foster deep learning are characterised by freedom in learning, less formality, good teaching input, a good social climate and clear goals. Surface or rote learning approaches are more likely to occur where there are heavy workloads. To address such issues, curriculum planning therefore needs to ensure that learning environments are created that will foster deep learning.

Among the many teaching methods employed to enhance clinical reasoning process, some authors have recognized the contribution of the case method approach to "deep learning" (Neistadt, Wight, & Mulligan, 1998; Lockyer, Gondocz, & Thivierge, 2004). Types of case studies noted in the literature are paper cases, videotape cases, simulated client cases, and real client cases (VanLeit, 1995; Neistadt, 1996; Thomas et al, 2001). There are many ways to develop a case and bring it to life. In fact, different case formats may facilitate different types of clinical reasoning (VanLeit, 1995; Neistadt, 1998). The clinical reasoning case study can be used as an effective teaching tool in occupational therapy educational programmes. The case studies can be formulated by students or educators and used as teaching tool in clinical settings or in classes where occupational therapy intervention planning for clients with specific diagnoses is taught (Kamin, Deterding, & Lowry, 2002; Lysaght & Bent, 2005).

Finally, the learners, along with their clinical experience and perceptions of curricular messages, have a critical role to play in the success of teaching and learning strategies to promote knowledge and reasoning competence. The best method for teaching clinical reasoning certainly appears to be an effective way to connect classroom theory to clinical practice and well worth the extra educator effort it involves.

The challenge for education is to identify meaningful ways to foster clinical reasoning abilities in student practitioners (Higgs & Jones, 2000; Ranka & Chapparo, 2000; Schuwirth, 2002).

8.9 Summary

This chapter has considered approaches to learning in relation to forms of understanding. The earlier work on the relationship between approach and outcome concentrated on showing links between the deep and surface dichotomy and the levels of understanding reached. In the usual descriptions of these approaches, each (surface, deep and achieving) of them has a single distinctive process of learning – seeking understanding or memorising – while levels are restricted to aspects of the content. These analyses were necessary starting points, but do not fully represent what is found in student learning: the process is much more intricate and complex than that.

This chapter also seeks to show that the approaches to learning are based on a clear theoretical rationale grounded in the reality of how students actually go about their learning tasks. The section on the "measuring instruments" (SPQ/LPQ) was comprehensive and has provided an evidence base that Student Process Questionnaire (SPQ) can be used validly to assess student learning in a number of Western and non-Western countries differing in terms of cultural values, ethnicity, and educational system. Furthermore, it has been shown through research that the SPQ is a valid instrument, which can be used in both applied and more theoretical research to aid our understanding of student learning and teaching effectiveness. The review has also shed some light on the teaching beliefs and its relationship between student conceptions of learning, learning approaches and learning outcomes.

Two issues in particular require further research. The research findings from various studies suggest that students do not come into the learning environment empty handed. It was shown that students bring to a task quite a variety of prior knowledge which influences in important ways the actual responses elicited. It may be appropriate for future research to further probe into the aspect of prior knowledge and to explore how this can be integrated into teaching content. Another issue, which needs further investigation, is how to relate the Bigg's SOLO taxonomy to Morton's notion of "conceptions". Through such investigation, qualitatively different ideas about the learning material by students can be further identified, so that the conceptual change and cognitive restructuring that learners have undergone can be traced stepwise.

Clinical reasoning is a fundamental component of occupational therapy curriculum. It is a complex skill which occupational therapy students and graduates need to develop throughout their careers. Educational strategies, which aim to develop deep, meaningful learning can involve curriculum level action such as designing the curriculum around clinical problem solving, subject level actions such as focusing subject goals and learning activities on clinical reasoning. The importance of evaluation and feedback in promoting deep learning and adequately assessing reasoning and knowledge is another consideration in planning curricula. The learners' active participation in creating and managing their own learning experiences and in deriving for them is at the core of this learning approach.

In becoming a competent occupational therapist, one needs to be aware of the three key components in clinical reasoning; knowledge, cognition and metacognition which, will shape how therapists' reason clinically. Knowledge of alternative perspectives and theories in clinical reasoning research is helpful in trying to understand what the critical factors might be and how they relate to each other. Furthermore, it is the therapist's ability to integrate new knowledge that can be facilitated by the adoption of a reflective and self-critical approach, which will in turn facilitate the growth of expertise.

The purpose of the next chapter is to outline the specific research design and methodology for this study. The Methodology chapter forms the most important and often difficult part of the research, because it controls the direction of all subsequent planning and analysis. As the research rationale presents a logical argument and provides a theoretical framework for explaining the constructs and mechanisms, the next chapter will further clarify this framework for developing and refining the research rationale, to define the different types of variables that form the basis for research questions, to describe how research objectives guide the study, and to discuss how the review of literature contributes the process.

Chapter 9

RESEARCH METHODOLOGY AND DESIGN OF STUDY

9.1 Introduction

The purpose of this chapter is to outline the development of the specific research design and methodology for this study. The chapter will initially present a discussion of qualitative and quantitative research paradigms, arguing for the mixed method approach to be adopted in this longitudinal study. Then the chapter will outline the overall research methods and design including study instruments, subject population, ethical, and validity and reliability considerations.

The aim of the study was to see if trainee occupational therapy students predisposed to a surface or deep approach to learning react differently, with particular reference to how they develop their clinical reasoning abilities and move progressively from one stage to the next stage in their undergraduate curriculum. The study also seeks to identify, analyse, and address specific process – and outcome – related problems that occupational therapy students experience when they learn their clinical education subjects, as well as solve clinical problems.

The research methodology provides a way for occupational therapy educators to gain access to the learners' errors and misconception at a course level. The research design adopted in this study not only provides insights on curriculum restructuring to capitalise on students' conceptual shift towards a set of formal theories, at the same time, it also allows changes to happen in the direction of establishing new knowledge in respect to the demands of contemporary occupational therapy theory and practice development.

The literature review (**Chapters 2-8**) brought together what was already known about the research problem and the methods that had been used to study it. The literature review thus suggested to the researcher of this study what specific research methods and strategies were best suited to conduct further inquiry. The research methodology is a plan for conducting the research and is implemented to find answers to the researcher's focused questions by explaining to the reader how the researcher set about seeking answers to the main research questions of this study of developing clinical reasoning skills in trainee occupational therapy students in Hong Kong. To remind the reader, the main research questions in this study were:

1. What is the evidence for the progressive development of Clinical Reasoning Skills as a result of three periods of clinical practice?

   1a. What factors in the Self-Assessment of Clinical Reflection and Reasoning (SACRR) (Royeen et al, 1994) instrument show the most marked changes over the four periods of administration of the instrument?
   1b. Are there any areas in which there is little change? If there are, why might this be so and what are the implications for this for the curriculum and in particular for teaching and learning?
   1c. Do the students who show most gain in scores of SACRR also gain higher/highest GPA scores?
   1d. How far does the repeated SACRR data support the Dreyfus & Dreyfus Model (1986) of Skill Acquisition?

2. To what extent are there any changes in students learning preferences during the programme (Student Process Questionnaire (SPQ) (Biggs, 1987c) July 1999–April 2001)?

   2a. Which students, in terms of their Grade Point Average (GPA) scores in years 1, 2 & 3 shows most change in the Study Process Questionnaire (SPQ)? Is there any relationship in these data to other instruments, such as the Self-Assessment of Clinical Reflection and Reasoning (SACRR)? (See **Sections 9.4.1.2 & 9.4.1.3** on the Validity and Reliability of SPQ).

   2b. Do students developed learning preferences as revealed by the administration of Moore & Fitch Inventory support the principles of Dreyfus & Dreyfus model, i.e., the students are becoming more independent in their reasoning skills? (See **Section 8.4.2** for details).

9.2 Paradigms of Educational Research: Quantitative and Qualitative Approaches

The researcher should selectively and appropriately choose a research approach according to the nature of the problem and what is known about the phenomena to be studied. Importantly, the choice of method depends upon a number of factors, such as the nature of the phenomena to be studied, the maturity of the concept, constraints of the setting and the researcher's ability and agenda (Koch, 1994; Jones, 1995; Creswell, 2002; Yegidis & Weinbauch, 2006).

The difference in approach may, in part, be due to the differences in the phenomena studied, the question asked and the techniques considered appropriate for confirming or refuting the conjecture. Quantitative researchers usually study concrete phenomena that have been examined to the point that they can be measured. The theoretical frameworks from which their hypotheses are derived are based on research that has been investigated and is not inferential (Patton, 2002). These researchers have some prior knowledge from which to work and a means to measure variables that are representative of the phenomena. In other words, they are able to propose a series of experiments that are reasonably "low risk" and planned to incrementally test their theory (Goodwin & Goodwin, 1984; Greenbaum, 1998; Edmunds, 1999).

It is important to note that both qualitative and quantitative researchers are concerned with the construction of solid theory as an outcome. They put their energies into systematically developing theory, but their approach to this task is different. The qualitative researcher's emphasis is on the construction of the theory, and the quantitative researcher's emphasis is on the testing of the theory (Taylor, 2000).

In clinical research the emic perspective may be the perspective of the patient, caregiver or relative. Qualitative research is usually conducted in a naturalistic setting, so the contexts in which the phenomena occur are considered to be part of the phenomena. Thus no attempt is made by the researcher to place experimental controls upon the phenomena being studied or to control "extraneous" variables, all aspects of the problem are explored and the intervening variables arising from the context are considered a part of the problem. Using this approach the underlying assumptions and attitudes are examined and the rationale for these is elicited within the context in which they occur.

As previously mentioned, the qualitative approach to understanding explaining and developing theory is inductive. This means that hypotheses and theories emerge from the data set while the data collection is in progress and after data analysis has commenced. The researcher examines the data for descriptions, patterns, and hypothesised relationships between phenomena, then returns to the setting to collect data to test the hypotheses. Thus, the research is a process that builds theory inductively over time, step by step (Mertens & McLaughlin, 1995; Morse & Field, 1996; Gall, Gall, & Borg, 2006). The theory fits the research setting and is relevant for that point in time only. These data may largely consist of transcriptions of interviews, observations of the setting and of the actors. Data of these kinds are meaningful to others and considered "rich" and "deep". However, these data are hard to manage for the purposes of analysing and writing a report, as they cannot be readily transformed into numeric codes for statistical manipulation. In this respect they are often said to be "soft" data.

9.2.1. Quantitative Research and Qualitative Research Approaches

Each of the qualitative and quantitative paradigms has its own set of assumptions, established methodologies and set of experts. In the following section, an attempt will be made to show how a new trend of combining quantitative and qualitative research is emerging.

9.2.1.1 Quantitative Research Approach

Quantitative as its name suggests refers to any approach to data collection where the aim is to gather information that can be quantified, that is to say it can be counted or measured in some form or another. Thus, quantitative research is concerned with the acquisition and interpretation of data, which can be presented in the form of discrete units that can be compared with other units by using statistical techniques (Maykut & Morehouse, 1994). A quantitative approach is therefore central to an experiment-based investigation and to many others. The design of quantitative research can be more difficult, relative to qualitative research, because it requires more explicit prior specification of the kind of data to be collected. However, once this is determined and the data collection completed, the analysis of quantitative data can be straightforward (Verma & Mallick, 1999; Creswell, 2002).

Quantitative research, in contrast to qualitative research, seeks causes and facts from the etic or "world view" perspective (Vidich & Layman, 1994). In this case the findings are based on the researcher's interpretation of the observed phenomena, rather than on the subjects' interpretations of events. Quantitative research looks for relationships between variables so that causality may be explained and accurate prediction becomes possible. The aim is to examine the experimental variables, while controlling the intervening variables that arise from the context. With this control over the effects of context, the relationship between variables will be able to be generalised and predictive in all settings, at all times.

As discussed earlier, quantitative researchers establish a theory identifying all constructs, concepts and hypotheses while preparing the proposal and before beginning data collection. These concepts are made operational so that the hypotheses may be tested. Concerned with rigor and replication, the researcher ensures that the measurement instruments are reliable and valid. Data are then collected, numerically categorised, and the relationships between the variables used to measure the concepts are established statistically using "hard" (i.e. numeral) data. Bias is controlled by randomly selecting a large and representative sample from the total population. Structured instruments, such as rating scales, are frequently used to collect data and are usually administered once, as it is assumed that reality are stable (the variables measures will not change over time). The techniques for research design and analysis are prescribed a priority in the research proposal, and there are acceptable, tested and appropriate written steps or guidelines to assist the researcher throughout the process.

9.2.1.2 Qualitative Research Approach

Qualitative research is often concerned with social processes. The main feature of qualitative research methods is that meaningful explanations of social activities require a substantial appreciation of the perspectives, culture and world-view of the actors involved (Verma & Mallick, 1999; Patton, 2002; Yegidis & Weinbauch, 2006). Furthermore, qualitative research is an approach to evidence gathering. Typically, it involves the gathering of evidence that reflects the experiences, feelings or judgements of individuals taking part in the investigation of a research problem or issue whether as subjects or as observers of the scene. There may be some element of quantification even in a qualitative approach, as for example, the researcher reporting the numbers of individuals with similar judgments or experiencing similar feelings.

Qualitative research is usually conducted to explore problems about which relatively little is known. Qualitative researchers often cannot find adequate information to begin to formulate a theory about the phenomena. Often there is nothing from which to create a theory and therefore nothing to test. In fact, creating and testing a theory at this stage may be so far removed from reality that the exercise would be one of futility, frustration and luck; it would be inefficient and often absurd (Maykut & Morehouse, 1994; Hammell, Carpenter & Dyck, 2000; Sim & Wright, 2000; Patton, 2002).

Qualitative data have always been used in the social sciences, particularly anthropology, history and political science, but it is only in recent years that the qualitative paradigm has developed a role in health care research. Qualitative research is the source of well-grounded theory, illustrated with rich (or thick) description and explanation of processes, which occur in an identifiable local context (Miles & Huberman, 1994). When using qualitative approaches, reality is explored from an emic perspective, understanding life from the perspective of the participants in the setting under study, and everyday life is examined in an uncontrolled, naturalistic setting.

Ideally, qualitative-based evidence should come from a clearly definable base, so that the readers are able to form their own judgment on the plausibility of the evidence presented. That base might be established by a careful description of the sample of subjects was selected to be interviewed and how the interview data were analysed. Very often too, when collecting qualitative data that relates directly to the topic being investigated from the subjects, some relevant biographical data on each are also collected; those biographical data, dependent on the topic of the research and the nature of the subjects, might include age, length of teaching experience, level of education received, size of family and so on. Those background data can be critical in enabling the reader to be convinced by the research evidence produced and the conclusions drawn from them.

Qualitative research enables us to make sense of reality, to describe and explain the social world and to develop explanatory models and theories. It is the primary means by which the theoretical foundations of social sciences may be constructed or re-examined. Doing qualitative research requires the researcher to be methodologically versatile, to have an extensive knowledge of social science theory, to interact skilfully with others, and to be persistent, focused and single-mindedly committed to research. It requires that the researcher be able to conceptualise, to write and to communicate.

As reported earlier, this study adopted a longitudinal design method to investigate how clinical reasoning skill patterns develop in a group of 80 occupational therapy students over a period of three years. The reason for this study is framed predominantly as being a quantitative research approach, though not exclusively, because focus group interviews were included. As Verma & Mallick (1999) pointed out, the longitudinal method is perhaps better for doing a cohort-type study since the researcher follows the same sample of subjects through their developmental stages. In the next section, the researcher will provide an overview of the longitudinal design and its significance in measuring the changes in students' clinical reasoning abilities at each successive year of their learning.

In this study, students interviews were used in addition to the Study Process Questionnaire (SPQ), Inventory of Learning Preferences (ILP) and the Self-Assessment of Clinical Reflection and Reasoning (SACRR) instruments for triangulation of data. For the purpose of the focus group interview (See **Section 9.4.4**), a set of open-ended question was developed to facilitate the interview process. These questions were compiled based on a review of literature and the investigator's clinical experience (See **Table 9.4.4.4**).

9.2.1.3 Quantitative versus Qualitative Research: Debate

In this section, an argument will be presented as to why over the past few decades; there has been a distinct rift between the proponents of the two paradigms; qualitative versus quantitative.

Research fills a vital and important role in society; it is the means by which discoveries are made; ideas are confronted or refuted, events controlled or predicted and theory developed or refined. All of these functions contribute to the development of knowledge. However, no single research approach fulfills all of these functions, and the contribution of both qualitative and quantitative research is vital and unique to the goals of research in general, Strictly speaking neither "quantitative" nor "qualitative" is a discrete perspective on research. However, both approaches make an important contribution to educational research and, the choice of a particular perspective has implications for the type of evidence to be collected and the mode of analysis used in the investigation of a research question or issue. (Morse & Field, 1996; Hammell, Carpenter, & Dyck, 2000; Johnson & Christensen, 2000; Taylor, 2000; Creswell, 2002)

Since the development of computers and the increasing sophistication of statistical methods, quantitative research has been more evident in scientific related health care fields including physiotherapy, radiography and medicine. Quantitative research has been the normative mode of inquiry taught in universities, and quantitative researchers have tended to dominate review panels of funding agencies and the editorial boards of prestigious research journals. Because quantitative research was more common and considered as the gold standard for research, qualitative researchers felt excluded, undervalued, and misunderstood. As a consequence, a qualitative versus quantitative debate of competing-paradigms tended to be vented in the literature (e.g., Goodwin & Goodwin, 1984; Smith & Heshusius, 1986; Guba & Lincoln, 1994).

From the perspective of considering research methods as tools, the qualitative-quantitative debate becomes an insignificant argument. Fortunately, since the early 1990s, both sides have come to appreciate the role of the other in developing knowledge, and a new trend of combining qualitative and quantitative research emerged. Nevertheless, it is important to remember that both qualitative and quantitative methods are merely tools for solving research problems. It is the responsibility of the researcher to be wise enough to be able to recognise when appropriate quantitative or quantitative methods should be used.

Finally, it should also be pointed out that quantitative and qualitative are not mutually exclusive. That means to say, if a researcher decides to use a quantitative approach to the investigation of a problem, there should be no objection to include any qualitative data that are collected in the process. Similarly, if in another study it were decided that a qualitative approach was best suited to the topic being investigated, it could still include quantitative data. It should be recognised that often researchers might not appear to have to make a decision about whether to adopt a qualitative or quantitative approach. The way research questions are formulated and the research agenda is specified make it clear what approach is most appropriate and trustworthy.

9.3. Research Design

The main research questions outlined in **Section 9.1** are the focus of the study, which forms the basis for creating a design methodology. Designs and methods are appropriate or not in terms of the research question to which an answer is sought. A study may encompass more than one methodological approach, particularly if it addresses more than one research question as in this study, leading to a combination of designs or hybrid research designs (Sackett & Wennberg, 1997; Sim & Wright, 2000; Patton, 2002). Based on these assumptions on the choice of research design, this study adopted a longitudinal non-experimental (descriptive) design documenting conditions, attitudes, or characteristics of a group of trainee occupational therapy students (Portney & Watkins,2000; Trochim, 2001). This study is framed predominantly as quantitative research approach, though not exclusively, because focus group interviews were included and it is therefore a combination of quantitative and qualitative methods in its design, data collection and data analysis, and hence their interpretation.

This study adopted a non-experimental design because the investigations are generally descriptive in nature and as such they do not exhibit direct control over the studied variables (Portney & Watkins, 2000; Trochim, 2001). Furthermore, there was no attempt on the part of the researcher to manipulate predictor variables, create a control group, or randomise subjects between groups. The reason why there was no attempt to include these design features in this study was because the study adopted the longitudinal design method which followed a cohort of 80 occupational therapy students over two years and performed repeated measurements at different stages of their clinical development. Because the same sample of subjects was tested through the study at intervals, personal characteristics remained relatively constant, data collected on the same individuals and differences observed over time could be interpreted as developmental change.

This study is termed as a descriptive type of research because investigator describes students' development over a period of time. This method is educationally important in the sense that this research is concerned with development of clinical reasoning abilities of individual students over a period of time. Furthermore, the research will make an attempt to describe how students' clinical reasoning abilities differ as they progress from one stage to the next stage of the programme. In designing a curriculum, it is extremely important to take into consideration the relevant characteristics of the learner. Essentially, in this type of study, recorded data from questionnaires, interviews and direct observation in various clinical settings are utilised with a view to determining what has happened in the past, what the present situation reveals, and what will likely happen in the future.

Quantitative and qualitative approaches are combined in this study to produce generalised knowledge for the profession and to evaluate its effectiveness. The use of a combination of qualitative and quantitative methods, therefore compliment with one another to address the problems under investigation (Smith & Heshusius, 1986; Morse & Field, 1996; Yegidis & Weinbauch, 2006).

To confirm the consistencies between students' approaches to learning and their level of clinical reflection and reasoning skills, quantitative methods were employed using standardised assessment procedure (See **Section 9.4** for details); The Study Process Questionnaire (Biggs, 1987c), Moore & Fitch Inventory of Learning Preferences (ILP) (originally cited in Woods, 1994), and the Self-Assessment of Clinical Reflection and Reasoning questionnaire (Royeen, et al, 1994).

9.3.1 Longitudinal Study

There are two commonly used methods to study students' characteristics and the way these characteristics change with growth: the longitudinal and cross-sectional methods. Longitudinal studies have proved to be most effective in studying students' behaviour development over a period since they allow for intensive studies of a fairly large number of cases and of many variables. The idea behind longitudinal studies as they have been employed in educational and social research is to answer questions about an individual's development from evidence based on a large number of cases.

An evaluation of longitudinal studies would suggest that the way in which studies are carried out serve two main purposes:

1. Because the sample of subjects is studied at certain points in their development, a cross-sectional picture of a particular category can emerge; and
2. If the sample has been carefully chosen and is representative of all individuals at a particular age, this can provide information about the number of individual students who have reached a certain stage in development, the number with highly intellectual skills, the number with particular educational problems, and so on.

The relationship between such measures as sex, age, and GPA scores can be of considerable importance. The relationship between age and student approach to study had been investigated in several studies (For example, Entwistle & Ramsden, 1983; O'Neil & Child, 1984; Harper & Kember, 1986; Biggs, 1987a). This knowledge can be of great value, particularly when the planning of educational and social policy is concerned.

All longitudinal research designs share a single characteristic – they entail the repeated study and measurement of the same variables and of the subjects over time at predetermined intervals. Longitudinal studies are designed to study change. But they try to find out more than simply if change occurred or how much change took place. Only longitudinal research can provide this type of useful knowledge. Most longitudinal studies are designed to document change. But they are also well suited to the needs of researchers who wish to document and learn more about the existence of a certain pattern of behaviour and what is associated with it.

Longitudinal designs can acquire knowledge not readily acquired using other designs. Slowly developing changes and up-and-down fluctuations in behaviours and phenomena might be missed using cross-sectional designs. But they can be identified and plotted by using repeated measurements over long periods. Longitudinal studies are alone are able to tell us when changes occur and to help us to predict their occurrence with reasonable accuracy.

An advantage of the longitudinal method is that the concern about comparability is not a problem in that the same group is involved at each level. A major disadvantage of the longitudinal method is that the researcher, the subjects and all others involved in the study must make an extended commitment. There are others sample mortality and the effect of the use of a repeated measure. When the longitudinal method is used, the same group of students is studied over a period as the individual students progress from level to level (Gray, 1996).

9.3.2 Sample Selection

As reported previously, this study is adopting a longitudinal research design. According to Yegidis & Weinbach ((2006), there are three additional adjectives that are used to describe longitudinal research and they are: the trend study, the cohort study and the panel study. These three reflect the differences in the way that a sample of research participants is selected. In a cohort study like this one, a class of full-time students is measured regarding their attitudes towards research over two years. Furthermore, the class size is maintained the same throughout the entire research period, i.e., potential participants did not change, and hence this class is known as a cohort.

The student cohort of this study are composed of a class of 80 occupational therapy students enrolled at the end of their first year of the three-year Bachelor of Science (Honours) Degree in Occupational Therapy programme. The average age of the group is 18 years, and all are native Cantonese speakers. Students have satisfied the minimum requirements for entry into the bachelor's programme of The Hong Kong Polytechnic University, where the medium of instruction is English.

This study involved an investigation of a cohort of 80 occupational therapy undergraduate students by administering the following validated test instruments:

- The Study Process Questionnaire (Biggs, 1987c) was used pre- and post-clinical education (CEII-pre, CEII-post, CEIII-post and CEIV-post) intervention to assess students' approaches to learning.
- The Moore & Fitch Inventory of Learning Preferences (cited in Woods, 1994) was administered pre- and post-clinical education intervention to determine the affective outcome of students, i.e. whether their changes in the learning preferences and attitudes affect their clinical reasoning skills.
- The Self-Assessment of Clinical Reflection and Reasoning questionnaire (Royeen et al, 1994) was administered pre- and post-clinical education intervention at different stages to evaluate students' level of clinical reflection and reasoning skills, and finally,
- A focus group interview was designed to probe students' understanding of the clinical reasoning process and its application to a novel clinical problem solving.

9.3.3 Selection of Participants for Focus Group Interview

Because the research goals for conducting focus groups often differs from those of quantitative research, the procedures related to selecting a sample are usually not directly applicable (Krueger, 1994; Morgan, 1997; Gall, & Gall, Borg, 2006). Qualitative research methods, such as focus groups, however, are designed to select members based on predetermined characteristics. In this study, five student members are selected from each of the category of their learning approaches; surface, deep and achieving scores obtained on the SPQ scale. Such sampling procedure in qualitative research design (such as focus groups) is called purposive sampling. (Also refer to **Section, 9.4.4.1)**

According to Vaughan, Schumm, & Sinagub, (1996), purposive sampling is a procedure by which researchers select subject(s) based on predetermined criteria about the extent to which the selected subjects could contribute to the research study. For the focus groups, specific criteria that relate to the target subjects for each of the focus groups are identified based on the extent to which they are homogeneous and likely to contribute to a successful focus group. With purposive sampling, the primary goal is not generalisability per se but understanding of an issue or topic in sufficient detail to provide information to design subsequent studies.

9.3.4 Ethical Considerations

Researchers have a responsibility for honesty and integrity in all phases of the research process, beginning with their choice of a research question. Researchers who are health care professionals have an obligation to set priorities and to pursue questions that are relevant to important health care issues. Researchers also have an ethical responsibility to do clinical research that is meaningful (Weijer, Dickens, & Meslin, 1997).

Ethics is a system of moral principles or statements that govern personal or professional conduct. The statements of ethics of their professional associations bind therapists. The public rightly expects that anyone carrying out research with humans must exhibit professional behaviour of a high moral and ethical standard. Ethical behaviour is not, however, simply a matter of obvious attributes such as personal honesty, integrity, competence and morality. It extends to judgements concerning confidentiality, giving or withholding services, maintaining personal competence and refraining from actions for which one is unqualified. Unethical behaviour means violating prevailing ethical standards of the profession relating to the safe, proficient and/or competent practice of occupational therapy.

In communicating information to others, the therapist has to consider the person who needs the information, how much is needed, whether it is appropriate to communicate it, any legal considerations, and how best to present it. It can also be difficult to know how much information to disclose to a relative or care giver. "Talking about a patient behind his back" may raise ethical problems. At all times, the therapist must avoid being placed in a position where disclosure looks like a breach of confidentiality, even if it is in the patient's best interests.

9.3.4.1 Informed Consent

Prior to agreeing to participate in the study, each individual student was sent a consent form giving him or her clear idea of what his or her participation would entail. In line with established ethical guidelines, an informed consent (See **Appendix 9.3.4.1**) was obtained prior to the start of the investigation. All participants were explained clearly the objectives of the study. To avoid any attrition in the class size, full explanation was given about the significance of a cohort study and potential benefits of the research. Those students who agreed to participate were asked to sign the consent form.

9.3.4.2 Confidentiality

The researcher was fully aware of the importance of safeguarding the privacy and identity of the participants. In all data collection procedures, such as questionnaires, assessment forms, and focus group interview, the participants' name was omitted and data anonymity was maintained by coding the data using students' numbers as identification numbers. Under the principles of confidentiality, the researcher was ethically obliged not to reveal the participants' identities or in any way let others be able to access any of the data. Furthermore, under the principle of confidentiality, the researcher was very careful when editing and reporting the data. All records and reports were filed and kept locked in the researcher's office and access to these records was restricted to the investigator himself.

9.4. Test Instruments

There are many types of standardised instruments available which yield a wide variety of data for a wide variety of purposes. Selection of an instrument for a particular research purpose involves identification and selection of the most appropriate one from among many alternatives. In order to select an instrument, a researcher must be familiar with the wide variety of types of instruments that exist and must also be knowledgeable concerning the criteria, which should be applied in selecting one from among alternatives.

All research studies whether experimental or non-experimental involve data collection. Since all studies are designed to either test hypotheses or answer questions, they all require data with which to do so. Most studies use some sort of data collection instrument, often a validated, standardised instrument and this study is no exception. The choice of research design often dictates the kinds of tools and procedures, which are to be utilised in order to study the variables/factors. In line with this, in this study, the following instruments were selected for the following reasons:

9.4.1 The Study Process Questionnaire (SPQ),

9.4.2 The Moore & Fitch Inventory of Learning Preferences (ILP)

9.4.3 The Self-Assessment of Clinical Reflection and Reasoning (SACRR)

9.4.4 The Focus group interview.

9.4.1 The Study Process Questionnaire (SPQ)

As reported in **Chapter 8**, the Study Process Questionnaire (SPQ) and the Learning Process Questionnaire (LPQ) were developed to reflect the findings of both quantitative and qualitative research into how students study (Biggs, 1987c). The SPQ has many research uses (See **Appendix 9.4.1**). Scale and subscale scores (See **Table 9.4.1.1** below) can be used either as independent variable, for classifying subjects, or as dependent variables, for assessing outcomes. Another major characteristic of standardized tests is the existence of validity and reliability. Because of their importance, these two concepts will be discussed in considerable detail in this chapter.

9.4.1.1 Process of Item Construction

The SPQ is an instrument with 42 items equally and systematically divided among the three approaches to learning (deep, surface and achieving) into six motive and strategy scales (See **Table 9.4.1.1** below). Each response to an item is to be answered on a five point Likert scale that describes the match with the respondent's behaviour (**Appendix 9.4.1**):

1= never or only rarely true of me,
2= sometimes true of me,
3= true of me about half of the time,
4= frequently true of me
5= always or almost always true of me

Scores are reasonably stable over periods of a few months (test-retest reliabilities are of the order of +0.70). Thus, LPQ/SPQ scores give an indication of the extent to which students are in general likely to rote learn, to seek meaning, or to maximise grades, or any combination of these. The SPQ scales have been translated using the usual translation/back-translation method (Hui & Triandis, 1985) into languages such as Chinese, Indonesian, Malaysian, Swedish and Arabic.

Table 9.4.1.1

Description of Subscales with corresponding item numbers of Study Process Questionnaire (SPQ)

SPQ Subscale	Description	Item Number
Surface Approach Surface Motive (SM)	Motivation is utilitarian: main aim is to gain qualifications at minimum allowable standard	1, 7, 13, 19, 25, 31, 37
Surface Strategy (SS)	Strategy is to reproduce bare essentials often using rote learning	4, 10, 16, 22, 28, 34, 40
Deep Approach Deep Motive (DM)	Motivation is interest in subject and its related areas	2, 8, 14, 20, 26, 32, 38
Deep Strategy (DS)	Strategy is to understand what is to be learnt through interrelating ideas and reading widely	5, 11, 17, 23, 29, 35, 41
Achieving Approach Achieving Motive (AM)	Motivation is to obtain highest possible grades	3, 9, 15, 21, 27, 33, 39
Achieving Strategy (AS)	Strategy is highly organised and designed to achieve high marks by being a 'model' student, e.g. being punctual, doing readings, etc.	6, 12, 18, 24, 30, 36, 42

Source: Adapted from Biggs (1987c).

9.4.1.2 Validity of SPQ Conceptual Equivalence

It appears that the approaches to learning and quantitative and qualitative conceptions of learning that are identified in Western studies and forming the theoretical basis for the SPQ are relevant to Nigerian students (Omokhodion, 1989; Ethindero, 1990). There have also been a number of qualitative investigations of the learning approaches and conceptions of Chinese learners in Hong Kong and China (Kember & Gow, 1991; Kember, 1996; Watkins & Biggs, 1996). According to Watkins (1996), these studies have partially supported the conceptual validity of the constructs underlying the SPQ for Chinese students.

9.4.1.3 Within-Construct Validity of SPQ

The within-construct validity was examined by comparing the results of an internal factor analysis of the SPQ scales for different cultures. It is interesting to note in all eight samples the results are clear -cut with distinct surface and deep approach factors. Another point worth noting is that the United Arab Emirates and Hong Kong students sampled clearly associated with the AM (Achieving Motivation) and AS

(Achieving Strategy). As reported, LPQ and SPQ shares the same motive/strategy model, interestingly 10 samples of school children from six different countries also confirmed the two basic factors of deep and surface approach (Wong, Lin, & Watkins, 1996).

9.4.1.4 SPQ/LPQ: Correlations with other Learning Questionnaires

There are several questionnaires tapping scales parallel to those of the SPQ. These include the Approaches to Study Inventory (ASI) (Entwistle, Hanley, & Hounsell, 1979), the Cognitive Styles Inventory (CSI) (Moreno, & DiVesta, 1991) and the Inventory of Learning Processes (ILP) (Schmeck, Ribich, & Ramanaiah, 1977). Unfortunately there appears to be few studies, which have used the SPQ, and one or more of these other inventories but those few studies are encouraging. For example, Wilson, Smart, and Watson (1996) found correlations for two samples of Australian psychology students between the SPQ and ASI to be 0.45 and 0.61 for deep Approach, 0.44 and 0.62 for Surface Approach, and 0.46 and 0.46 for Achieving Approach (all $p<0.001$).

9.4.1.5 Between-construct validity with SPQ

When examining the summary of correlations between SPQ and academic achievement for nine samples of 4359 university students from five countries, overall the nine samples the mean correlations were: 0.16, 0.17, and 0.20 for the surface, deep, and achieving approaches, respectively. While the correlations may seem disappointingly small it must be kept in mind that in fact few variables consistently show correlations of above 0.20 with achievement across a number of studies (Fraser et al, 1987).

9.4.1.6 Reliability of SPQ

The internal consistency reliability estimates alpha for the SPQ scales for 14 independent samples of 6500 university students from 10 countries ranged as follows (Watkins & Biggs, 1996):

Table 9.4.1.6

Internal consistency reliability coefficients alpha for SPQ scales

SPQ scales	Alpha range	Median range	Hong Kong
Surface Motive (SM)	0.37-0.67	0.55	0.53 – 0.56
Surface Strategy (SS)	0.25-0.66	0.55	0.55 - 0.65
Deep Motive (DM)	0.44-0.70	0.64	0.60 - 0.67
Deep Strategy (DS)	0.47-0.76	0.69	0.68 - 0.75
Achieving Motive (AM)	0.48-0.77	0.68	0.71 - 0.77
Achieving Strategy (AS)	0.56-0.77	0.72	0.69 – 0.77

It is worth noting that all but 13 out of the 84 alpha coefficients exceeded 0.50; a magnitude, considered to be acceptable for a research instrument used for group comparisons but well below the level required for important academic decisions about an individual student (Nunnally, 1978).

From the validity and reliability point of view, there is no doubt SPQ may be a reliable and valid tool for research use within many cultures with some exceptions such as Nepal. According to Watkins (1996), although the SPQ offers a tool for directly assessing the quality of learning processes, further work is needed to fully justify cross-cultural comparisons of student learning and this study is aiming to accomplish this.

9.4.2 The Moore & Fitch Inventory of Learning Preferences (ILP)

The ILP (Inventory of Learning Preferences) test instrument, which was developed by Moore et al, (1989) consists of 34 items (See **Appendix 9.4.2**) covering students' preferences for course content, delivery mode, assessment and peer group interaction. In this test, students are asked to select 10 items out of 34 items that best reflect their ideal learning environment.

The Moore and Fitch Inventory of Learning Preferences (ILP) (originally cited in Woods, 1994, and used by Stokes, Mackinnon, & Whitehill, 1997; Wun, Chan, & Dickinson, 1999, and Stokes, 2001) was selected in this study because it had been used previously to assess Hong Kong students' attitudes to the problem-based learning pre- and post-exposure. In this study, the pre-and post-course evaluation questionnaires about attitudes to learning (ILP, cited in Woods, 1994) were administered, using the following explanation:

> "Each of us has an ideal learning environment. Think of how you learn best. Try not to focus on one particular course or one particular instructor. Focus on their significance in an ideal learning environment for you. You have 10 check marks to distribute among 34 questions. Put a check mark in the column next to the statement that best describes your ideal learning environment."

The respondent depending on whether or not it reflected attitudes conducive to a clinical reasoning process weighted each item. Each score contributes to the derivation of a final score for that student, which ranged from 1= not conductive to clinical reasoning process, to 5= very conductive to clinical reasoning process. The higher the score, the more the student preferred an environment that facilitates reasoning abilities. Each student's final score was entered into a database of pre- and post-course scores, and the scores were compared by t-test for correlated samples.

9.4.3 <u>The Self-Assessment of Clinical Reflection and Reasoning (SACRR)</u>

Roth (1989) summarised and operationalised the reflective process as a hierarchical compilation of 24 behaviours or actions. This compilation served as the domain specification of the instrument development (Royeen et al, 1994). Items for the Self-Assessment of Clinical Reflection and Reasoning (SACRR) were adapted from the descriptors that Roth (1989) postulated as critical reflection, or what Royeen et al, (1994), believe to be clinical reflection and reasoning. In this manner, the construct validity of the instrument was assumed because it was based on "detailed trait or construct definitions" (Anastasi, 1988, p162).

The SACRR consists of two sections (See **Appendix 9.4.3**); the first section addresses demographic information, and the second section contains 26 close-ended questions that evaluate different aspects of clinical reflection and reasoning. These questions use a 5-point Likert scale from "strongly agree" (5) to "strongly disagree" (1).

9.4.3.1 Reliability of SACRR

(a) Study One

The SACRR questionnaire was administered as a reliability study to 30 first-semester students enrolled in a bachelor of science of occupational therapy (BSOT) programme at a Midwestern university. The summated scores of the SACRR were analysed using SPSS for Windows (1997). Internal consistency as measured by Cronbach's alpha further evaluated test validity (Anastasi, 1988). Test-retest reliability was examined by using a Spearmann rank correlation (Portney & Watkins, 2000).

Results of the analysis revealed that Cronbach's alpha was 0.87 for the pre-test and 0.92 for the post-test, which suggested that the SACRR had high internal consistency and that it was indeed measuring a unified concept. The Spearman rank order correlation coefficient (rho) of test-retest reliability was an "accepted value" of 0.60 (Benson & Clark, 1982, p796).

From these results (**Table 9.4.3.1** below), the SACRR instrument was constructed in a theoretically sound and reliable manner and that it had acceptable psychometric qualities for investigation purposes.

(b) Study Two

In this study, 109 participants (65 occupational therapists, 19 physical therapists, 13 occupational therapy assistants, and 12 other professionals) attended a two-day workshop and completed the SACRR questionnaire at the beginning (pre-test) of the workshop. For the final evaluation (post-test) of the workshop, participants again completed the SACRR questionnaire. The results of the test revealed a significant difference between pre-test and post-test scores on the SACRR (t [108] = 3.797, p= 0.000). Participant's scores were higher on the post-test than on the pre-test (106 vs. 101). These results clearly suggest that intervention can enhance clinical reflection and reasoning as measured by the SACRR instrument (See **Table 9.4.3.1** below).

Based on these results, the authors (Royeen et al, 1994) advocated a mixed-method approach incorporating the SACRR (quantitative) as well as other qualitative measures such as observation, interview, and reflective journal writing is probably the best way to evaluate clinical reflection. In line with this recommendation, in this study a focus group interview was considered along with the SACRR instrument.

Table 9.4.3.1

Investigation of Reliability of the Self-Assessment of Clinical Reflection and Reasoning (SACRR)

Participants (Age)	**Study One (n=30)** (Undergraduate Students)		**Study Two (n=109)** (2-day Therapists' workshop)	
20 – 24	18		6	
25 – 29	3	alpha	17	t[108]= 3.797,
30 – 34	0	Pre-test---0.87	29	p=0.000
35 –39	3	Post-test--0.92	22	
40 – 44	3	r(rho)-----0 .60	10	Scores
45 – 49	-		19	Pre-test = 101
50 – 54	-		4	Post-test = 106
>50	-		2	
Already qualified	3		-	

(Source: Royeen et al, 1994)

Reference: to the **Table 9.4.3.1** above, results of both investigations clearly suggest that SACRR has high internal consistency and that intervention can enhance clinical reflection and reasoning. The authors, Royeen et al. (1994) however, advocate that future research is needed to ensure the validity of the approach followed in their study. Although the internal consistency of the SACRR is high, its test stability is moderate (Portney & Watkin, 2000). To further improve its test stability, they stressed that future investigation should examine whether differences exist in clinical reflection and reasoning between occupational therapists and physical therapists. Their suggestion paved way to conduct future in-depth studies to examine the clinical reflection and reasoning process, which will be the main focus of this research study.

9.4.4 The Focus Group Interview

As reported in the research design (**Section 9.3**), this study is a combination of quantitative and qualitative methods, although former is more predominant. It is quite a common practice in the research field to conduct focus groups in combination with quantitative research methods (Krueger, 1994; Morgan, 1997; Krueger & Casey (2000). However, focus groups should not be considered as an alternative to a quantitative study, since the objectives and capabilities of each technique are quite different. The output of a focus group study is not likely to be valuable if a different research methodology is more appropriate (Greenbaum, 1998).

As Vaughan, Schumm & Sinagub (1996) points out that there is a misconception that focus group interviews are used primarily for gauging consumer reaction to a product or marketing technique. They opined that focus group interviews are a versatile tool that can be used alone or with other methods (quantitative or qualitative) to bring an improved depth of understanding to research in education and psychology. This view is also shared by Greenbaum (1998), who advocates that focus groups are one of the important techniques in qualitative research and when used appropriately in combination, focus groups can be extremely effective in generating meaningful information about consumer attitudes toward a variety of different topics.

The students focus group interviews will be used in addition to the SPQ, ILP and SACRR for triangulation of the data. Through this process, it is hoped that information gained during the interview will confirm the data from the questionnaires. This will help the internal validity of the research results. Furthermore, it is anticipated that a focus group interview may bring a fresh perspective to the research problem under investigation when combined with questionnaire designs.

9.4.4.1 Selection of Participants

Taking the above factors into consideration, the researcher of this study followed the following procedure in selecting participants for the focus group (Also refer to **Section 9.3.3**):

1. Based on students' SPQ scores and their GPA scores, five students from each category of surface biased, deep biased and achieving biased approaches, making a total of 15 students, were selected from the student cohort.

2. The focus group of five students from each category form a relatively homogenous group in nature because these students are carefully selected from top, middle and lower bands so that this method encourages individual students to share their ideas and perceptions.

3. The researcher adopted this particular selection method because the group is known to be knowledgeable about the research focus. Furthermore, it is the intention of the investigator to form a focus group that is to produce self-disclosure, homogeneity, which is seen as reducing perceived risk of the information by the students. As Greenbaum (1998) puts it, "the more homogeneous the group is, the better the participants will relate to each other and higher the quality of the input they will generate".

9.4.4.2 Interview Protocol

Calder (1977) defined three basic approaches to research that apply to focus group interviews: exploratory, clinical (judgement), and phenomenological. Each is appropriate for collecting specific types of information. In building a rationale for using focus group interviews, the researcher must consider whether the purpose for conducting the study is consistent with one or more of these approaches.

Since this study is concerned with the clinical problem solving, it is most appropriate here to consider clinical approach. The clinical or therapeutic approach is influenced by clinical psychology in that its purpose is to provide a "psychological loosening effect" of the group to get beyond superficial self-reports and to delve into emotions and unconscious motives related to the topic (Durgee, 1986, p58). Calder (1977) labeled this approach as quasi-scientific in that the researchers' knowledge of the constructs and theories pertaining to the topic are used to guide in-depth probing and careful observation of verbal and non-verbal responses during the interview and analysis and interpretation of the data following the interview. Thus this is highly dependent on the level of knowledge of the individuals who conduct and interpret data and on the degree to which that knowledge is based on scientific theories and constructs rather than simple intuition or personal experience.

Calder's (1977) views are very much applicable to this study. For example, focus group interview in this study was conducted to ascertain occupational therapy students' attitudinal changes after the clinical intervention. The researcher was particularly interested in the extent in which they felt more or less able to gain clinical competence in the fieldwork education and how their experience compared with how they felt towards the end of their final clinical education placement.

In line with the clinical approach outlined above, the researcher of this study is highly familiar with theoretical models of the clinical reasoning process and therefore is able to structure probes that will uncover reasons for espousing particular beliefs and will encourage a high degree of group interaction to trigger emotional, unguarded reactions.

9.4.4.3 Structure of the Focus Group Interview

In this study, the semi-structured interview method was used because the researcher knew all of the research questions but could not predict the answers. This approach was useful because this technique ensured that the researcher would obtain information required (without forgetting a question), while at the same time permitting the participant's freedom of responses and description to illustrate the concepts. In this study, one of the main aims of the interview was to draw the focus of the subjects to the five main research questions (See **Table 9.4.4.4** below), using liberated, free-flow discussions. The more students pursue the discussion, the more their conceptualisations in regard to the presented learning will be discerned. So to unfold the various structures of students' thoughts in relation to the role of the clinical reasoning content knowledge to the understanding of the client's clinical problem situation, the researcher focused on the verbalisations of students' conceptions to map qualitatively different ways of conceptualisations. This structure also constituted the format and the probes used for the interview.

The researcher is fully aware of the difficulties of giving inner accounts associated with the learning experiences that could lead to possible frustrations. Furthermore, students could also become defensive when the liberation of one's exposition is limited by incompetence due to lack of necessary background knowledge. To avoid such situation, on occasions when an interviewee was unfamiliar with the topic content and might require more probing at the time the interpretations or descriptions were not possible, the researcher tried to maintain open and genuine attitudes. Furthermore, judgement based on theoretical underpinnings of the research was suspended to avoid imposing unnecessary threats or bias to the students. Sensitivity to the possible associations of the complexity of the interview task and students' academic performance was also attended to. To avoid generating unpleasant feelings, interviewees were given top priority on choosing the time and schedule of interview. It was noted from the scheduling of the interview that descriptions of the students' experiences were more favourable after they completed all their final year assignments and reports.

9.4.4.4 Schedule for Focus Group Interview

When preparing a semi-structured schedule, the researcher thought through the situation carefully and prepared the questions (**Table 9.4.4.4**) in a logical, possibly chronological order to address one aspect of a topic, i.e. no double-barrelled questions to avoid confusion on the part of the participant. Remember: "the quality of the study relies on the quality of questions" (Morse & Field, 1996).

Since the semi-structured schedule provides participants with the freedom to explain a situation in their own words, the researcher tried to establish a conversational tone during the interview by encouraging participants to express themselves freely and providing clear instructions and explanations. This sort of attitude on the part of the researcher provided the rich descriptive context, which makes qualitative research valuable and the analysis so interesting and significant.

Table 9.4.4.4

Schedule of questions for focus group interview

1. As a group, your task is to write down individually what are the four most important things that you learned in your clinical education placements. Then tell the rest of the group what's on your list. The group should discuss these and come up with a final list of top four. Record these on a sheet of paper.
2. As individuals first note down what you think has been the biggest change in you as a trainee OT as a result of the course. Then share these with the group and produce a top two.
3. As individuals first note down, in the same way, what do you think you are better at as a result of the course. Share with the group and produce a top two.
4. What do you think is the weakest element of your performance? Share with your group and produce a top two.
5. What do you consider you now need in order to develop further your skills as occupational therapists? Share and produce a list.

9.4.4.5 Preparing for the Focus Group Interview

A focus group interview appears deceptively easy to implement, and therefore, they are frequently misused. Perhaps the mistake most commonly made is lack of adequate preparation for the implementation of focus group interviews. To avoid such mistakes, the researcher in this study had prepared a researcher's guide, which was to serve as a map to chart the course of the focus group interview from beginning to end. The guide included the following essential steps:

a. Introduction,
b. Warm-up,
b. Clarification of terms,
c. Wrap-up, and
d. Closing statements.

9.4.4.6 Role of the Researcher

The researcher, who was the interviewer for the focus group session, paid absolute attention to uncover the inherent meaning of the students' verbalisations and understanding of the students' conceptualisation of clinical reasoning process through a carefully designed schedule. The researcher also endeavoured to bring the interviewee's reflection back to focus through out the clinical problem-solving process. Probing questions had to be addressed whenever the researcher was not clear of the verbal descriptions of the students. On certain occasions elaboration was encouraged to re-evaluate and/or reconfirm the interpretations interviewees made to the critical aspects of the research questions.

Since the interviewees were expected to share their clinical experience and personal experience about their learning in clinical environment settings while learning difficulties were also unfolded, the interviewer tried to be as pleasant and friendly as possible – a sign of invitation and recognition to their responses. The whole session was then audiotaped. The recorded interview data was transcribed verbatim; the verbatim transcript was then thoroughly analysed using the method described by Glaser & Strauss (1967) and others.

9.4.4.7 Procedures of Data Collection and Data Analysis

In any data collection procedure, the framework of the analysis should reflect and inform the research paradigm to unfold the characteristics of the conceptions in students' learning processes and outcomes and its impact on the reasoning abilities of the trainee student occupational therapists. As reported earlier, this study is designed using both quantitative and qualitative research methods, although the former is more predominant. The quantitative data for the Study Process Questionnaire (SPQ), The Moore & Fitch Inventory of Learning Preferences (ILP), and the Self-Assessment of Clinical Reflection and Reasoning (SACRR) were analysed using SPSS-10 for Windows (2002) and qualitative data for focus group interview was analysed using a method of thematic content analysis.

9.4.4.8 Method of Analysing Interview Transcripts in Qualitative Research

The difficulty often lies with the question of how to analyse the transcripts once the interviews have been completed. In this study, one method of analysis that has been adapted from Glaser and Strauss's "grounded theory" approach and from various works on content analysis (e.g., Glaser & Strauss, 1967; Field & Morse, 1985; Bryman, 1988; Strauss & Corbin, 1998) was used to categorise and codify the interview transcripts.

The aim is to produce a detailed and systematic recording of the themes and issues addressed in the interviews and to link the themes and interviews together under a reasonably selected category system. Herein lies the first problem that the researcher must remain aware of it. To what degree is it reasonable and accurate to compare the utterances of one person with those of another? Are "common themes" in the interview really "common"? Can one assume that one person's worldview can be linked with another person's? The method described here takes for granted that this is a reasonable thing to do.

Managing data analysis presents an immense task, which may be fraught with frustration when attempting to make sense of the data while, at the same, endeavouring to locate a description to illustrate a particular concept or event. The purpose of data analysis in this study is twofold:

1. to code the data so that the categories may be recognised and analysed, and behaviours noted, and
2. to develop a data filing system that will provide a flexible storage system with procedures for retrieving the data.

With the above purpose in mind, the researcher followed a method, which will now be described. The first major task in analysing interview data was to become extremely familiar with the data as the data from the focus group interview was in the form of textual narrative. Soon after the completion of a tape-recorded interview, the tape was replayed with the researcher listening carefully to the content as well as to the questions asked and to the participant's response. Having checked the transcript, next step was to recognise the persistent words, phrases or themes within the data.

The task of coding the data is an important process in which to identify the words, passages or paragraphs for later retrieval and restoring. Hence, data needs to be checked, coded, sorted and stored in a form that may be easily retrieved and analysed for future discussion. With this in mind, the researcher will now outline briefly the coding system that he followed in this study.

- Transcripts were read through and notes were made throughout the reading on general themes within the transcripts. The aim, here was to become immersed in the data. According to Rogers (1951), the process of immersion will make the researcher fully aware of the "life world" of the respondent to enter other person's "frame of reference".

- Transcripts were read through again and as many headings as necessary were written down to describe all aspects of the content, excluding "dross". Field & Morse (1985) uses the term dross to denote the unusable "fillers" in an interview – issues that are unrelated to the topic. The "headings" or "category system" should account all of the interview data. This stage is known as "open coding" (Berg, 1989). Categories were generated freely at this stage.

- The list of categories was surveyed and grouped together under higher-order headings. The aim, here, was to reduce the numbers of categories by collapsing some of the categories that were similar into broader categories. Hence, categories were initially kept as broad as possible without overlapping. A few categories were chosen from the broad categories in the initial stages of the analysis and labelled the major headings within each paragraph by writing the category in the margin, and then sorted the data by transferring to index cards for manual sorting.

- Transcripts were re-read alongside the finally agreed list of categories and sub-headings to establish the degree to which the categories cover all aspects of the interviews. As more data accumulated, the major categories were sorted into smaller categories. In this way, the data remained manageable and permitted the subcategories to be derived from the larger domain. Each transcript was worked through with the list of categories and sub-headings and "coded" according to the list of categories headings. The use of coloured highlighting pens helped to analyse categories within the simple constructs of data. Adjustments were made as necessary.

9.4.4 9 Validity of the Focus Group Interview

The question of the validity of the categorisation process described above must be considered. If, as Glaser & Strauss (1967) suggests, the aim of ethnomethodological and phenomenological research is to offer a glimpse of the focus group interview process, the researcher should attempt to offset his own bias and subjectivity that must creep through any attempt at making sense of the interview data. To suggest some internal validity, some students from each category of their SPQ scale were asked to read through the transcripts of their interviews and asked to jot down what they see as the main points that emerged from the interview. This produced a list of headings, which were compared with the researcher's coding system. After discussions with students, minor adjustments were made to the final list of headings. One of the difficulties in this sort of research is always going to be finding a reliable and honest method of presentation. This, clearly, would not be satisfactory and the reader of those transcripts would have to find his/her own way of categorising what was read. The method suggested by the researcher in this study is one that stays close to the original material and yet allows for categories to be generated which allow the reader of a research report to "make sense" of the data.

9.5 Time Frame

This study was conducted for almost two years. The following is the time frame that lasted from July 1999 to June 2001.

July 1999	Informed consent was obtained from all the participants.
August 1999	Pre-SPQ (Study Process Questionnaire) and Pre- Moore & Fitch Inventory of Learning (ILP) were administered.
July 2000	Pre-test Self-Assessment of Clinical Reflection & Reasoning (SACRR) was administered after their CEII (Clinical Education) placement. (End of second year of study)
September 2000	Post-test Self-Assessment of Clinical Reflection & Reasoning (SACRR) was administered after their CEII (Clinical Education) placement. (Beginning of Year 3 study)
January 2001	Post-test Self-Assessment of Clinical Reflection & Reasoning (SACRR) was administered after their CEIII (Clinical Education) placement. (Year 3 study)
January 2001	Post-SPQ (Study Process Questionnaire) was administered & Post- Moore & Fitch Inventory of Learning (ILP) were administered.
March 2001	Post-test Self-Assessment of Clinical Reflection & Reasoning (SACRR) was administered after their CEIV (Clinical Education) placement. (Year 3 study)
June 2001	Focus group interview was conducted.

9.6 Summary

This chapter outlined the methodology and design aspect of the study to show how the researcher of this study set to seek answers to the main research questions of developing clinical reasoning skills in student occupational therapy students in Hong Kong. This study adopted a longitudinal design method to investigate how clinical reasoning skills patterns develop in a cohort of 80 occupational therapy students over a period of three years. A detailed description of both qualitative and quantitative research paradigms also provided with rationale for using longitudinal study as opposed to others. The study method involved the use of a series of validated test instruments, The Study Process Questionnaire (Biggs, 1987c), The Moore & Fitch Inventory of Learning Preferences (cited in Woods, 1994), and The Self-Assessment of Clinical Reflection & Reasoning (Royeen et al, 1994) were administered pre-and post-the clinical training to assess students' approaches to learning, to determine the affective outcome of students and to evaluate students' level of clinical reflection and reasoning respectively. The study design also used the focus group interviews to understand students' clinical reasoning process.

The next chapter will focus on the methods of investigation and data analysis.

Chapter 10

RESULTS

10.1. Introduction

This chapter presents report of results, that is, a brief description of what happened in order of importance relative to the specific aims of the study. In the course of study, the researcher of this study has gained considerable amount of information, which has been included in this chapter. The main research objectives are set out in the introductory **Chapter 1** of the thesis. In order to meet these research objectives it has been necessary to obtain data on a sample of trainee occupational therapy students. The data includes information on learning approaches, learning preferences and clinical reasoning skills of the undergraduate students who have followed the Bachelor of Science (Honours) Degree in Occupational Therapy from 1998 to 2001 at the Hong Kong Polytechnic University.

This chapter provides a description of the student sample (**Section 10.2**) and a summary of the results of both the quantitative and qualitative results of data analysis. The outcome of statistical tests is included in the data analysis to demonstrate or support the statement of results. The results of the Study Process Questionnaire (SPQ) (**Section 10.3**), Moore & Fitch Inventory of Learning Preferences (ILP) (**Section 10.4**), Self-Assessment of Clinical Reflection and Reasoning (SACRR) (**Section 10.5**) and Focus group interview (**Section 10.6**) will be presented in the following sections:

10.2. Sample Population

As reported in the Research Methodology **Chapter 9**, the student cohort (80 students) who enrolled in the year 1998 as first year students is the sample of the study. The Bachelor of Science (Honours) Degree in Occupational Therapy programme is delivered on a full-time mode and as such all students followed the same curriculum throughout the entire duration of the programme, which is normally three years.

10.2.1 Demographic Profile

Table 10.2.1 presents the demographic data profile of the sample population. The student cohort data was classified according to gender, age and subject grades. The demographic profile of the student cohort revealed some interesting features.

Table 10.2.1

Demographic profile of sample at the beginning of the study

Age	Gender					
	Male *(n=25)* No.	%	Female *(n=55)* No.	%	Overall *(n=80)* No.	%
22	9	11.25%	17	21.25%	26	32.5%
23	12	15%	29	36.25%	41	51.25%
24	3	3.75%	4	5%	7	8.75%
≥25	1	1.25%	5	6.25%	6	7.5%
Mean Age	22.92 yrs		23.24 yrs		23.15 yrs	

Reference to the above **Table 10.2.1**, the sample made up of 55 female (69%) students and 25 male (25%) students with a mean age of 23.24 for female students and 22.92 for male students. It can be seen from the data profile: female students greatly out numbered their male counterparts by more than double in number. Similarly, the mean age of the female students (23.24) is slightly higher than their male (22.92) subjects at the time of enrolling on the undergraduate honours degree in occupational therapy programme. From the above results, it is also noticeable that 6 mature students making 7.5% of the sample total form the study cohort. The demographic profile of these students shown above is comparable to the age of the matriculation graduates in the Hong Kong population.

10.2.2 Educational Background

The student cohort of this study is the first batch graduating with honours in occupational therapy under the credit-based system, which was implemented in 1998/99. Under the credit-based system, these students had a wide choice in the subjects they took including technical subjects related to their profession, general education as well as language enhancing subjects to broaden their outlook on life and achieve a higher level of proficiency in English, written Chinese, Putonghua. The General Education subjects covered the domains of science, history, philosophy, values and aesthetics. To help students acquire the necessary language skills, the University made tremendous efforts to retain English as the formal medium of instruction and to provide mandatory language programmes to all students, to offer language enhancement programmes and to promote and develop a bilingual culture on campus (See **Table 10.2.2** below).

Table 10.2.2
Educational Background of the sample at the beginning of the study

Subjects			No. (n=80)	%
Science Subjects	HKCEE	Biology	79	98.75%
		Chemistry	74	92.5%
		Physics	72	90%
	HKALE	Biology	69	86.25%
		Chemistry	71	88.75%
		Physics	34	42.5%
Language Subjects	HKCEE	English (Syllabus B)	77	96.25%
		Chinese	58	72.5%
	HKALE	English	6	7.5%
	HKASL	English	65	81.25%
		Chinese	60	75%

Note: HKCEE (Hong Kong Certificate of Education Examination
HKALE (Hong Kong Advanced Level Examination)
HKASL (Hong Kong Advanced Supplementary Level

Before considering the educational background of the cohort, it is important to know the weighting of the subject grades and its relationship to admission procedure. According to the university's policy, all applicants are admitted based on their public examination results from which, a score will be calculated for each individual applicant based on his/her attainment grades (Grade A, B, C, D, E & F or below) in various subjects. There is a Hong Kong Polytechnic University (PolyU)-wide weighting system on a subject basis, to equate grades (for e.g., Grade A= 5, B=4, C=3, D=2 and E=1). All applicants must meet the University's General Minimum Entrance Requirements for Bachelor's Degree Programmes as well as the programme-specific entrance requirements. Applicants enrolling on BSc (Hons) in Occupational Therapy must fulfil the following additional requirements:

1. For entry with HKALE qualification, Grade E in HKCEE Biology or Human Biology is preferred.
2. Preference will be given to applicants who are able to communicate effectively in English, Cantonese and Putonghua.
3. Preference will be given to HKALE/HKALE (AS-Level) subjects in Biology, Chinese language or use of English.

To comply with the above requirements, it is noticeable from the data in **Table 10.2.2,** 79 (99%), which is significantly high, students, had obtained their Biology at HKCEE level. Another point worth noting is that 69 (86%) students out of 80 students had also achieved their Biology at HKALE level. In line with the University's language enhancement programme and the need to retain English as the formal medium of instruction, 77 (96%) which is significantly high in relation to those students who had passed their English (Syllabus B) at HKCEE level. In addition to English, about 75% of students had also achieved their Chinese language grades at HKCEE as well as HKASL levels, which once again demonstrates the excellent quality of the student cohort.

10.3. Students Approaches to Learning

Students' approaches to learning have already been defined in **Chapter 8.** Occupational Therapy Students approaches to learning were measured twice in August 1999 (pre-test) and January 2001 (post-test) by using the Study Process Questionnaire (SPQ) (Biggs 1987c) which has been used extensively in Hong Kong, whose cultural relevance has been researched, and for which Hong Kong norms are available (For reference, see **Table 10.3.3**). For reader's information, the SPQ consists of 42 items (See **Appendix 9.4.1**), 7 items for each combination of the three approaches, motive and strategy sub-scales (See **Table 9.4.1.1**).

10.3.1 Learning Approaches of the Student Population

Table 10.3.1 shows the total number and percentage of students in each approach (surface, deep and achieving) between pre-and post-test SPQ questionnaires

Table 10.3.1

Comparison of Learning Approaches of the Sample Population

Learning Approach	Pre-test (n=80)		Post-test (n=80)	
	Numbers	%	Numbers	%
Deep-biased	24	30%	26	32.5%
Surface-biased	34	42.5%	27	33.75%
No-biased	22	27.5%	27	33.75%

The data from the above results indicated that there was no significant movement in the deep approach between pre-and post-tests over the period of two years (p=1.00, McNemar's test). From the post-test results, it was observed that two more students appeared to be using deep approach, which is a positive shift. The results further confirmed that 5 (6.5%) more students moved towards achieving approach. These findings are in agreement with Biggs (1987a) in that students change from one approach to another over time because of contextual variations.

10.3.2 Comparison of Mean scores of the Whole Student Population by Sex and Age

The mean (SD) scores of the whole student population in their pre-and post-test questionnaires were compared using a paired t-test. Comparison in SPQ subscale scores were made by using repeated measures ANOVA, with pre-test and post-test scores as the dependent variables, gender and age group being the between-subjects factors (See **Tables 10.3.2a, 10.3.2b, & 10.3.2c).**

Table 10.3.2a

Mean Scores of Study Process Questionnaire (SPQ) for the Whole Sample

Subscale	*N* items	Alpha	Pre	Post	*T*	*d.f.*	*P<*
Surface Motive (SM)	7	.56	22.20	21.18	2.32	79	.023
Surface Strategy (SS)	7	.65	20.46	20.30	.37	79	n.s.
Surface Approach (SA)	14	.74	42.66	41.48	1.72	79	n.s.
Deep Motive (DM)	7	.64	22.85	23.15	-.66	79	n.s.
Deep Strategy (DS)	7	.70	24.49	23.33	2.67	79	.010
Deep Approach (DA)	14	.76	47.34	46.48	1.18	79	n.s.
Achieving Motive (AM)	7	.71	24.48	20.93	6.82	79	.000
Achieving Strategy (AS)	7	.75	19.90	20.43	-.99	79	n.s.
Achieving Approach (AM)	14	.75	44.38	41.35	3.64	79	.000

Reference to the above **Table 10.3.2a,** the results indicated that

- there were no differences on surface strategy (SS) and surface approach (SA), deep motive (DM) and deep approach (DA), and in achieving strategy (AS). The interpretation of the results suggested that students who use a rote learning method for their study were interested merely in their subject matter but aiming for higher grades without putting more effort for deep and meaningful learning. Furthermore, these students saw no connections between elements, concentrating as they do on the surface features of learning (Marton & Säljö, 1976).

- the findings also revealed some interesting outcomes. The post-test scores of surface approach (SA) which includes surface motive(SM) and surface strategy (SS), deep strategy (DS) and deep approach (DA), achieving motive (AM) and achieving approach (AP) showed a decreasing trend, whereas deep motive (DM) and achieving strategy (AS) scores increased slightly.

- when comparing the scores of surface approach (SA), the repeated measures analyses indicated that a significant change had occurred in students' study methods over the two-year period since the first testing. The change that took place was largely attributable to a lowering in the 'surface approach (SA)' scores over time, which suggests that the students were gradually becoming less reliant on rote learning – surely a trend in the right direction.

The mean scores of the SPQ were further broken down by gender and age group as shown in the following **Tables 10.3.2b & 10.3.2c**:

Table 10.3.2b

Mean (SD) Scores of Study Process Questionnaire (SPQ) by Sex

Subscale	Sex	Pre-test	Post-test	P<
Surface Motive	Male Female	22.92 (4.18) 21.87 (4.04)	22.16 (3.89) 20.73 (3.06)	0.320
Surface Strategy	Male Female	21.44 (4.38) 20.02 (3.30)	21.32 (3.22) 19.84 (3.07)	0.713
Deep Motive	Male Female	23.04 (4.12) 22.76 (4.20)	22.72 (2.69) 23.35 (3.01)	0.115
Deep Strategy	Male Female	24.96 (3.47) 24.27 (3.31)	23.44 (3.76) 23.27 (3.24)	0.028
Achieving Motive	Male Female	25.52 (4.11) 24.00 (4.86)	21.24 (4.25) 20.78 (3.03)	0.0005
Achieving Strategy	Male Female	19.96 (3.99) 19.87 (4.80)	19.76 (4.49) 20.73 (4.06)	0.940

Reference to the **Table 10.3.2b** above, the Results showed that there were significant decrease in scores for deep strategy (mean difference: 1.42, $p = 0.028$) and achieving motive (mean difference: 2.76, $p < 0.0005$), regardless of gender ($p = 0.314$) and age group ($p = 0.767$). No significant changes were observed for surface motive ($p = 0.320$), surface strategy ($p = 0.713$), deep motive ($p = 0.115$) and achieving strategy ($p = 0.940$).

Furthermore, findings also suggested that male students (**Table 10.3.2c**) were still tending to utilize less admirable study methods that the females found on the first testing. Indeed, the change in study methods that did occur was not influenced by such factors as students' self-esteem, locus of control, grades, IQ, or field independence (Watkins, Hattie, & Astilla, 1986).

The combined data shown in **Tables 10.3.2b & 10.3.2c** (below) suggest that Hong Kong students see their learning not just a rule-governed activity that they had to follow or that something spontaneously "came" to them. The changes may be small, however, the results have shown that these students change the way they thought about their learning in future. Likewise, deep and achieving scores would be expected to increase only over time, as students felt increasingly competent in their learning.

Table 10.3.2c

Mean (SD) scores of Study Process Questionnaire (SPQ) by Age

Subscale	Age	Pre-test	Post-test	P=value
Surface Motive	22	22.62 (4.11)	22.15 (3.63)	0.320
	23	22.20 (3.89)	20.63 (3.30)	
	24	23.00 (3.00)	22.00 (1.73)	
	25 or above	19.50 (6.09)	19.67 (3.61)	
Surface Strategy	22	20.38 (3.70)	20.15 (2.85)	0.713
	23	20.46 (3.72)	20.32 (3.29)	
	24	21.00 (3.74)	22.71 (2.43)	
	25 or above	20.17 (4.49)	18.00 (3.16)	
Deep Motive	22	22.92 (4.01)	23.50 (2.86)	0.115
	23	22.07 (4.10)	23.05 (3.16)	
	24	24.86 (4.60)	22.86 (2.12)	
	25 or above	25.50 (3.62)	22.67 (2.50)	
Deep Strategy	22	25.08 (2.10)	24.46 (3.49)	0.028
	23	23.93 (3.76)	22.54 (3.33)	
	24	24.86 (3.44)	24.00 (3.79)	
	25 or above	25.33 (4.76)	23.00 (1.41)	
Achieving Motive	22	25.81 (4.74)	21.46 (4.11)	0.0005
	23	24.24 (4.56)	20.39 (2.94)	
	24	23.71 (1.70)	22.86 (3.80)	
	25 or above	21.17 (6.18)	20.00 (2.28)	
Achieving Strategy	22	20.00 (4.42)	20.50 (4.92)	0.940
	23	19.32 (4.54)	20.10 (4.00)	
	24	21.29 (4.03)	22.00 (3.83)	
	25 or above	21.83 (5.74)	20.50 (2.74)	

10.3.3 Reliability of the Student Process Questionnaire (SPQ) Scales and Subscales.

Like any measuring instruments, the scales and subscales of the SPQ instrument were assessed for reliability. The following **Table 10.3.3** shows the comparison of the internal consistency reliability estimates alpha for the SPQ scales for samples of Hong Kong, Australian and British university students and compared their alpha estimates with the present study.

Table 10.3.3

Internal Consistency Reliability Coefficient Alpha of SPQ Scales and Subscales

SPQ scales and subscales	Hong Kong Students					Australian Students			British Students
	N=80	N=2338	N=1043	Alpha range	N=190	N= 2365	N= 823	N=255	N=245
	a	b	C	d	e	f	g	h	j
Sub-scales									
Surface Motive (SM)	0.56	0.53	0.61	0.53-0.56	0.56	0.51	0.61	0.60	0.53
Surface Strategy (SS)	0.65	0.65	0.57	0.55-0.65	0.55	0.62	0.66	0.69	0.56
Deep Motive (DM)	0.64	0.60	0.66	0.60-0.67	0.67	0.63	0.65	0.67	0.64
Deep Strategy (DS)	0.70	0.75	0.72	0.68-0.75	0.76	0.73	0.75	0.72	0.65
Achieving Motive (AM)	0.71	0.74	0.73	0.71-0.77	0.71	0.71	0.72	0.70	0.72
Achieving Strategy (AS)	0.75	0.69	0.76	0.69-0.77	0.77	0.75	0.77	0.74	0.73

a. Present PhD study
b. Biggs (1992)
c. Kember and Gow (1990)
d. Biggs & Watkins (1996)
e. Chan &Watkins (1995)
f. Biggs (1987a)
g. Biggs 1992)
h. Hattie & Watkins 1981)
j. O'Neil and Child (1984)

Note:

The HK norms are derived from the survey of over 5000 students in degree level courses at five institutions in Hong Kong, reported in Biggs, (1992)

The Australian norms are for 2365 students at 10 Australian College of Advanced Education and five Australian Universities, reported in Biggs (1987a)

From the results shown above in **Table 10.3.3**, it can be noted that the

- Alpha estimates of this study (a) varied from 0.56 to 0.75 and compares favourably with other studies reported in Hong Kong, Australia and U.K (for example, O'Neil & Child, 1984; Hattie & Watkins, 1981; Biggs, 1987a; Biggs, 1992; Chan & Watkins, 1995; Watkins & Biggs, 1996).

- Alphas reported in the present study are considered adequate for research purposes by Biggs (1987a & 1992) and Biggs & Watkins (1996) in their SPQ tertiary norming sample in Hong Kong (d), which ranged from 0.53 to 0.77, as well as in Australia, which ranged from 0.61 to 0.77 for College of Advanced Education students (g).

- Alpha estimates of the present study compares favourably with the alphas reported by O'Neil & Child (1984) for their British undergraduate students whose alpha values ranged from 0.53 to 0.77 (j).

- Alpha estimates between this study and a study reported by Chan & Watkins (1995) with their Hong Kong Nursing students revealed favourable results in which alpha estimates ranged from 0.56 to 0.77 (h). This is an important observation in that occupational therapy and nursing are closely related health care professions and they follow a curriculum in which clinical education forms an important and integral part of their curriculum.

10.3.4 Comparisons of the Hong Kong Polytechnic University students from other courses and Hong Kong Nursing students with students of this study

The **Table 10.3.4** shows the mean SPQ scores obtained from the present study are compared with mean SPQ scores of students from other courses undertaken at the Hong Kong Polytechnic University and the mean SPQ scores of Hong Kong nursing students to lend further evidence of reliability since all programmes considered are at the undergraduate level and are closely follow the Hong Kong Tertiary Institutions' General Admission's Policy.

Reference to the **Table 10.3.4**, at the outset, for the benefit of readers, particular attention is drawn to courses shown in columns (b), (c), and (h). All three professions, Rehabilitation Sciences (b), Diagnostic Sciences (c) and Nursing (h) are health-care related disciplines and that there is a strong foundation of basic, behavioural, biological and clinical sciences (For example, Anatomy, Physiology, Psychology, Sociology, Neurology, Orthopaedics etc.) curriculum common to all these professions. Furthermore, the Department of Rehabilitation Sciences offer both occupational therapy and physiotherapy programmes and as such these two programmes follow common curriculum except modality-specific modules.

Table 10.3.4

Comparison of Mean scores of the Study Process Questionnaire (SPQ) between the Hong Kong Polytechnic University students and Hong Kong Nursing students

Learning Approaches	The Hong Kong Polytechnic University Students									HK Nursing students	
	Davies, Sivan & Kember (1994)		Kember & Gow (1991)					Present Study		Chan & Watkins (1995)	
	Year 1	Year 2						Year 1	Year 3	Year 1	Year 3
	a.		b.	c.	d.	e.	f.	g.		h	
Surface Approach	42.14	42.80	41.3	42.5	41.3	44	43	42.7	41.4	44.46	44
Deep Approach	45.96	45.47	46.2	45	45.6	45	45	47.3	46.3	47	43.48
Achieving Approach	44.68	43.35	42.2	42.3	43	42.5	41.5	44.3	41.4	45.21	39.5

a. Business Studies
b. Rehabilitation Sciences
c. Diagnostic Sciences
d. Engineering
e. Accountancy
f. ALL (a+b+c+d+e….)
g. Present Study
h. Nursing

Note:

The Hong Kong Polytechnic University Students

b, c, d, e,f =Kember & Gow (1991) carried out a survey of 2143 students in degree level courses at The Hong Kong Polytechnic University (formally known as Hong Kong Polytechnic)

In addition, another point worth noting from the above results is that Kember & Gow (1991) in their study included both occupational therapy and physiotherapy students among other students; this is shown collectively in column (f). Since the data in Column (f) is made up of undergraduate students from the health care, engineering, business and accountancy professions, comparing the present study with these professions will provide wider representative sample, thus making this study more valid and reliable.

Furthermore, mean scores obtained by students in this study shown in the column "g" with that from other courses in Hong Kong tertiary institutions shown in the column "f", exhibited a very similar pattern. Some of the highlights about the data in **Table 10.3.4** are presented below:

- Davies, Sivan & Kember (1994) in their study reported a slight increase in mean scores from 42.14 to 42.80 with respect to the surface approach of their Business Studies students; this trend however was not confirmed in this study (g) as well as in nursing studies students (h). In case of occupational therapy students (g), mean scores fell from 42.7 to 41.4 and in nursing students (h), mean scores also reduced from 44.46 to 44.

- From the above findings, it is also worth pointing out that occupational therapy students' scores from Year 1 to Year 2 follow a very similar pattern to that of nursing studies students (Chan & Watkins, 1995) in that mean scores of SPQ fell slightly from Year 1 to Year 3 on the three learning approaches. This observation is of particular importance as occupational therapy and nursing are integrated health care professions in which the development of clinical reasoning skills in a student novice forms an important aspect of the clinical education subjects.

- Kember & Gow (1991) presented mean SPQ scores for academic departments shown in columns (b, c, d & e). The overall mean scores for the entire sample, labelled as 'ALL' is also shown in column (f). As reported by authors, it was an extensive study in which mean scores of students in degree level courses at the then Hong Kong Polytechnic were compared with Australian norms (Biggs, 1987a). When comparing the mean scores of all Hong Kong students by academic departments with the current study (g), it is interesting to note that the results are very similar in all three approaches.

- The results of this study also confirmed that the mean scores of the previous students of Rehabilitation Sciences Department (b) are very similar and comparable in all three learning approaches with this study. It is also noticeable that, overall, the Hong Kong students including students of this study have somewhat higher scores on the deep approach scales and lower scores on the surface approach scales.

When comparing the data in both **Tables 10.3.3 & 10.3.4**, although, comparison between Australian and Hong Kong students is not straightforward as identical departments were sampled in the two studies, it is reasonable to conclude that the surface and deep scores of Hong Kong students are at least comparable to those of students from CAE's in Australia (Biggs, 1987a), and if anything, the Hong Kong students' scores are lower on the surface approach and higher on the deep approach; a similar trend is also observable in this study.

When comparing the scores of achieving approach sub-scales with the present study, it seems to back the anecdotal impression. The overall scores for Hong Kong students for achieving approach are higher than the CAE scores, suggesting that Hong Kong students are slightly more motivated, keener and slightly more completive. When comparing the mean scores, the striking feature of the results including this study in **Table 10.3.4** is that they do not confirm with the anecdotal evidence that rote learning is far more widespread among Hong Kong tertiary students than among their counterparts in countries like Australia or the United Kingdom (See **Chapter 8** for more details).

It is also worth mentioning that Australian students' approaches to study seem to be similar to that of British students. Research studies using the SPQ instruments (Hattie & Watkins, 1981; O'Neil & Child, 1984; Biggs, 1987a or the ASI of Ramsden & Entwistle, 1981; Entwistle & Ramsden, 1983; Watkins, 1983; Harper & Kember, 1986) found no significant differences between British and Australian student norms.

10.3.5 Summary

The results of this study did not confirm the anecdotal claims that rote learning was far more widespread among Hong Kong tertiary students than their counterparts in Australia or the United Kingdom. Furthermore, the findings of this study are also in agreement with many empirical cross-cultural studies (Kember & Gow, 1990; Biggs, 1992; Watkins, Regmi, & Astilla, 1991). As it can be noted from the findings, over all, the Hong Kong students have somewhat higher scores on the deep approach scales and lower scores on the surface approach scales than Australian Science CAE students. When comparing the scores of achieving approach subscales, overall, Hong Kong students' scores are higher than CAE scores, suggesting that Hong Kong students may have better organisational skills and time management, take keen interest in their studies, and are more competitive.

The results of the study also showed that there was a close relationship between demographic variables and SPQ subscales. The data also appear to follow a pattern consistent with other studies in Australia and the U K including Hong Kong. The results however must be interpreted with caution, since students' approaches to learning reflect a combination of their levels of interest for academic endeavours, cultural traits of the group of individuals and the academic demands of the institution. As stressed by Biggs (1992) a student's orientation to study represents the outcome of complex and dynamic processes affected by interactive individual and contextual factors.

10.4 The Moore & Fitch Inventory of Learning Preferences (ILP)

This section describes the data analysis of the Moore and Fitch Inventory of Learning Preferences (ILP) and its relationship to the Study Process Questionnaire (SPQ). It was reported in the Methodology **Chapter (9)** that the changes in students' attitudes to learning environment were captured by using the Moore and Fitch Inventory of Learning Preferences (ILP) instrument, which was developed by Moore and his associates (Moore-West et al, 1989; cited in Woods, 1994) to study students' preferences for course structure, content delivery, and assessment as well as peer interaction. The Data were analyzed by using SPSS software for Windows (Version 10; SPSS, Chicago, IL, USA). For reader's reference, ILP consists of 34 items that represent the students' learning environment. In this instrument, students were required to select 10 items out of the 34 items that best reflected their ideal or most preferred learning environment. (See **Appendix 9.4.2**).

Reference to **Table 10.4**, the frequency of each item selected by the students was recorded and calculated as percentage scores in the pre-and post-test ILP questionnaires. The researcher of this study interpreted the results and its implication for the occupational therapy curriculum based on students' attitudes to learning in terms of their preference for a particular learning environment. As noted earlier, this was done by dividing the 34 items of ILP into four broad categories (Moore-West et al., 1989; Wun, Chan, & Dickinson, 1999). On further examination of the description of individual items in each category in **Table 10.4** below, it is noted that items, which are closer to category 1, reflect a preference for more teacher-centred learning. Similarly, items, which are closer to category 4, suggest preference for student-centred independent learning (Wun, Chan, & Dickinson, 1999).

Table 10.4

Item Numbers of ILP and the Corresponding Categories.

More towards teacher-centred

Category	Description (proposed themes/concepts)	Item number
1	Preference for a learning environment in which students are given the right answers, reproduce information in tests, provide clear directions and guidance.	2, 4, 8, 13, 16, 19, 28 and 33
2	Preference for a learning environment in which preference is given for class discussion, different learning methods including relevance of course material, reward with good grades, provides relevant experience.	1, 5, 7, 10, 14,21, 25, 29 and 32
3	Preference for a learning environment which encourages individual thinking, individual control over the course content, express own opinions and learn from peers.	3, 6, 9, 12, 18, 23, 26, and 30
4	Preference for a learning environment, which promotes personal motivation, provides an atmosphere for independent, reflective and integrated learning.	11, 15, 17, 20, 22, 24, 27, 31 and 34

More towards student -centered

(Adapted from Wun, Chan, & Dickinson, (1999), p93)

10.4.1 Analysis of Inventory of Learning Preferences (ILP) Data

Descriptive statistics and frequency distribution methods were used to calculate mean scores from the total scores of the pre- and post test questionnaires. In addition, a paired-sample t-test was also used to compare students' performance in pre- and post-test course levels and to identify if mean score values were significantly different from each other (See **Table 10.4.1** below)

Table 10.4.1

Paired Sample T-Test For Pre- and Post-Course Mean Scores on ILP

	N	*Mean*	*SD*	*p-value*
Pre	80	6.95	1.73	.003*
Post	80	6.01	2.57	

(*p-value <0.05)

Table 10.4.1 presents the mean scores of the Moore & Fitch Inventory of Learning (ILP) questionnaire (cited in Woods, 1994) obtained in pre-test and post-test course. The results of the paired sample t-test suggested that the difference between the pre- and post-course levels was statistically significant (6.95 versus 6.01, $p<0.05$).

10.4.2 Frequency of Pre-and Post Inventory of Learning Preferences (ILP)

The following **Table 10.4.2** presents the results of the frequency of items (in percentage) selected by students in pre-and post- test questionnaires as their preferred learning environment in each category. The analysis of data showed no statistical difference between items in categories 1, 3, and 4 with an exception of items in category 2, which, is statistically significant (-7.4% change, $p<0.001$). On further examining the items in category 2 (1, 5, 7, 10, 14, 21, 29, and 32), it s interesting to note that students preferred a learning environment that would encourage class discussions through a variety of teaching/learning methods, provide relevant experience and course material and reward with good grades to reflect their hard work.

Table 10.4.2

Frequency of Items within Each Category of Learning Environment Selected by Students in the Pre- and Post-Course ILP Questionnaire

Learning Environment Categories	Pre (Total Score) (%)	Post (Total Score) (%)	% Change	*p-value*
1 (8 items)	71 (8.88)	94 (11.75)	2.87%	.498
2 (9 items)	314 (34.8)	247 (27.4)	-7.4%	.000*
3 (8 items)	164 (20.5)	134 (16.75)	-3.75%	.051
4 (9 items)	231 (25.67)	202 (22.44)	-3.23%	.070

(*p-value<0.001)

Furthermore, the above results also indicated that students preferred their professors to be more of an explainer rather than just an instructor so as to make them more independent in their learning. This is an important educational implication in that students preferred a learning environment that would encourage deep and meaningful learning approaches making them more student-centred as they move from stage to stage in their curriculum

10.4.3 Students' Attitudes to Learning Environments Pre-and Post Inventory of Learning Preferences Questionnaire

Table 10.4.3 below shows the percentage of students who selected each item on the scale in both pre-and post-test course questionnaire (Moore & Fitch Inventory of Learning Preferences, cited in Woods, 1994). The results are analysed by frequency distribution method.

From the comparison of frequency of score differences between the pre-and post-test course questionnaire, it can be noted from the results that there are five items (items 1, 24, 27, 28, and 32) show 10 or more percentage points change and six items (items (9, 11, 14, 26, 29 and 34) show 15 or more percentage points change.

Table 10.4.3

Differences in Students' Attitudes to Learning Environments Pre-and Post Inventory of Learning Preferences Questionnaire (Moore & Fitch Inventory, cited in Woods, 1994)

Category	Item No.	My ideal learning environment	Pre (%) *n=80*	Post (%) *n=80*
1	2.	Would have the professor give me all the theory and information I need to know.	22.5	26.3
	4.	Would be where I take effective notes on what is presented in class and reproduce that information on tests.	12.5	12.5
	8.	Would include straightforward, not 'tricky' tests, covering only what has been taught and nothing else.	5	6.3
	13.	Would be where the professor is an expert who knows all the answers.	13.8	17.5
	16.	Would have the focus on having the right answers rather than on discussing methods on how to solve the problems.	1.3	5
	19.	Would be where the professor provides me with clear directions and guidance for all course activities and assignments.	60	58.8
	28.	Would be lectures since I can get the information I need to know most efficiently.	11.3	21.3*
	33.	Would be where I could listen intently to the professor and not to classmates and peers for answers to questions.	7.5	7.5
2	1.	Would provide assignments with practical everyday applications.	43.8	32.5*
	5.	Would emphasise class discussion but I would expect the professor to tell us the right answer.	40	31.3
	7.	Include grading that is by a prearranged point system (for homework, tests, and final) since I think that is most fair.	21.3	13.8
	10.	Would be where the professor doesn't tell me the answers; rather he/she shows me how to find the answers for myself.	16.3	21.3
	14.	Would provide experiences and material that is relevant to what I need to know.	76.3	58.8**
	21.	Would reward me with good grades when I worked hard to learn the material.	35	26.3
	25.	Would encourage me to learn using lots of different learning methods.	38.8	31.3
	29.	Would have the professor who was not just an instructor, but more an explainer, entertainer and friend.	63.8	48.8**
	32.	Would provide a relaxed atmosphere where discussion is encouraged.	57.5	45*
3	3.	Would be where I would have a lot of control over the course content and class discussion.	15	22.5
	6.	Would be where I have my own opinions and I can think for myself.	36.3	37.5
	9.	Would let me learn on my own because I hate being spoon-fed by professors.	22.5	6.3**
	12.	Is where my opinion counts, but I have to support it with factual evidence?	28.8	21.3

Category	Item No.	My ideal learning environment	Pre (%) *n=80*	Post (%) *n=80*
	18.	Would reward me with high grades for independent thought.	25	23.8
	23.	Would let me learn from my classmates and peers.	31.3	28.8
	26.	Would allow peers the right to have their own opinions.	36.3	20**
	30.	Would be a 'free-flowing' class that does not follow a strict outline.	10	7.5
4	11.	Would provide a flexible class where I can explore independent learning options.	50	33.8**
	15.	Would be where the learning is a mutual experience where I contribute to the teaching and learning in class.	18.8	23.8
	17.	Would value my classmates as sources of information, not only as companions.	23.8	28.8
	20.	Would take learning seriously and be where I feel personally motivated to learn the subject.	47.5	43.8
	22.	Would provide me with a professor who is a source of expertise only in a particular subject area.	7.5	12.5
	24.	Would provide a classroom atmosphere of exploring and debating new ideas.	37.5	25*
	27.	Would include exams and assessment as part of the learning process.	23.8	13.8*
	31.	Would provide a workshop or seminar atmosphere so that we can exchange ideas and evaluate our own perspectives on the subject matter.	20	28.8
	34.	Would be where I can make connections among various subject areas and am encouraged to construct an adequate argument.	60	42.5**

***10 or more percentage points change**

****15 or more percentage points change**

The details of the differences in students' attitudes to learning environment in the pre-and post ILP questionnaire scores are presented from category 1 to Category 4 (**Table 10.4.3**) as follows:

<u>Items in Category 1</u>

- In this category, students' preferred only one <u>item 28</u> (*"Would be lectures since I can get the information I need to know most efficiently"*). The increase in post-test scores demonstrated that students preferred more specific information, particularly clinical expertise for preparation to enter the job market. The 10% gain in post-test results further revealed that after the course, more students preferred lectures to other styles of learning and more direct and specific information from professors.

Items in Category 2

- There are four items (1, 14, 29 and 32) in category 2 and all of these items are shown to be statistically different ($p<0.001$). The majority of students in this category seemed to prefer a variety of learning methods, guided by course relevance, applicability and reward including a relaxed atmosphere for class discussion (items 1, 29 and 32). On further analysis of these items individually, students indicated a preference for more involvement in the variety of assignments given and learning methods relating to assignments including perhaps different learning styles (item 1- *"Would provide assignments with practical everyday applications"*).

- Item 29 (*"Would have the professor who was not just an instructor, but more an explainer, entertainer and friend"*), results indicated that in students' minds, the professor is in an expert who passes knowledge and information and this is what they expect. Furthermore, they see roles of their professor such as mentoring, a friend, and entertainer as being important. Students indicate through this item that they need less dependence on course material/information from their professor. This is an indication of more independent learning on the part of students.

- The drop by 12% in the post-test scores of item 32 (*"Would provide a relaxed atmosphere where discussion is encouraged")* indicated that for students a relaxed atmosphere might mean too much independent learning and not enough of the expertise that they need. With regard to item 14 (*"Would provide experiences and material that is relevant to what I need to know"*); it is worth reporting that this item ranked as number one by students in their pre-and post-test questionnaire as their most preferred ideal learning environment. This high ranking implies that students want more relevant expertise from their professor.

Items in Category 3

- In relation to category 3, items (9 and 26), on examining the pre-and post-test percentage score difference with regard to item 9 (*"Would let me learn on my own because I hate being spoon-fed by professors")*, students clearly indicated that they prefer more direction from professors and not left to make decisions on their own. Students' like to feel that professor is there to provide back up when they try to find out information on their own. After the course, the students indicated their lack of concern to use their peers as experts. Furthermore, as a graduating student, their preference also indicated less emphasis on debating but more emphasis on acquiring clinical expertise (item 26, *"Would allow peers the right to have their own opinions")*.

Items in Category 4

- This category includes items (11, 24, 27 and 34). The percentage score difference between pre-and post-test for item 11 (*"Would provide a flexible class where I can explore independent learning options* ") indicated their preference for more structured learning environment, such as concrete information rather than flexible-type class. In their mind the teacher was an expert.

- One might expect the percentage scores of item 24 ("*Would provide a classroom atmosphere of exploring and debating new ideas")* to go up, but the decrease in percentage scores indicates that students are less interested in explanation. However, this issue is very much related to the styles of a Chinese Learner and will be discussed in detail in the next **Chapter (11)**.

- With regard to item 27 ("*Would include exams and assessment as part of the learning process*"), the drop in students' percentage score in the post-test suggested that there was a shift in the items relating to examinations and assignments (see also item 21 ("*Would reward me with a good grades when I worked hard to learn the material").* away from formal examinations, but towards the desire for reward (high grades) for effort. The results also supported to the idea that in students' minds assessment is not part of the learning process. Some implication of this will be further elaborated in the next chapter.

- Item 34 ("*Would be where I can make connections among various subject areas and am encouraged to construct an adequate argument")* clearly indicates a learning preference, which focuses for more in-depth information, less in breadth and correlations between various subjects. In addition, this item together with items 11, 24, and 34 indicate preferences for classroom discussion, different learning methods including relevance of course material and relevant experience (See items in Category 2 for comparison).

Over all, comparison of pre-and post Inventory of Learning Preferences (ILP) course questionnaire percentage scores on students' attitudes to learning revealed some results, which certainly suggest some influence for curriculum development. The results indicated that students prefer to learn together in a classroom atmosphere where teacher is an expert and leads them through learning process but does not spoon-feed them.

10.4.4 Inventory of Learning Preferences (ILP) Data and its Relationship to the Study Process Questionnaire (SPQ)

The analysis of Inventory of Learning Preferences (ILP) (Moore & Fitch Inventory (cited in Woods, 1994) data and its relationship to the Study Process Questionnaire (SPQ) (Biggs, 1987c) is presented in **Table 10.4.4** below.

Furthermore, the items chosen by the greatest percentage of students (most preferred) and least percentage of students (least preferred) in pre-and-post-course questionnaire are also shown in **Table 10.4.4** below.

Table 10.4.4.

Most Preferred vs. Least Preferred Learning Environments Selected in Pre- and Post-Course by Students

	Pre (n=80)					Post (n=80)				
Preference	Item No.	% Total	DB%	SB%	NB%	Item No.	% Total	DB%	SB%	NB%
Most preferred	14	76.25	32.79	40.98	26.23	14	58.75	23.40	46.81	29.79
	29	63.75	23.53	50.98	25.49	29	48.75	17.95	46.15	35.90
	19	60	25	47.92	27.08	19	48.75	25.64	43.60	30.76
	34	60	37.5	35.42	27.08	32	45	22.22	44.44	33.34
	32	57.5	26.09	47.82	26.09	20	43.75	34.29	37.14	28.57
Least Preferred						9	6.25	0	40	60
	8	5	0	100	0	8	6.25	60	20	20
	16	1.25	100	0	0	16	5	25	25	50

DB= Deep-biased learning approach
SB= Surface-biased learning approach
NB= No-biased learning approach

Reference to the above data, the results confirmed that students chose items mostly from category 2 (items 14, 29, and 32) for their most preferred learning environment and only fewer items from other categories such as category 1 (item 19) and category 4 (item 34). Another point worth noting is that items 14, 19, 29 and 32 appeared to be most popular among students who selected these four items as their most preferred learning environment in both periods of pre-and post-course administration. Items 8, 9, and 16 were rated by students as least preferred, in particular items 8 and 16 which were chosen at the beginning (pre-test)) and at the end of course (post-test).

On comparison of total percentage change of scores for all items (items 14, 29, 19, 34 and 32) between pre-test and post-test ILP questionnaires, results revealed very encouraging findings. The overall drop in all items of the post-test total scores (pre-test range 58%-76%, post-test range 44%-59%) is a positive indication which clearly suggests how students' preference for a particular learning environment influences their choice of learning approaches. Furthermore, when most preferred learning environment items are compared with that of students' approaches to learning in terms of their total percentage change, the results revealed somewhat mixed pattern. Among three groups of students, NB students achieved significant gains in all five items (items 14, 29, 19, 34 and 32) in their post-test scores, where as DB and SB students showed a marked shift in their preferred learning environments between pre-test and post-test scores. From the post-test results, it can be noted that even after the course, that is at the end of the final year, the SB students preferred more in-depth and specific information from their professor for their learning (item 14, *"Would provide experiences and material that is relevant to what I need to know*). However, this was not the case with DB students who did not find it most important and to have specifics from their professor to maximise their learning and understanding.

In relation to item 19 (*"Would be where the professor provides me with clear directions and guidance for all course activities and assignments"),* while the percentage difference of DB students' scores between pre-and post-test remain more or less steady, the percentage scores of SB students dropped in the post-test. It can be concluded from these results that SB students' preferred to put more focus on self-directed and peer learning after the course rather than relying on professors for more guidance and direction. With regard to item 29 (*"Would have the professor who was not just an instructor, but more an explainer, entertainer and friend*") findings showed that there was a drop in percentage scores from pre-test to post-test in groups, DB and SB students. This trend appears to suggest that both groups prefer an environment in which their professor gives more in depth explanation. There is a suggestion that students prefer the professor to have a more collegial approach and to be more of an entertainer and friend rather than a teacher.

Though the percentage scores decreased in terms of ILP, the relationship between the scores of item 32 (*"Would provide a relaxed atmosphere where discussion is encouraged"*), DB and SB students changed. From the percentage score differences between pre-and post-test scores, it is noticeable that DB students' increased their scores by 8% in the post-test indicating that a relaxed atmosphere is conductive to good learning. The SB students' scores on the other hand, dropped by 10% in the post-test suggesting this was not their ideal learning environment. This change in students' attitude perhaps explains the fact that surface learner's focus more on what appears to the most important topics or elements and not on the surface features.

A comparison of percentage score differences of NB students between pre-and post-test results, it is rather surprising to note that about 30% of students opted to remain as neutral. From the findings, however, it is clear that NB students also preferred all those items chosen by the DB and SB students as their most preferred learning environment. This finding is in agreement with Biggs (1993) who noted that some students retain their learning style.

The total percentage scores of least preferred items (items 8, 9 and 16), which are selected by the least percentage of students, are very low as compared to most preferred items, which are chosen by the greatest percentage of students. The least preferred items despite their low scores tend to indicate some curricular implications. There is an interesting observation of pre-test results in that DB students preferred the item 16 ("*Would have the focus on having the right answers rather than on discussing methods on how to solve the problems*") and SB students preferred the item 8 ("*Would include straightforward point system (for homework, tests, final) since I think that is most fair* "), before the course that is at the end of their second year of study. The scores of these two items however dropped lower in the post-test at the end of their third year of study. The findings indicated that after the course, the students might have preferred less guidance with right answers and less direction and less reproduction in tests. Students also seemed to prefer a less individual control over the course (item 9, *"Would let me learn on my own because I hate being spoon-fed by professors"*).

10.4.5 Summary

The comparison of the pre-and post-course ILP questionnaire scores on students' attitudes to learning has implications for teaching, particularly for proponents of Problem Based Learning. The findings showed that both deep-biased and surface-biased students change over time as it depends on context of learning (Biggs, 1992). For example, among three groups of students, NB students recorded significant gains in all five items (14, 19, 29, 34 and 32) in **Table 10.4.4** in the post-test scores, whereas DB and SB students downward shifted in their preferred learning environments between pre-and post-test scores. Of the particular note was the percentage difference on item 32 in which DB students increased their scores by 8% in the post-test which might indicate that a relaxed atmosphere is conducive to good learning. The SB students' scores on the other hand dropped by 10% in the post-test suggesting this was not their ideal learning environment. This change in students' attitudes perhaps explains the fact that surface learners focus less on what appears to the most important topics or elements and more on the surface features. The drop in students' percentage score in the post-test (item 27) suggested that there was shift in the terms relating to examinations and assignments (see also item 21, away from formal examinations, but towards the desire for reward (high grades) for effort.

The above results might indicate that teaching context may exert a considerable influence on learning during the process of learning (Biggs, 1987a). This may be related to exposure to clinical education settings and development of clinical reasoning skills, though other factors such as maturity may explain the change. The experience, which occupational therapy students gain in the clinical setting, offers a good opportunity to integrate skills learned in practical laboratory with theory learned in the classroom. Furthermore learning through the interactive model promotes what Higgs & Jones (2000) call deep learning i.e. learning for understanding and meaning rather than rote learning of facts and principles. Use of deep learning in a clinical setting certainly strengthens the content and organisation of the knowledge that the therapists use during clinical reasoning

The results of the study also supported to the idea that some students remained fairly secure over time and some students adopted a consistent approach to their learning. According to Biggs (1999), some teaching environments make it easier for students to "go deep" than others, so that the mean of all of students' responses to learning inventories, such as ILP, SPQ can have implications for curriculum development and refinement and teaching and learning styles. The findings and implication for occupational therapy education will be further discussed in the next **Chapter (11).**

10.5 Evaluation of Clinical Reflection and Reasoning using Self-Assessment of Clinical Reflection and Reasoning (SACRR) Instrument and its Relationship to GPA and SPQ Data

As reported earlier, the Self-Assessment of Clinical Reflection and Reasoning (SACRR) instrument (See **Appendix 9.4.3**) was used to measure occupational therapy students' development of clinical reasoning skills and reflective thinking ability based on their experiential learning during four instances (CEII-pre, CEII-post, CEIII-post and CEIV-post) of clinical education placements, which took place over two years from July 2000 to June 2001.

For reader's reference, the duration of the CEII clinical education placement was eight weeks, CEIII was nine weeks and CEIV was 10 weeks respectively (for details, refer to Clinical Education calendar (**Figure 3.4.3**). It was also reported earlier that the authors (Royeen et al, 1994) developed the SACRR instrument, which was shown to be valid and reliable with the internal consistency and test-retest reliability of Cronbach's alpha 0.87 for pre-test and 0.92 for the post-test respectively.

10.5.1 SACRR Results of Factor Analysis

Before analysing the results of SACRR, the structure of SACRR items is first considered using factor analysis method. The reason for doing this was to establish whether SACRR instrument based on a uni-dimensional or multi-dimensional construct. From the original authors of the SACRR instrument (Royeen et al, 1994), it was clear that they did not undertake this method. Factor analysis was carried out on the 26 items of SACRR using the maximum likelihood with varimax rotation to study the possible structures of 26 items, which represent 24 behaviours or actions (Roth 1989).

There are actually several ways that factor axes can be statistically rotated to arrive at any given solution In this study, varimax rotation is considered as opposed to other forms of rotation (e.g. quartimax rotation, equimax rotation) because varimax rotation generally presents the clearest factor structure and as such, varimax rotation approach was used to minimise the complexity of the loadings within each factor (Portney & Watkins, 2000). Furthermore, this study is also aimed at looking at the relative strength of the association between each of the variables within a factor and the themes/concepts that the factor represents.

For the purpose of factor analysis, CEIV Clinical Education placement results are used with the assumption that this gives the most stable and well-established trait. **Table 10.5.1a** (See below) contains four factors, which accounts for a total of 47.22% of variance with eigenvalues ranged from 6.38 to 1.67. The scree-plot in **Figure 10.5.1** also indicates a four-factor model for the 26 items of SACRR.

Table 10.5.1a

Factor loading of the 26 items of Self-Assessment of Clinical Reflection and Reasoning (SACRR) after maximum likelihood varimax rotation

	Factor Loadings			
Items	Factor 1	Factor 2	Factor 3	Factor 4
CEIV10	**0.81**	0.02	0.26	-0.02
CEIV8	**0.74**	0.19	0.09	-0.17
CEIV7	**0.72**	0.02	0.13	0.20
CEIV9	**0.70**	0.02	0.19	-0.12
CEIV26	**0.69**	0.30	0.08	0.25
CEIV3	-0.11	**0.66**	0.02	0.11
CEIV25	0.11	**0.65**	-0.03	0.07
CEIV1	0.35	**0.62**	0.00	0.17
CEIV4	0.13	**0.59**	0.31	-0.09
CEIV5	-0.09	**0.54**	0.37	-0.11
CEIV2	0.50	**0.50**	-0.20	0.07
CEIV20	0.23	**0.46**	-0.10	-0.23
CEIV18	0.31	**0.37**	0.10	-0.08
CEIV24	0.33	**0.34**	0.03	0.15
CEIV11	0.14	**0.33**	0.26	0.28
CEIV16	0.30	0.19	**0.76**	-0.10
CEIV15	0.28	0.19	**0.73**	-0.10
CEIV14	0.19	0.14	**0.63**	-0.03
CEIV6	0.13	-0.12	**0.50**	0.08
CEIV13	-0.25	0.33	**0.48**	0.10
CEIV19	0.03	0.22	**0.44**	0.17
CEIV22	0.12	0.31	**0.43**	0.27
CEIV17	0.10	0.07	0.14	**-0.77**
CEIV21	0.20	0.11	0.44	**0.54**
CEIV23	0.08	0.03	0.44	**0.49**
CEIV12	0.31	0.35	0.22	**0.39**

Reference to the scree-plot shown below (**Figure 10.5.1**), it is noticeable that a two-factor solution will account for only 32.8% of the total variation. Since it is considered to be low, a four-factor solution is attempted and this accounts to 47.2% of total variation. By doing this way, almost 50% of the information is retained. From the factor analysis results and the thematic analysis of the 26 items, four groups are identified as shown in the **Table 10.5.1b**.

Figure 10.5.1

Scree-Plot of 26 items of SACRR

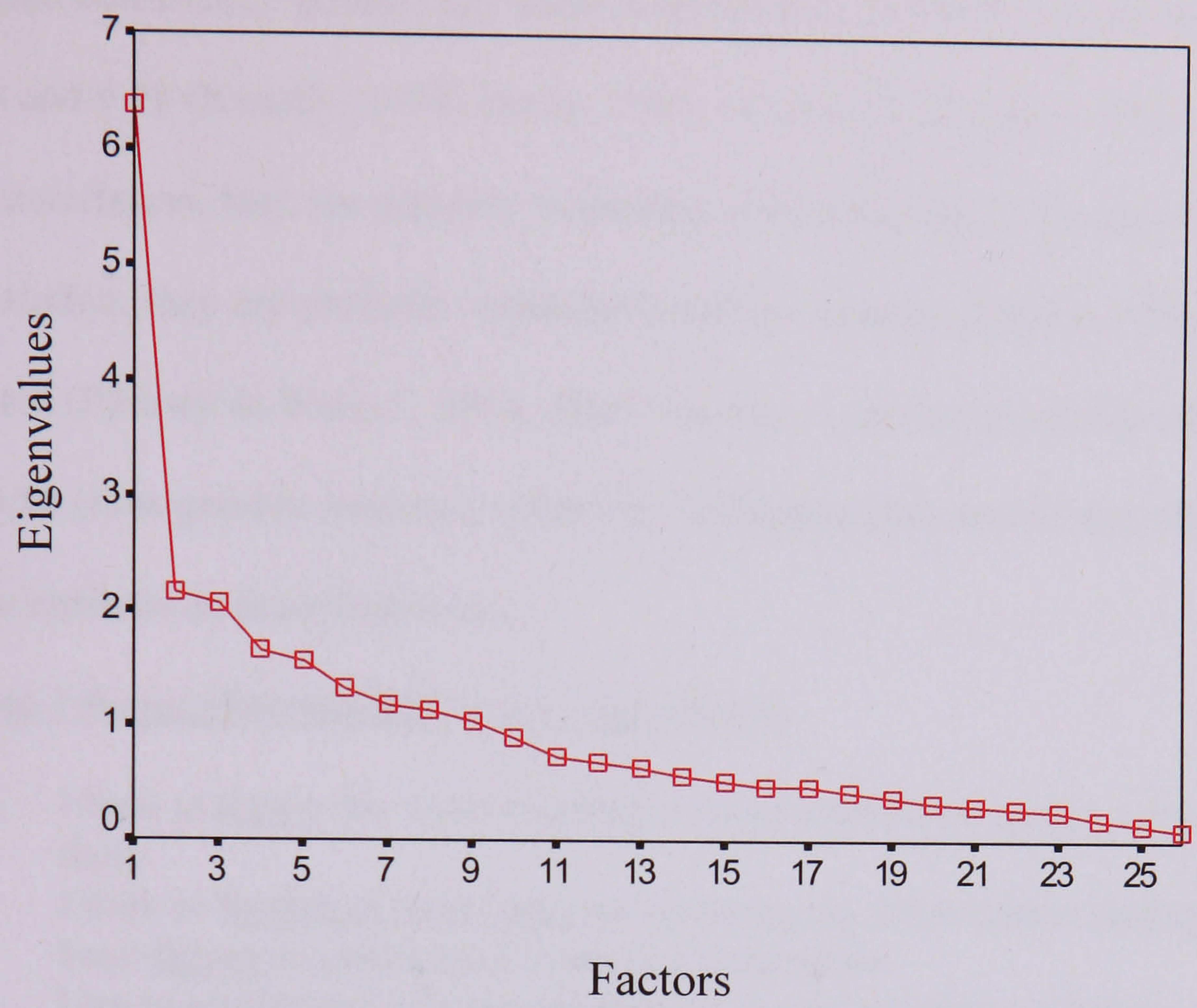


Table 10.5.1b.

Factor Groupings of SACRR Items

Proposed Themes/Concepts	Factor Groupings	Question no.	Cronbach's Alpha
Knowledge/Theory application	1	7, 8, 9, 10, 26	0.83
Decision making based on experience and evidence	2	1, 2, 3, 4, 5, 11,18, 20, 24, 25	0.75
Dealing with uncertainty	3	6, 13, 14, 15, 16, 19, 22	0.74
Self-reflection and reasoning	4	12, 17, 21, 23	0.52

Reference to the above **Table 10.5.1b**, all four factor groupings consisted of five to ten items of Self-Assessment of Clinical Reflection and Reasoning (SACRR) with a similar range of factor loadings. Furthermore, Cronbach's Alpha (Cronbach, 1951) was also used to examine the internal consistency of the individual items for each subscale. According to Portney & Watkins (2000), reliability coefficients below 0.50 represents poor reliability, coefficients from 0.50 to 0.75 suggest moderate reliability, and values above 0.75 indicate good reliability. Several sources suggest that a scale with strong internal consistency should only show a moderate correlation among the items between 0.70 and 0.90 (Nunally, 1978; Hattie, 1985; Streiner & Normal, 1995). If items have a low correlation, they are possibly measuring different traits. If the items have too high a correlation, they are probably redundant, and the content validity of the scale might be limited (Portney & Walker, 2000). Based on this, it can be noted that all items in **Table 10.5.1b** show good to moderate reliability, indicating that overall they are measuring the same attribute as described below:

Group 1 Items: (Knowledge/Theory Application)

7. I look at theory for understanding a client's problems and proposed solutions to them.
8. I look to frames of references for planning my intervention strategy.
9. I use theory to understand treatment techniques.
10. I try to understand clinical problems by using a variety of frames of references.
26. I use theory to understand intervention strategies.

Group 1 included five items, which looks at theory, past knowledge and various frames of reference for planning intervention strategy and to understand clinical protocols and problems for selection of appropriate treatment techniques. The purpose of a frame of reference is to organise theoretical knowledge, which guides students to understand the development of the models of the profession and guidelines for practice, which, provide the basis for the development of professional competency in assessing various clinical problems and evaluating intervention programmes for clients. The internal consistency reliability alpha for the data is 0.83.

Group 2 Items: (Decision making based on experience and evidence)

1. I question how, what, and why I do things in practice.
2. I ask others and myself questions as a way of learning.
3. I don't make judgments until I have sufficient data.
4. Prior to acting, I seek various solutions.
5. Regarding the outcome of proposed intervention, I try to keep an open mind.
11. When there is conflicting information about a clinical problem, I identify assumptions underlying the differing views.

18. I must validate clinical hypotheses through my own experience.
20. I anticipate the sequence of events likely to result from planned intervention.
24. I use clinical protocol for most of my treatment.
25. I make decisions about practice based on my experience.

Group 2 integrated 10 items which are related to seeking information by questioning others on how, what and why as a way of learning and seeking various solutions to problems before making judgements and proposing intervention strategies. With an open mind to possible outcomes, students answering positively in this group, base their decision making on past experience but also on evidence gathered from other sources such as clinical protocols, views from other professionals etc. The internal consistency reliability alpha for the data is 0.75.

Group 3 Items: (Dealing with uncertainty)

6. I think in terms of comparing and contrasting information about client's problems and proposed solutions to them.
13. I ask for colleagues' ideas and viewpoints.
14. I ask for the viewpoints of client's family members.
15. I cope well with change.
16. I can function with uncertainty.
19. I clearly identify the clinical problems before planning intervention.
22. Regarding a proposed intervention, I ask, "In what context would it work?"

Group 3 incorporated seven items, which includes the concepts of identifying issues and viewpoints while dealing with uncertainty. It suggests open-mindedness to the views of colleagues and clients families in preparation for dealing with unanticipated/unexpected changes and uncertainty in a variety of clinical situations before planning intervention. The internal consistency reliability alpha for the data is 0.74.

Group 4 Items: Self-reflection and reasoning)

12. When planning intervention strategies, I ask "what if" for a variety of options.
17. I regularly hypothesise about the reasons for my clients' problems.
21. Regarding proposed intervention strategies, I think, "What makes it work?"
23. Regarding a particular intervention with a particular client, I determine whether it worked.

Group 4 consisted of four items, which are mainly related to reflecting on various hypotheses about client's clinical problems before planning intervention and considering different rationale for the proposed intervention strategies. It also includes reflecting on hypotheses and intervention to see whether they really worked. The internal consistency reliability alpha for the data is 0.52.

10.5.2 Comparisons of SACRR (Self-Assessment of Clinical Reflection and Reasoning (SACRR) Subscale Scores

Table 10.5.2 & Figure 10.5.2 (below) present results of Self-Assessment of Clinical Reasoning and Reflection (SACRR) subscale scores calculated during four instances across four blocks of clinical education from CEII to CEIV using Single-factor Repeated Measures Analysis of Variance Design Method. This method is appropriate to compare treatment conditions within each subject across four periods of clinical education placements. Therefore, statistically, each subject was considered a unique block in the design (Portney & Watkins, 2000).

Table 10.5.2

Comparison of Subscale Scores of Self-Assessment of Clinical Reflection and Reasoning (SACRR) in Four Instances of Clinical Education Placements

	CEII-pre	CEII-post	CEIII-post	CEIV-post	P value for Pairwise comparisons					
	T1	T2	T3	T4	T1 vs. T2	T1 vs. T3	T1 vs. T4	T2 vs. T3	T2 vs. T4	T3 vs. T4
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)						
Knowledge/ Theory Application	3.59 (0.49)	3.61 (0.51)	3.63 (0.52)	3.80 (0.61)	1.000	1.000	0.110	1.000	0.109	0.132
Decision making based on experience and evidence	3.57 (0.29)	3.60 (0.30)	3.79 (0.33)	3.82 (0.37)	1.000	< 0.0005	< 0.0005	< 0.0005	< 0.0005	1.000
Dealing with Uncertainty	3.57 (0.31)	3.62 (0.33)	3.73 (0.42)	3.86 (0.46)	1.000	0.041	< 0.0005	0.262	< 0.0005	0.243
Self-reflection and reasoning	3.37 (0.25)	3.41 (0.32)	3.48 (0.34)	3.41 (0.40)	< 0.0005	< 0.0005	< 0.0005	1.000	0.474	1.000
Total Score	3.58 (0.24)	3.64 (0.27)	3.76 (0.34)	3.84 (0.34)	0.501	0.001	< 0.0005	0.066	< 0.0005	0.292

Note – T1, T2, T3, T4 = Four-Time Measurements P<0.001

Reference to the above **Table 10.5.2**,

- the results show that there is no significant change in the subscale; Knowledge/Theory application across four instances of the clinical education placements, although means scores increased gradually from CEII (pre) to CEIV (post) clinical education placements.

- the data on the subscale, Decision making based on experience and evidence indicated that there was a significant difference between four pairs of mean scores T1 vs. T3 ($p<0.0005$), T1 vs. T4 ($p<0.0005$), T2 vs. T3 ($p<0.0005$) and T2 vs. T4 ($p<0.0005$) respectively. The pairs T1 vs. T2 and T3 vs. T4 did not show any significant differences.

- for the results of subscale; Dealing with Uncertainty, three pairs showed a significant difference between T1 vs. T3 ($p<0.041$), T1 vs. T4 ($p<0.0005$) and T2 vs. T4 ($p<0.0005$) pairs respectively, where as the other three pairs, (T1 vs. T2), (T2 vs. T3) and (T3 vs. T4) did not show any statistical significance.

- when comparing the findings of mean scores for the subscale; Self-reflection and reasoning, three pairs, T1 vs. T2 ($p<0.0005$), T1 vs. T3 ($p<0.0005$) and T1 vs. T4 ($p< 0.0005$) showed that there was a statistically significant difference between these three pairs. No statistically significant change was observed in the mean scores of three pairs, T2 vs. T3 ($P>1.000$), T2 vs. T4 ($p>0.474$) and T3 vs. T4 (p>0.1.000) respectively.

When looking at the results collectively, it is noticeable that:

- the pairwise comparison between T3 vs. T4 did not show any significant difference in their mean scores for all four subscales of the factor analysis.

- another observation was made about the subscale, Knowledge/Theory Application that showed no significant difference for all six pairs of comparisons.

- other findings of the data indicated that the pairwise comparison for T1 vs. T2 was statistically significant for only one subscale, Self-reflection and reasoning and the pairwise comparison for T2 vs. T3 was also statistically significant only one subscale, Decision making based on experience respectively.

When comparing the mean scores of the Clinical Education placements across four periods, results revealed the following interpretations:

- the significant increase in the mean scores in the subscale of Knowledge/Theory Application clearly suggested a greater change in students after CEIII (post) placement.

- the results of mean scores for the subscale; Decision-making based on experience and evidence on the other hand indicated a greater change in students after CEII (post) placement.

- the significant increase the mean scores for the subscale; Dealing with Uncertainty clearly indicated a change in students after CEII (post) placement.

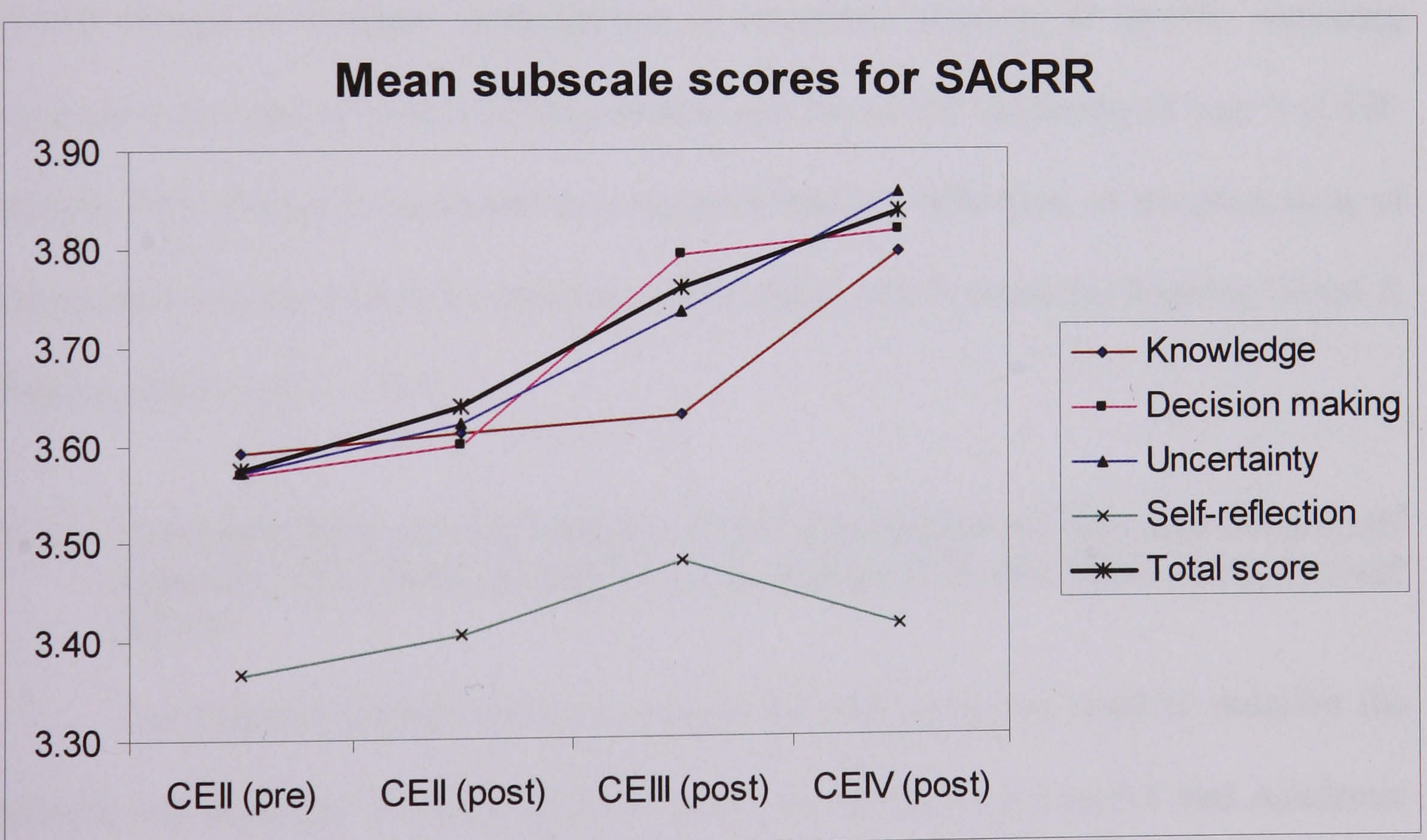
- it is interesting to note that the mean scores for the subscale, Self-reflection and reasoning showed an overall increase across four instances of clinical education placements.

- all of the above findings have an important implication for theory and practice application within the curriculum structure and will be discussed in **Chapter (11)**.

In addition to Repeated Measure Analysis of Variance Design, Trend Analysis procedure (**Figure 10.5.2** shown below) was also used to pinpoint the source of the significant difference between the four instances of clinical education placements.

Figure 10.5.2

Trend Analysis Method to Show Comparison of SACRR Subscales across Four Instances of Clinical Education Placements



As pointed out by Portney & Watkins (2000), Trend Analysis method is most appropriate to find out the most reasonable description of continuous data based on the number of turns, or "ups and downs" seen across the levels of the independent variable. From the Trend Analysis Graph, it can be seen that:

- the results of mean scores present an increasing trend, which is statistically significant from CEII (pre) to CEIV (post) for each SACRR subscale scores across four instances of clinical education placements.

- the findings also indicated a significant increase in mean scores after CEII (post).

The above findings have important curricular implications in that that it indicates that students' level of reflection and reasoning abilities have improved gradually as the student's progress from lower level of clinical education experience to a next higher level of clinical education placement.

The summary of results from **Table 10.5. & Figure 10.5.2** revealed that the mean of total scores have increased gradually over 4 periods (CEII to CEIV) of clinical education placements indicating that the gradual change over time in both dimension of students' reasoning and reflection which is presumed to be due to exposure to different learning experiences in a variety of clinical settings. The findings also indicated that the overall change in students' development of contextual learning of specific reasoning occurred at the end of year 2 (CEII-posttest) and not at the beginning of year 2 (CEII-pretest). This finding is important as it suggests that it is reflection, or the processing of experiences and the search for meaning within them, which promotes learning (Boud & Walker, 1991; Schön, 1987).

10.5.3 Correlation between the Subscales of Self-Assessment of Clinical Reflection and Reasoning (SACRR), Approaches to Learning (SPQ) and Grade Point Average (GPA).

The Pearson product-moment correlation coefficient was used to describe the strength and direction of relationship between the subscales of SACRR and Academic results (GPA) of the cohort (**Table 10.5.3.1**), between Approaches to Learning (SPQ) and the subscales of Academic (GPA) results (**Table 10.5.3.2**) and between Approaches to Learning (SPQ) and Self-Assessment of Clinical Reasoning and reflection (SACRR) (**Table 10.5.3.3**).

10.5.3.1 Correlations between GPA scores and SACRR Subscale scores

The results of the Pearson correlations between scores on students' GPA in year 2 and year 3 and Weighted GPA and the SACRR subscales are presented in **Table 10.5.3.1** below.

Table 10.5.3.1

Correlation between the subscales of Self-assessment of Clinical reasoning and Reflection (SACRR) and academic results (GPA)

	GPA (Year 1)	GPA (Year 2)	GPA (Year 3)	Weighted GPA
CEII (pre)				
Knowledge/Theory Application	0.05	-0.03	0.01	0.00
Decision making based on experience and evidence	-0.09	0.13	0.08	0.10
Dealing with Uncertainty	0.02	0.26*	0.27*	0.29**
Self-reflection and reasoning	0.09	0.13	0.09	0.08
CEII (post)				
Knowledge/Theory Application	0.06	0.22	0.16	0.17
Decision making based on experience and evidence	-0.24*	-0.13	-0.15	-0.14
Dealing with Uncertainty	0.00	0.07	0.04	0.03
Self-reflection and reasoning	-0.08	-0.05	-0.11	-0.12
CEIII (post)				
Knowledge/Theory Application	0.02	0.01	0.00	-0.01
Decision making based on experience and evidence	-0.06	-0.05	-0.02	-0.01
Dealing with Uncertainty	0.05	0.11	0.09	0.09
Self-reflection and reasoning	0.08	0.13	0.04	0.04
CEIV (post)				
Knowledge/Theory Application	-0.10	-0.09	-0.11	-0.11
Decision making based on experience and evidence	-0.06	-0.12	-0.16	-0.16
Dealing with Uncertainty	-0.05	-0.12	-0.14	-0.15
Self-reflection and reasoning	0.04	0.05	0.01	0.00

* $P < 0.05$, ** $P < 0.01$

As there is no widely accepted criteria for defining a strong versus moderate versus weak association, Cohen (1987) as a general guideline, defines a small effect as a correlation coefficient, r = 0.10; moderate effect, r = 0.30 and a large effect as r = 0.50.

Based on the above guideline, from the results, it can be noted that overall, a moderate, statistically significant relationships were found as correlation coefficients ranged from 0.22 to 0.30, p<0.05 (Cohen, 1987).

When comparing the data in the above **Table 10.5.3.1** for SACRR subscales across four instances of clinical education placements with students academic results:

- it can be noted that the subscale, Dealing with Uncertainty for CEII (pretest) placement showed moderate positive relationship with GPA scores in Year 2, Year 3 and Weighted GPA; *r* ranging from 0.26 to 0.29 respectively.

- the results for subscales for CEII (posttest), CEIII (posttest) and CEIV (posttest) did not show any statistical association with students' academic results in their Year 2, Year 3 and Weighted GPA except the subscale, Decision-making based on experience and evidence, which indicated a moderate negative relationship with Year 1 GPA ($r = -0.24$, $p<0.05$).

- although, the findings indicated a moderate correlation, the instrument appears not to be highly predictive and as such the data did not reflect any predictive nature of students' reasoning skills at a later stage of their training. It is shown that GPA is a fairly crude measure, combining achievement across a number of subjects, with little knowledge of how individual grades were derived (Meyer, Parson & Dunne, 1990; Beckworth, 1991).

- from the results, it is also noted that GPA (Year 1) scores did not correlate with any of the subjects in Year 2 and Year 3 when dealing with Uncertainty. When examining items in grouping 3 (See **Table 10.5.1b**), it became clearer that subjects in Year 1 were shown to be not directly related to patient treatment and unresolved clinical problems.

  As reported in **Chapter 3** (BSc (Hons) Occupational Therapy Curriculum structure), Year 1 is mainly a foundation year in which the main emphasis is placed on Biological and behavioural science subjects and little exposure to subjects relating to clinical education. However, students visualize that as they progress through the curriculum, they will be able to gain more confidence in dealing with uncertainty. This includes being able to seek other's view, know when to ask questions, being about to sort through data gathering from the client to identify problems and consider the viability of the proposed intervention strategies.

10.5.3.2 Correlations between Students' GPA results and their Approaches to Learning (SPQ) scores

The results of Pearson correlations between scores on students' GPA in Year 1, Year 2, Year 3 and Weighted GPA and their approaches to learning (SPQ) post-test scores are shown in the following **Table 10.5.3.2**:

Table 10.5.3.2

Correlation between approach to learning (SPQ data) and academic results (GPA)

Approach to learning	GPA (Year 1)	GPA (Year 2)	GPA (Year 3)	Weighted GPA
Surface Motive	-0.19	-0.29*	-0.27*	-0.26*
Surface Strategy	-0.02	-0.10	-0.05	-0.04
Surface Approach	-0.13	-0.23*	-0.19	-0.18
Deep Motive	0.15	0.17	0.10	0.09
Deep Strategy	0.24*	0.28*	0.27*	0.26*
Deep Approach	0.22*	0.26*	0.21	0.19
Achieving Motive	-0.07	-0.05	-0.04	-0.03
Achieving Strategy	0.08	0.17	0.11	0.11
Achieving Approach	0.00	0.08	0.04	0.05

* $P < 0.05$

From the **Table 10.5.3.2**, it is noticeable that the data seemed to show moderate statistically significant relationship as correlation coefficients in absolute values ranged from 0.22 to -0.29 (Cohen, 1987) between students' approaches to learning (SPQ) and their academic results (GPA). On examining the data critically, it is clear that

- the surface motive subscale scores show negative association with GPA scores in Year 2 (r = -0.29, p<0.05, Year 3 (r = -0.27, p<0.05, and Weighted GPA scores (r = -0.26, p<0.05); the results however revealed no statistically relationship between the surface motive scores and GPA results in Year 1 (r = -0.19, P>0.05).

- On the other hand, the results of deep strategy subscale indicated moderate positive relationship with GPA scores in Year 1 ($r = 0.24$, $p<0.05$), Year 2 ($r = 0.28$, $p<0.05$) and Year 3 ($r = 0.27$, $p<0.05$) including its Weighted GPA ($r = 0.26$, $p<0.05$) respectively.

- Looking at the deep approach (strategy + motive) data, findings suggested only moderate positive statistically significant relationship with the academic results in Year 1 ($r = 0.22$, $p<0.05$) and Year 2 ($r = 0.26$, $p<0.05$). The results however, did not show any correlation with the academic scores of Year 3.

- With regard to the achieving approach (strategy + motive), it can be noted that results suggested that there was no statistically significant relationship with students' academic achievement scores (GPA).

- The negative correlation between GPA results and surface motive scores has clearly shown that approaches to learning tend to be characteristic of student over time during their learning process (Biggs, 1987a).

- The results of positive correlation of students' academic scores in Year 1, Year 2 and Year 3 and its Weighted GPA with that of deep approach (strategy + motive), on the other hand shed some light on the educational strategies which aim to develop deep, meaningful learning which involve curriculum level action such as designing the curriculum around clinical problem solving, subject level actions and learning activities.

  The results further confirmed that students' motives influence their strategies of learning (Biggs, 1992) but, teaching and learning environments (or contexts) also influence their choice of strategy.

10.5.3.3 Correlations between the scores of Approach to learning (SPQ) and Self-Assessment of Clinical Reasoning and Reflection (SACRR) Subscales

The **Table 10.5.3.3** below presents the data about the Pearson correlation coefficient between the subscale scores of approach to learning (SPQ) and self-assessment of clinical reasoning and reflection (SACRR) subscales.

Reference to the data in **Table 10.5.3.3** below, The Pearson correlations ranged from 0.23 ($p<0.05$) to 0.40 ($p<0.01$) suggesting an overall moderate association between the subscales of the SACRR groupings, that is CEII (pretest), CEII (posttest), CEIII (posttest) and CEIV (posttest) and subscales (motive & strategy) of the SPQ (Cohen, 1987).

Table 10.5.3.3

Correlations between the scores of approach to learning (SPQ) and self-assessment of clinical reasoning and reflection (SACRR) subscales

SACRR Subscales	Surface Motive	Surface Strategy	Surface Approach	Deep Motive	Deep Strategy	Deep Approach	Achieving Motive	Achieving Strategy	Achieving Approach
CEII (pre)									
Knowledge/Theory Application	-0.08	0.08	0.00	0.10	-0.01	0.06	-0.10	0.06	-0.02
Decision making based on experience and evidence	0.01	-0.02	-0.01	-0.09	0.10	0.00	0.08	0.04	0.08
Dealing with Uncertainty	-0.01	-0.02	-0.02	-0.09	0.20	0.05	0.01	-0.02	-0.01
Self-reflection and reasoning	0.03	-0.16	-0.07	-0.15	0.09	-0.05	0.07	-0.12	-0.03
CEII (post)									
Knowledge/Theory Application	-0.13	-0.13	-0.15	0.26*	0.31**	0.33**	0.06	0.40**	0.28*
Decision making based on experience and evidence	-0.01	-0.08	-0.05	0.17	0.14	0.18	-0.05	0.09	0.03
Dealing with Uncertainty	0.04	-0.01	0.02	0.16	0.19	0.20	0.01	0.12	0.08
Self-reflection and reasoning	-0.04	-0.12	-0.09	0.24*	0.14	0.23*	-0.08	0.02	-0.04
CEIII (post)									
Knowledge/Theory Application	-0.23*	-0.21	-0.26*	0.15	0.20	0.20	-0.03	0.14	0.07
Decision making based on experience and evidence	-0.07	0.02	-0.03	0.29**	0.10	0.23*	0.08	0.06	0.09
Dealing with Uncertainty	-0.24*	-0.27*	-0.30**	0.27*	0.14	0.25*	0.12	0.16	0.17
Self-reflection and reasoning	-0.08	-0.11	-0.11	0.17	0.13	0.17	0.14	0.20	0.21
CEIV (post)									
Knowledge/Theory Application	-0.07	-0.04	-0.07	0.12	0.18	0.17	-0.05	0.06	0.00
Decision making based on experience and evidence	-0.07	-0.04	-0.07	0.12	0.18	0.17	-0.05	0.06	0.00
Dealing with Uncertainty	-0.07	-0.16	-0.13	0.13	0.29**	0.23*	-0.17	0.08	-0.06
Self-reflection and reasoning	-0.06	-0.14	-0.11	0.25*	0.22	0.27*	-0.05	0.10	0.03

*$p<0.05$, **$p<0.01$

- From the data, it is also observable that the Pearson correlation coefficient found to be somewhat larger in comparison to results described in other **Tables (10.5.3.1 & 10.5.3.2**) above.

- On examination of the correlations associated with the relationship between approaches to learning (SPQ) subscales and CE II (pretest), results indicated no relationship for any of the four groupings (refer to **Table 10.5.3.2** for details).

- On the other hand, the data confirmed that there was a statistically significant positive relationship existed between the SACRR subscale for the grouping, Knowledge/Theory application during the CEII (posttest) clinical education and SPQ scales and subscales, that is deep motive ($r = 0.33$, $p<0.01$), deep strategy ($r = 0.31$, $p<0.01$), deep approach ($r = 0.33$, $p<0.01$), achieving strategy ($r = 0.40$, $p<0.01$) and achieving approach ($r = 0.28$, $p<0.05$).

- It is also observed that the findings of SACRR subscale for the grouping, Self-reflection and reasoning during the CEII (posttest) clinical education placement indicated a positive moderate correlation with deep motive ($r = 0.24$, $p<0.05$) and deep approach ($r = 0.23$, $p<0.05$) of the SPQ subscales.

- The results of the SACRR subscales during CEIII (posttest) clinical education placement for the grouping, Knowledge/Theory Application, correlations showed a negative relationship with SPQ scale and subscale of surface motive ($r = -0.26$, $p<0.05$) and surface approach ($r = -0.26$, $p<0.05$),

  where as for grouping, Decision-making based on experience and evidence findings suggested a moderate positive correlation with the SPQ scales and subscale of deep motive ($r = 0.29$, $p<0.01$) and deep approach ($r = 0.23$, $p<0.05$). During the same clinical education placement for the grouping, Dealing with Uncertainty, results indicated a negative correlation with the SPQ scales and subscales of surface motive ($r = -0.24$, $p<0.05$), surface strategy ($r = -0.27$, $p<0.05$), surface approach ($r = -0.30$, $p<0.01$) and positive correlations with deep motive ($r = 0.27$, $p<0.05$) and deep approach ($r = 0.25$, $p<0.05$).

- When comparing the results of SACRR subscales for the grouping, Dealing with Uncertainty during the CEIV (posttest) clinical education placement confirmed a positive moderate statistically significant relationship with students' SPQ scale and subscale scores, that is deep strategy ($r = 0.29$, $p<0.01$), and deep approach ($r = 0.23$, $p<0.05$).

  During the same clinical education placement, Pearson correlations for the grouping, Self-reflection and reasoning indicated a statistically positive significant association with students SPQ subscale, that is deep motive ($r = 0.25$, $p<0.05$) and SPQ scale, that is deep approach ($r = 0.27$, $p<0.05$).

- From the findings of the Pearson correlations, it could be argued that clinical education plays an important and integral part of the BSc (Hons) Occupational Therapy curriculum and that students are expected to develop clinical reasoning skills by integrating theoretical information with practical knowledge and this was clearly confirmed by the Pearson correlations.

- When comparing the SACRR grouping, Knowledge/Theory Application between CEII (pretest) and CEII (posttest), findings clearly indicated a big jump in students' correlation scores of the SPQ scales and subscales which is to be expected as they attend their first major CEII clinical education placement in which students are provided with opportunity to consolidate and apply occupational therapy knowledge, attitudes and skills learned in The Hong Kong Polytechnic University to assess, plan, and implement occupational therapy intervention programmes for various patients/clients.

10.5.4 Summary

In this study, the Self-Assessment of Clinical Reflection and Reasoning (SACRR) instrument was used to compare 26 individual items across four periods of clinical education placements, which lasted over two years. The data was analysed by using various statistical methods.

While the Pearson correlations obtained were found to be moderately significant (Cohen, 1987), it must be kept in mind that in fact few variables, particularly deep strategy, deep approach and achieving showed correlations with all three years of GPA scores. These findings are to some extent consistent with Watkins (1996) who predicted that a surface approach would be significantly negatively correlated while the other two approaches would be positively correlated. The relationship between approaches to learning clearly indicates the fact that learning through experience calls on deep learning, that is learning for understanding and meaning rather than rote learning of facts and principles. Furthermore, the results also confirmed that the deep approach used by student novices in their clinical education settings strengthens their professional knowledge.

A student adopting a deep approach relates the content to meaningful contexts, theorizing about what is learned and how it relates to understanding the client's problems. The findings also supported that the achieving approach is different from the deep and surface approaches and according to Biggs (1991), the former refers to arranging the context for carrying out the task that is not to handle the content of learning, as do surface and deep learners, but to manage its context: organizing time, working space, and syllabus coverage in the most-effective way ("study skills"). Students need these skills in order to gain specific learning outcomes. The results indicate that students use theories and frames of reference for understanding clinical problems for planning and implementing treatment relevant to the patients/clients needs.

From the results, it is also noticeable that some scales and subscales, particularly, surface strategy, deep motive, deep approach, achieving approach were not found to be correlated with students' academic grades. Although, it would be expected that students' approaches to learning would influence their academic performance, findings of this study, however, do not fully support this. The results may, however, suggest that it may be due to the fact that the correlations are a reflection that university grades are often not a true indicator of the quality of learning outcomes (Tang & Biggs, 1996). It would seem logical that students who do well in their academic studies would do well in their clinical performance. However, results of this study do not fully support this evidence and are in agreement with other studies (Mann & Banasiak, 1985). While SPQ is a quite useful predictor of academic achievement, it is evident from other research studies that there may be differences in teaching styles of faculty and their relationship with GPA scores (Kember & Gow, 1994; Watkins, 1996; Watkins & Biggs, 1996). The implication of these results will be discussed in the next **Chapter 11**.

10.6 Focus Group Interview

In this section, the results of the focus group interview are presented. As reported in the methodology **Chapter 9**, the principal method used in the focus group was the semi-structured interview. Allocating five students from each category of surface-biased, deep-biased and achieving-biased learning approaches to each group formed the focus group. Students were also selected based on their Students' Process Questionnaire (SPQ) (Biggs, 1987c) scores and their GPA scores (See **Section 9.4.4.1**).

The Focus group interview was held at the end of students' final Clinical Education placement (CEIV) in June 2001 at mutually convenient time. A set of open-ended questions, which were developed taking into consideration the review of literature and the investigator's clinical experience (See **Table 9.4.4.3**) to facilitate the focus group interview process. The data from all three categories (SB, DB and NB-biased) of the focus group interview were audiotaped and subsequently transcribed and coded using constant comparative method.

10.6.1 Compilation of Initial Themes (Codes)

The analysis commenced with a naïve reading of the transcripts and by listening to the entire contents of each audiotaped interview to become familiar with the data and to obtain an overall impression of the interview. A content analysis was then performed on data collected from the interview. This technique involved examining and breaking down of transcripts into units of information, which reflected particular meanings, patterns and context related to the occupational therapy curriculum. Similar information was then grouped into meaningful categories, which were, in turn, clustered into themes (See **Table 10.6.1**). Coding was performed on data as emerging categories of meaning and themes were identified in the transcripts. In addition, reflective notes taken during the interview were used to support findings of the data analysis. The categories were also validated by taking into account voice inflection and context when listening to the audiotaped recordings of the focus group session. The entire process of analysis incorporated the "constant comparative method" described by Strauss & Corbin (1998) which involved comparisons made between different questions of the data for similarities, differences and connections. Clusters of meaning and themes from each group were contrasted for similarities and differences (See **Table 10.6.1**).

Qualitative findings were considered within the context of the literature review. The literature is a common and accepted means of enhancing theoretical sensitivity for developing insight and awareness of qualitative data collected for its interpretation (Halloway, 1997; Strauss & Corbin, 1998). Where relevant, original quotes, extracted from the transcripts reviewed, has been included to increase meaningfulness of data analysed.

Table 10.6.1

Construction of Initial Themes From the Focus Group Interview Transcripts.

DB	SB	NB
Q1. List four most important things that you learned in clinical education placements		
1. Theory & practice integration 2. Communication skills 3. Practical skills (Case management) 4. Problem-solving skills 5. Reflect/reflection 6. Responsibility	1. Clinical judgment 2. Classroom vs. fieldwork experience 3. Problem-solving skills 4. Independent learning 5. Communication skills 6. Time management 7. Hierarchy	1. Communication skills 2. Professional/personal attributes 3. Theory & Practice integration 4. Confidence 5. Ethical issues 6. Safety
Q2. What do you think has been the biggest change in you as a trainee OT as a result of the course?		
1. Mature -Different perspectives -Models & frames of references -Better attitude towards person with disability 2. Self-confidence increased after clinical practice 3. Evidence-based practice 4. Show empathy -Develop relationship with clients 5. Scope of OT services	1. Problem-solving skills -Prioritise the problem 2. Professional attitude -Self-centred => Co-operation 3. Objective decision-making (Evidence-based) 4. Flexible 5. Mature -Holistic thinking	1. Mature -In-depth thinking of people's problem 2. Critical thinking 3. Flexibility 4. Confidence 5. Co-operation with others 6. Problem-solving skills 7. Time management
Q3. What you think you are better at as a result of the course?		
1. Communication skills/rapport 2. Problem-solving skills -View from all possible angles 3. Better attitude toward person with disability 4. Holistic thinking	1. Independence 2. Communication & Decision-making skills 3. Problem-solving skills 4. Leadership & management	1. Self-actualization 2. Communication skills 3. Logical thinking 4. Creativity 5. More organised 6. More critical and creativity
Q4. What do you think is the weakest element of your performance?		
1. Too aggressive -Without careful consideration 2. Flexibility in learning & Time management 3. Lack of real patients 4. Not sensitive to patient needs 5. Be serious but in a playful way	1. Inadequate practical skills 2. Inadequate knowledge 3. Critical thinking 4. Lack of self-confidence -Incapable in handling new things 5. Stressful 6. Less practice with real clients	1. Use of English -Writing skills -Presentation skills 2. Inadequate knowledge leading to frustration 3. Less practice with real patients in school 4. Lack of appropriate knowledge
Q5. What do you consider you now need in order to develop further your skills as an occupational - therapists?		
1. Professional skills - lifelong 2. Professional Knowledge 3. Continuing education 4. Practical skills -More practice in jobs 5 Quality training	1. Clinical experience 2. Professional knowledge -Further studies in clinical education 3. Self-reflection 4. Practical skills	1. Get a job to do more practices 2. Continue education 3. Master certain area of knowledge (e.g. paediatric 4. In-depth information)

In answering the question 1 (*List four most important things that you learned in clinical education placements*), all three groups mentioned communication skills and professional Skills & attitude and ethical consideration as most important themes. They further stated that both internal and external communication between medical team, clients, caregiver and his/her family was also important. For "professional attitude", variations existed among the three groups. DB (deep-biased learning approach) group was most explicit by expressing it in terms of responsibility, whereas SB (surface-biased learning approach) and NB (no-biased learning approach) groups were less explicit by naming the term "professional attitude" or "professional attributes" but without any explanations. On the importance of ethics, some students commented:

> "We need to become more aware of our own ethical stance and ways of dealing with ethical dilemmas during the clinical practice. We must also be aware of the realities of practice that may limit our own effectiveness despite making decisions that seems right for the clients".

Ethics involves choice, deliberations, and practical judgment (what ought to be done), wisdom and prudence, doing what is morally fitting in a particular situation. On the question of ethical dilemmas, Neuhaus (1988) notes that ethical dilemmas may include "having the knowledge, the clinical judgment and the technical expertise but not the funding to enhance a client's quality of life, having limited amount of time or resources and deciding who is entitled to them, having the tools of science and struggling not to be entrapped by them" (p292).

Both DB and SB groups listed problem-solving skills as another important issue in clinical education except the NB group. For the rest of the items, the three groups had different opinions. DB group mentioned that putting theory into practice, practical skills (e.g. case management) and self-reflection were other issues that were equally important in clinical education. SB group had clinical judgement, independent learning and on-the-job training on their list while NB group considered knowledge and ethical issues as also important issues in clinical education. The importance of professional knowledge, linking theory to practice was evident in the following comments:

> "A major challenge facing us as students is how to integrate thinking skills together with knowledge and subject matter and how to identify specific cognitive skills necessary for practice at the appropriate stage of clinical education. To apply knowledge in real practice, it needs to be comprehensive, relevant, accurate and accessible".

One of the four major important things, students in three categories rated "integration of theory to practice" as one of the most important things. . Students need professional knowledge, which includes the propositional or theoretical knowledge, the "knowing that" (Dreyfus & Dreyfus, 1986), Knowledge of theories of occupation, health and disability, and the tools of practice necessary to apply to practice.

In relation to question 2 (*What do you think has been the biggest change in you as a trainee OT as results of the course?).* All three groups indicated that they became more mature as a result of the course and felt that this was the biggest change. However it was noticed that students had a variation in their interpretation of the meaning of maturity. In DB group, it meant the ability in handling different perspectives, models, and better attitude toward a person with disability. SB group, on the other hand, simply clarified it as holistic thinking while NB group explained it as in-depth thinking about people's problem. In short, from the students' point of view, maturity meant gaining experience in handling real cases in the clinical settings. Next to maturity, DB and SB groups reported that they had improved their learning styles by making it more evidence-based, which involved objective decision-making after considering the evidence from all perspectives. For personal changes, SB and NB groups reported three changes; changes in their critical thinking practices, becoming more flexible, and gaining cooperation from others, but no clear explanations were given. With regard to change, DB and NB groups reported that their biggest change was in their self-confidence. DB group expressed that they gained more confidence after clinical exposure in treating real patients. On this, NB group did not come up with any explanation. Besides those already mentioned, students had also reported changes in other aspects, such as reflection, empathy and time management.

With regard to question 3 (*What you think you are better at as a result of the course?).* On the question of reflection, the three groups had quite different opinions. Reflecting on improvements that they made, in general, all three groups had reflected that real case presentation in the clinical education settings was an effective way of learning, which helped to develop their clinical reasoning skills. However, some students found it difficult to reflect as exemplified by the following quotes:

> "I have been thinking recently about just how difficult it is to be reflective ... I often feel like I don't have enough time to step back and evaluate how effective I am. By the time I finish one day, I usually feel like there is still the next day's work.

Another student said:

> "Another thing about reflection – it's hard. It's hard because one must analyse what's transpired. And if the reflection is honest, it can mean that I may have to alter my style or completely chuck something that I have worked hard to develop.

Another participant responded:

> "It seems to be much safer and more secure not to reflect, because I don't have to change that which I don't see as being wrong".

In relation to communication skills, there was unanimous agreement among the three groups in that they reported greater improvement in this area, in particular after their clinical placements. Students also reflected that there was a significant development in their ability to establish rapport with their clients. The importance of communication skills was reflected in the following comments made by one student participant:

> "I think that communication is very important. There are doctors, physiotherapists, social workers, and clinical psychologists on the team. They may not know about OT treatment. It is through communication, we need to explain about our role".

Students of DB and SB groups expressed a positive attitude towards their problem-solving skill development. They stated that as a result of their continued exposure to clinical settings, they were able to view their client holistically and consider all possible strategies from various sources. Comparing the improvements made by each group, DB group had achieved a better attitude toward person with disability in terms of more willingness to help others; SB group had become more independent in learning and made improvements in leadership and management; and NB group had reported better performance in logical thinking, creativity, and more self-confidence through self-actualisation. On the question of problem solving skills, one student opined that:

> "In my previous clinical education placements, my mentor commented that I had poor problem-solving skills… Since I developed more confidence, I found my ability in problem solving had improved. Of course, this was seen my colleagues too. So, I think I have changed a lot though I cannot concretely give you few examples. Well, I cannot say it is all due to clinical education, but at least I have found myself changed positively'.

When reflecting on the weakest element of performance in question 4 (*What do you think is the weakest element of your performance?*), the three groups had reported quite differently. DB group claimed a relatively better reflection and each group member was able to self-evaluate his/her own performance. Students of DB were more open and self-critical of their weaknesses which included too aggressive, not flexibility in learning, decreasing self-confidence, not sensitive to client needs, and try to be serious but in a playful way. The DB group reported their weaknesses as having inadequate practical skills and knowledge, less critical thinking, and less confidence in handling new things. Basically, SB group also felt they were self-evaluative of their weaknesses but did not come up with any relevant examples. The performance of NB group however, appeared to be very different from DB and SB groups. The opinions expressed by students in NB group showed less self-reflection and rarely commented on the deeper thinking as these students largely focused on areas such as use of English, particularly writing and presentation skills, and inadequate knowledge. Students in all three categories expressed concern about not having opportunity to practise with real patients in school. Some students stated that experience with real patients helps them to build on the fundamental theory that they learn in class. They also commented that application of theory to practice with real patients, particularly in occupational therapy applied subjects will help them to think and reason, though they also noted that because of resource constraints, they could not all have the opportunity during class time to practise with real patients. Some students however suggested videotape review, which could supplement real practice as evidenced by the following quotation:

> "I could visualise whether the seating position of the patient was proper and assess whether the patient was being treated properly. I could also notice in the video whether my classmates were following the treatment protocol properly or forgot some things".

Some students commented that the feedback sessions conducted immediately after videotape review was meaningful and that they had a better understanding of the needs of the clients and consequent decisions about the assessment methods appropriate to the client.

Last, the three groups were asked, what they need in order to develop further skills as occupational therapists (*What do you consider you need in order to develop further your skills as OTs?*). Answers from the three groups were quite similar but still showed some variations. All of the three groups agreed that they need to develop their <u>professional skills and knowledge</u>. However different groups perceived and interpreted this question slightly differently. The DB group reported that both skills and attitude are equally important. Furthermore, they believed that the development of professional skills should be lifelong and must be updated to meet client needs. SB group had different opinions among their group members in that some students felt that professional skills were more important, while others noted knowledge was more important. NB group on the other hand reflected that both were needed for further development without rating their importance. All three groups unanimously agreed that it was important to get <u>more practice in job training</u>. In other areas, specifically, SB group had stated that they need <u>self-reflection</u> to review their past experience and to reflect on their own actions, whereas NB group indicated their preference to master in a relevant speciality, such as paediatrics.

From the above statements/comments, it is clear that unlike SB student, Students from DB group showed more personal commitment to learning. Furthermore, these students relate the content to meaningful contexts rather than focusing on the concrete and literal aspects like SB students. As Biggs (1991) points out that an SB students sees the components of a task as unrelated to each other, whereas, a student adopting a deep approach relates to existing prior knowledge, theorising about what is learned. Some of these quotes clearly pointed out to the importance of reflection as an essential component of practice and that reflection have a legitimate place in professional education. Reflection demands not only time, but also a safe environment. Clinical Educators can create safe environment, which facilitate reflection in clinical practice. They can build that reflective time into expected educational experience. For example, keeping a journal about clinical experience is one way to encourage a thinking focus instead of a predominately task. Reflection, however, is not easy.

10.5.2 Summary

As a whole, DB group had presented in a more organised way and they were able to draw examples to link up the ideas consistently. It was also noted that every member of the group participated and contributed in the focus group interview. On observation, overall performance of NB group was not as good as the other two groups. They always chose to give short answers by naming only the terms with limited explanations and no examples. By comparison, students in the SB group showed varied individual differences and ranked second next to DB group in their organisation and depth of responses.

Another point worth noting is that students with DB group and students with SB group showed greater performance than NB students. When comparing students' responses, DB and SB groups were more spontaneous and their thinking was not limited by the question. The group of students with no-biased learning approach (NB group) however just answered the question by giving limited answers.

The results also showed that all three groups (DB, SB & NB) mentioned communication and professional attitude as most important things that they learned in the clinical education settings. As the focus groups were held immediately after their final clinical education placement (CEIV), it is, therefore, not surprising that students selected communication and professional attitude among the top four things. This is in line with the criteria set in the Clinical Education Manual (Tsang, 2000), where the end of their final year clinical placement expects students, to be able to demonstrate professional attitudes and behaviour with practical skills of communication and interaction.

From the initial codes (themes), it is also noted that DB students expressed self-reflection as one of their most important issues in clinical education. This clearly describes the characteristic of a deep learner who thinks critically and reflects on their decisions in order to rationalise their treatment choice for a given client. Furthermore, this point also suggests that through the process of reflection on practical experience and observations, students expect to gain a better perspective of themselves in relation to their future career.

With regard to professional knowledge and skills, all three groups agreed that this is very important but with some variation. DB showed equal importance for both knowledge and skills, whereas SB group thought knowledge was most important.

All three groups of students expressed concern about their lack of opportunity in some clinical settings to integrate theory with practice. They also opined that proper guidance in clinical settings was necessary for them to build on the fundamental theory they learn in classroom and to be able to think and reason when working with real patients. Some students reflected that clinical practice was very important to gain confidence when facing real patients because they could not all have the opportunity to practice with real patients in classroom.

Students also reported that they had gained appropriate background knowledge from their academic subjects. However they felt that this knowledge base required better integration through discussion and more case demonstration. Some students noted that through seminar/tutorial discussion, they learned to improve their problem solving skills, to discuss their strengths and weakness, and to reflect on their own actions. Students also commented that journal reading and reflective journal writing had improved their critical thinking and felt that this method was the best way to develop their clinical reasoning skills.

The feedback from the focus group interview results indicated that while students expressed a positive attitude towards the video case stimulations, they felt that real case presentation could provide more effective learning of clinical reasoning skill in the classroom situation rather than video presentations. Furthermore, students also reflected that the best way of developing their clinical skills was to have more demonstration from the subject tutors and the opportunities to practise the clinical skills directly with clients.

On the question of theory and practice integration, students opined that in clinical education, they bring concepts together and compare and contrast various models and establish evidence to determine appropriate approaches. In spite of studying relevant theory and knowledge and organise this knowledge for use in the clinical settings, sometimes, they are not able to see the integration clearly. On the question of ethics, students' feedback indicated that they preferred more knowledge on the awareness of ethical issues in relation to client's rights and student responsibilities.

They further commented that faculty tutors should discuss the assessment process and constraints and provide more options for consideration.

Readers should by now have a clear picture about the validity of this study and the outcome. In the next chapter, a clear statement of major conclusions based on the interpretation of the results and research objectives will be presented. These findings will be compared and contrasted results with other related work to offer support for existing clinical theory or propose an alternative theory or explanation. Furthermore, the impact of results on clinical education will be discussed.

Chapter 11

DISCUSSION

11.1 Introduction

This chapter provides an in-depth discussion related to the findings of the research study. Initially the chapter will explore the appropriateness of the research approach used and seek to describe how the study has answered the research questions, which were outlined in **Chapter 1** of the thesis. Furthermore, this chapter will focus on alternative explanations of the observed outcomes in the light of the findings, emphasizing how they either support or refute previous work taking into consideration the evidence from the literature. Finally, it is also hoped that this chapter will provide perspectives on the applicability of results to occupational therapy course development and practice.

This chapter includes a discussion of results as well as reflection on the possible reasons why certain factors influence a Novice-Expert continuum development. This chapter concludes by reviewing the original contribution, which this study makes to the body of knowledge about the beginning practitioner's educational development, together with a review of the potential limitations of some of the methods and findings.

The literature reviews outlined in **Chapters 2-8** not only provided several pointers for making a decision about adopting the mixed method research, but also helped to find answers to the investigator's focused questions by explaining to the reader how the investigator set about seeking answers to the following main research questions of this study of developing clinical reasoning skills in occupational therapy students in Hong Kong:

1. What is the evidence for the progressive development of Clinical Reasoning Skills as a result of four periods of clinical practice?

   1a. What factors in the Self-Assessment of Clinical Reflection and Reasoning (SACRR) (Royeen et al, 1994) instrument show the most marked changes over the four periods of administration of the instrument?
   1b. Are there any areas in which there is little change? If there are, why might this be so and what are the implications for this for the curriculum and in particular for teaching and learning?

1c. Do the students who show most gain in scores of SACRR also gain higher/highest GPA scores?
1d. How far does the repeated SACRR data support the Dreyfus & Dreyfus Model (1986) of Skill Acquisition?

2. To what extent are there any changes in students learning preferences during the programme (Student Process Questionnaire (SPQ) (Biggs, 1987c) July 1999–April 2001)?

2a. Which students, in terms of their Grade Point Average (GPA) scores in years 1, 2 & 3 show most change in the Study Process Questionnaire (SPQ)? Is there any relationship in these data to other instruments, such as the Self-Assessment of Clinical Reflection and Reasoning (SACRR)? (See **Sections 9.4.1.2 & 9.4.1.3** on the Validity and Reliability of SPQ).
2b. Do students developed learning preferences as revealed by the administration of Moore & Fitch Inventory support the principles of Dreyfus & Dreyfus model, i.e., that the students are becoming more independent in their reasoning skills? (See **Section 9.4.2** for details).

11.2 Influence of Demographic Variables on Approaches to Learning

The literature review revealed that the relationship between age and approach to study had been investigated in several studies. When comparing the results of this study with other studies, the findings almost followed a pattern consistent with Biggs' study and other studies in Australia and U.K including Hong Kong (Entwistle & Ramsden, 1983; O'Neil & Child, 1984; Harper & Kember, 1986; Biggs, 1987c), regardless of type of institution or full-time/part-time mode of study. The purpose of this section is to discuss the relationship between the approach to learning and how sex, age and faculty may influence it.

The findings of this study confirmed that Hong Kong students see their learning not just as rule-governed activity that they had to follow, or that something spontaneously 'came' to them. However small the changes in their mean scores may be, it helped Hong Kong students to change the way about their learning. Although results showed that there were no significant decreases in mean scores for deep strategy and achieving motive regardless of gender and age, females appeared to be more likely than the males to show interest in their courses and to adopt a deep-level approach to their work. At the same time the females also generally seemed to possess more organized study methods than their male counterparts. On the other hand, males were more likely to have a pragmatic approach to tertiary study, to be worried about their work, and therefore opt for reproducing strategies which would allow them to just scrape their examinations (Watkins & Hattie, 1981). Moreover, students in other countries (e.g. Marton & Säljö, 1976; Watkins & Hattie, 1981; Entwistle & Ramsden, 1983; Thomas & Bain, 1984) suggest that they will tend to employ a surface approach if that is what the curriculum appears to demand, or if the learning environment is unfavorable. On the basis of this study's results, it would be predicted that females would have better academic results than male students. Indeed, this is true in occupational therapy studies at The Hong Kong Polytechnic University where females have shown higher average marks and higher graduation achievement than males when their GPA results are compared (see **Appendix 11.3**).

As reported earlier, CHC (Confucian Heritage Culture) regards higher education as an important criterion to obtain respect and recognition from society. In line with this tradition, a majority of Chinese students aim for higher education and this factor is clearly reflected in the findings of this study in which 34% of students show as high level `achievers (no-biased)'in Year 3. This finding is backed up by the research studies of Watkins & Regmi (1990) and Kember (2000).

The results in this study further confirmed that regardless of sex or academic year, the mature students tended to be less motivated by pragmatic concerns and to be more prepared to adopt a deep-level approach to their study methods. These results also seem to be consistent with studies of Watkins & Hattie (1981) who used the SPQ instrument with students at the University of New England in Australia and found that older students tended to be less motivated by pragmatic concerns and more liable to adopt a deep-level approach. Furthermore, this finding may be of particular interest given The Hong Kong Polytechnic University decided to increase its admission quota of mature students from 10% to 15% in the year 2003.

There is evidence in the literature that supports the faculty influence on approaches to learning. Some studies reported that regardless of sex, academic year, or age, Arts students who most clearly showed intrinsic interest in their courses adopted a deep-level approach in their work. Science students, on the other hand tended to be relatively more motivated by vocational concerns and to adopt surface-level reproductive study methods (Watkins & Hattie, 1981). However, Business studies students reported an increase in the use of a surface approach and decline in the employment of a deep approach from start to finish of a course. These results are somewhat puzzling and contradictory when compared to Rehabilitation Science and Nursing students.

Besides some of the above controversies, the findings of this study seemed to be in agreement with Biggs' (1987c) study, in which University science students showed a general decline in the use of a deeper approach as they progressed though their course from year 1 to year 3, a trend similar to this study. Based on these study findings, it may be possible that some variation in mean scores of SPQ was accounted for in differences among faculties. However, differences among faculties did not emerge with the demographic variables such as age, sex, gender, but it was these variables that contributed more than faculty variation in the SPQ scales.

11.3 Cross-Cultural Differences in Students' Approach to Learning

With the internationalization of Higher Education, tertiary institutions in many countries such as Australia, USA, UK, and Canada, have now become extremely diverse. Despite this diversity, and the implications for teaching and learning, there is insufficient understanding of how students from diverse backgrounds approach their learning, or how they may differ in their learning behaviour. This section reports on the findings of this study that investigated learning diversity using the Biggs' Study Process Questionnaire (SPQ) in a sample of 80 Chinese undergraduate occupational therapy students in the Department of Rehabilitation Sciences at the Hong Kong Polytechnic University. Furthermore, this section also focuses on cross cultural learning behavior of the study cohort in relation to other students from other countries because of a pressing need to understand the learning styles, needs and expectations of these students based on the results of this study which supports the findings of some other studies in the literature on cross cultural learning and refutes others. This section also serves to question some of the anecdotal evidence relating to the learning approaches of Asian students, particularly Chinese students, and discusses implications for teaching, learning, and diversity management within tertiary institutions' classrooms.

There are conflicting stereotypes existing in the literature about Asian students; this was discussed at length in the literature reviews, particularly in **Chapter 8**. As noted earlier, anecdotal evidence also abounds in Hong Kong to the effect that students entering tertiary education are predisposed to a "rote" learning approach, the cause of which is identified either with innate abilities, their school experiences, or some mixture of these. However, until the research studies at City Polytechnic of Hong Kong and Hong Kong Polytechnic (Balla & Stokes, 1989; Gow et al, 1989; Kember & Gow, 1991; Davies, Sivan & Kember, 1994), there have been no systematic studies performed locally that actually look at the learning styles and approaches exhibited by students emerging from the secondary system, nor of any modifications that might occur as a result of their tertiary experiences.

Analysis of the data in this study indicated that, contrary to some anecdotal evidence cited in the literature (See for example, Biggs, 1987c; Kember & Gow, 1991), the Hong Kong Chinese students in this study demonstrated a higher mean for the deep approach to learning (47.3 in Year 1 and 46.3 in Year 3) and a lower mean for the surface approach (42.7 in Year 1 and 42.4 in Year 3), similar to other Hong Kong students from other tertiary institutions in Hong Kong and Australian students from CAE (College of Advanced Education) courses. However, when comparing the findings of this study to Hong Kong nursing Year 2 students, a reverse trend was observed in which nursing students displayed a lower mean for the deep approach to learning (43.48) and a higher mean for the surface approach to learning (44), a trend similar to Australian students with higher mean scores on the surface approach as reported by Biggs (1990) and Kember & Gow (1991). To what extent these findings may be influenced by the large sample population needs to be further investigated. The overall scores for Hong Kong students for achieving approach are higher than the CAE scores, suggesting that Hong Kong students use well motivated strategies, take a keener interest in their studies and are more competitive. Overall, the results of this study were consistent with the research conducted in Hong Kong by Biggs (1992) and others (for example, Balla & Stokes, 1989; Gow et al, 1989; Kember & Gow, 1991, and including that of Dasari (2006a), which challenge much of the anecdotal literature on overseas students' learning. The findings of this study have not only confirmed Biggs' studies, but also supported other studies of the learning approaches of Chinese students at Polytechnics in Hong Kong (Gow et al, 1989; Kember & Gow, 1991) which found no support for the notion of students from Asian backgrounds adopting essentially surface rote approaches to learning.

When comparing the above results of this study with other cross-cultural studies involving Asian students at universities in the Northern Territory (Niles, 1995) and New South Wales (Ramburuth, 1997), and Singaporean students at Western Australia (Volet & Renshaw, 1996), it is not surprising to note that the learning approaches of Hong Kong students were not vastly different from other Asian students from Northern Territory, New South Wales and Singapore. Furthermore, on the basis of the evidence gathered from this research, it is reasonable to conclude that Chinese students' show no difference in their patterns of adaptation to academic demands and that their approach to study was, like that of other Asian students, influenced by their perceptions of course requirements rather than any 'typical' personal or cultural characteristic. To sum up, based on the findings of this current study and some other evidence in the literature, the stereotypic description of Asian learners being more prone to rote learning than western students is not supported.

11.4 Students' Learning Approaches and Attitude toward Learning Environment

This section explores the relationship between students' approaches to learning and their learning preferences. To remind readers, the Study Process Questionnaire (SPQ) was used to determine student approaches to learning, and students' attitudes to learning environments were measured by administration of the Moore and Fitch Inventory of Learning Environments (cited in Woods, 1994). On the basis of the normed decile scores students were classified into surface-bias approach, deep-bias approach and no-bias approach. It was expected that there would be shifts in both students' approaches to learning and attitudes to learning environments. It is likely that students who initially indicated a preference for didactic lecture-based courses would shift towards more independent student-centred learning (Stokes, Mackinnon, & Whitehill, 1997).

The comparison of the pre- and post Moore & Fitch inventory questionnaire scores revealed that students preferred 5 items (items 14, 29, 19, 34 and 32) in pre-course and 5 items (items 14, 29, 19, 32 and 20) in post-course as their ideal learning environment. From these responses, it can be noted that 4 items (14, 29, 19 and 32) were most popular among students who selected these items as their most preferred learning environment in both periods of pre-and post-course administration. These findings are similar to the findings of Wun, Chan, & Dickinson (1999) who investigated

4th year medical students in Hong Kong. They also reported that students preferred 3 items (items 14, 29, and 32) in Non-PBL group and 4 items (14, 29, 32 and 11) in PBL group as their most ideal learning environment. The items in these studies clearly portray a discursive learning environment where the teacher (professor) is an explainer friend, and guide on all aspects of learning. The teacher would also provide relevant experiences and materials. Students should take the discussions and their learning seriously but at the end of class discussion the teacher would provide students with `the right answers'. Some of the assumptions on the student cohort characteristics may be drawn from the findings and these may include that the final year occupational therapy students' take their learning seriously but prefer a more relaxed environment where discussion is encouraged. They are willing and able to share and discuss their ideas and opinions with their peers. However, they expect clear guidance from the teacher on all aspects of learning.

The comparison of students' attitudes toward learning environments was very encouraging for proponents of problem-based learning. The overall drop in all items (items, 14, 29, 19, 34, 32) of the post-test total scores (pre-test range 58%-76%), post-test range 44%-59%) is a positive indication which clearly identified a move towards a learning environment with higher cognitive strategies and independent learning (Dasari & Lai (2001). The results from this study were also in agreement with Kelly & Davey (1996), Stokes, MacKinnon, & Whitehill (1997) and Tang & Biggs (1996) who reported similar findings in their studies with Hong Kong students. These findings suggest how students' preferences for a particular learning environment influence their choice of learning approaches. This was a move away from the familiar didactic teacher-centred approach with its low-level cognitive strategy of rote learning lecture notes to pass examinations. The students' responses also showed a shift towards a learning environment where they would be 'rewarded for independent thought, could make connections among various subject areas and are encouraged to construct an adequate argument'.

When comparing the least preferred items (items 8, 9 and 16) in both pre-and post-course questionnaire, the results reveal an interesting observation of post-test results in that DB students preferred the item 16 and SB students preferred item 8 at the end of their second year of study. The scores of these items however, dropped lower in the post-test scores at the end of their third year of study. Despite low scores of items 8, 9, and 16, the findings indicated that the after the course, students may have preferred less guidance with right answers and less direction and less reproduction in tests. Furthermore, students also seemed to prefer less teacher control over the course as revealed by the item 9. These findings are somewhat similar to Wun, Chan, & Dickinson's (1999) study for items 9 & 16 in their pre-test scores, but are in total disagreement with their post-test score results for items 3, 13 and 33. On further examination of the frequency of score differences between the pre-and post-test results of the 3 items (items 3, 13 and 33), it is interesting to report that there is neither 10 nor 15-percentage point change in these items. These findings were also confirmed by Stokes, MacKinnon, & Whitehill (1997) in their study. Based on Wun, Chan, & Dickinson's study (1999) study, it is reasonable to conclude that irrespective of whether students chose PBL, students in their study did not prefer a learning environment where the teacher would give the most reliable answers to them.

Interestingly, findings of this study did not confirm some of findings reported by Stokes, MacKinnon, & Whitehall (1997) in their investigation of Speech & Hearing Science students in Hong Kong. After the course, the students preferred less direction and expertise from the professor (items 2, 10, 19, 33) and more focus on self-directed and peer learning (items 17).

11.5 Summary

Despite its limitations in terms of sample size, this study draws attention to 'the gap' in on-going perceptions of the learning behaviour of cross-cultural students and their actual practices. This study confirmed that the cross-cultural students in fact engage in deep learning, as identified by Biggs (1987a, 1991, 1999), perhaps even more so than their Australian counterparts. Consequently, it could serve to dispel the myths and generalizations relating to cross cultural learning behaviour. For the Health and Social care professions, this study provides useful data and information that could enable staff to understand more clearly the learning behaviour of their students and differences that exist, and, on the basis of this understanding, to reconsider misplaced perceptions. Furthermore, the findings of this study clearly suggest combined usage of the deep and surface approaches by cross cultural students. However, the extent to which these approaches are influenced by cultural factors, as in the practice of memorization, or by learning context and environmental factors, as suggested by Volet & Renshaw (1996) and Niles (1995) also needs further investigation.

The findings of the pre-and post course Moore & Fitch Inventory of Learning preferences (cited in Woods, 1994), indicated a move away from a traditional teacher-centred learning environment in which students are often regarded as passive recipients of learning. The students' post-course questionnaire responses showed that they preferred less direction and expertise from their teacher and that they no longer sought a teacher who would provide all the theory and necessary course information needed for rote reproduction. Overall, the findings of this study reinforced the previous research and support the proposition that the move from stage one of a study to the next higher stage can increase students' preference for independent thinking and thus promote deep learning in all three types of students, surface, deep and no-biased approach.

The results of the Moore & Fitch Inventory of Learning Preferences (cited in Woods, 1994) did not support the stereotypic descriptions that Hong Kong Chinese students rely mainly on surface, reproductive modes of learning and that they were passive, uncritical, seldom volunteered an answer or an opinion unless called upon. From the findings of this study, it is arguable that some of these differences in students' behaviours were due to Asian students being shaped by their previous educational experiences and that Chinese culture emphasize on discipline and proper behaviour in accordance with CHC tradition. The results of this study, however, lend support to the notion that Chinese students present themselves as metacognitive in their learning. Although they seldom express their disagreements explicitly to their teachers, they do not just accept all the information that their teachers provide. In the researcher's experience, when Hong Kong students disagree with their teachers, they express their disagreement very subtly and sometimes indirectly. It is important to recognise that different students may perceive the learning environment differently based on their learning preferences and styles, understanding the learning behaviour may provide insights into students' learning across cultures and into individual students' learning needs. Therefore, educators should pay more attention in determining how students' learning preferences affect their attitudes and study skills.

There is general consensus in the literature that the goal of education is to increase the students' capacity to learn, to provide them with analytic skills and to increase their abilities to deal with new information (Gow & Kember, 1990; McCune & Entwistle, 1999; Entwistle, Tait, & McCune, 2000). The purpose of the next section is to shed some light on the extent to which clinical education promotes these abilities and provides an opportunity for students to demonstrate their understanding of didactic classroom material by applying their theoretical knowledge to practise in a more structured and controlled clinical practice settings with supervision.

11.6 Development of Clinical Reflection and Reasoning in Fieldwork Education

The reader may recall, the SACRR instrument was used in this study to measure occupational therapy students' development of clinical reasoning skills and their reflective thinking ability based on their experiential learning during four instances of clinical education placements. With this background in focus, the study will now discuss the SACRR results and its significance to occupational therapy education as well as its implications to occupational therapy practice.

From the review of the literature, it is seen that the clinical reasoning development is being enhanced by worldwide research studies in occupational therapy. Concerns about different models of clinical education are compounding, and although new models and strategies are emerging, they fail to resolve some of the fundamental difficulties that academicians, clinicians and students are experiencing. Inherent in the Dreyfus & Dreyfus (1986) model of skill acquisition is the nature of competence and expertise in relation to the novice to expert continuum with a view to developing and expanding the concepts of clinical reasoning strategies for application to occupational therapy principles and practice. The next section will explore fully the expert-novice continuum in the light of SACRR findings in relation to students' development of clinical reasoning skills and their reflective ability based on their experiential learning during four instances of clinical education placements.

11.6.1 Development of Clinical Reasoning: Novice-Expert Continuum

The SACRR findings from the four Groupings as discussed in-detail below revealed that students not only value clinical techniques and their application to patient treatment, but also recognize that the clinical reasoning is based on the knowledge of treatment procedures, interactions and interventions with patients and interpretation and analysis of evolving situation.

11.6.1.1 Knowledge/Theory Application

As noted earlier, the five items (7, 8, 9, 10 & 26) of the SACRR in Grouping 1 looks at theory, past knowledge and various frames of reference for planning an intervention strategy and to understand clinical protocols for selection of appropriate treatment techniques. The items in this Grouping also emphasizes the fact that clinical reasoning is a complex process in that knowledge, skills and attitudes are entwined to make the therapist simultaneously a scientist, ethicist and artist (Rogers, 1983).

As one of the aims of clinical education is to provide occupational therapy students with the opportunity to consolidate, integrate, apply and evaluate knowledge, attitudes and skills, it requires a novice student gaining years of experience to reach a level of an expert, which Mattingly (1991a & 1991b) puts it as the clinician's ability to create an original response to the patient's unique condition moving beyond the knowledge base. Based on the findings of the items in this Grouping, it may be unrealistic to expect students to emerge from an 8 weeks of fieldwork placement with clinical reasoning skills firmly established. Students need professional knowledge, which includes the propositional or theoretical knowledge, the "knowing that", the knowledge of theories and frames of references to organize theoretical knowledge which guides students to understand the development of professional models which provide the basis for the development of professional competency in assessing various clinical problems and evaluating various intervention strategies for clients (Benner, 1984; Dreyfus & Dreyfus, 1986; Schön, 1987; Fish, Twinn, & Purr, 1990).

Clinical education is the vital part of the educational process within the BSc (Hons) Occupational Therapy curriculum, which includes both academic and clinical components. The collaboration between academic and clinical personnel is encouraged to enhance the exchange of knowledge and skills. Such a joint approach aims to enhance theory to practice link, and aid standardisation of marking within clinical/fieldwork learning. This academic-clinical link is clearly supported by a fieldwork survey conducted by Cohn & Frum (1988) who asked fieldwork educators to identify their top priorities. The survey revealed that "students were lacking integration of knowledge and skills" as one of the major problems facing fieldwork educators (Cohn & Frum, 1988, p. 326). Further evidence is seen in this study in which students during a focus group interview also rated "integration of theory to practice" as one of the four most important things that they learned in their clinical education placements. Based on this evidence, it is seen that clinical reasoning has become yet another "skill" to be taught among other skills and that it has been interpreted as having a reason for connecting a particular treatment decision to a particular frame of reference or a theory. Although a frame of reference or a theory helps students to make this connection, it is insufficient, by itself, to address the complex problems that occupational therapists face in clinical practice. There is, therefore more to clinical reasoning than simply translating academic theory into practice.

Another point worth noting in this context is that although the knowledge gained in Year 1 subjects forms a prerequisite for learning subjects in Year 2 and Year 3 of the curriculum, results of correlation between SACRR subscale scores and GPA scores supported the fact that subjects in Year 1 appeared to be not directly related to patient treatment and unresolved clinical problems. This is an important observation, which recognizes that fact that Year 1 is mainly a foundation year in which main emphasis is placed on learning theoretical knowledge from Biological subjects (e.g., Anatomy, Physiology) and Behavioral science (e.g. Psychology, Sociology), Occupational therapy Theory and Process and little exposure to clinical education subjects. Furthermore, this cohort of students had only two weeks of clinical observation placement (CEI) in their first year and their first major clinical placement (CEII) was only at the end of their second year of study.

It is also important to point out that although, the results of SACRR subscales indicated a moderate correlation with GPA scores mainly in Year 2 & Year 3 (Cohen, 1987), the SACRR instrument appears not to be highly predictive of students' academic performance and as such the data did not reflect any predictive nature of students' reasoning skills at a later stage of their training. This may be due to the fact that GPA is a fairly coarse measure, which requires combining grades across a number of subjects, with little knowledge of how individual grades will be derived (Meyer, Parson, & Dunne, 1990; Beckworth, 1991). While the findings of this study are in agreement with other studies that found no or only weak correlation coefficients between the academic grades and clinical performance (e.g. Englehart, 1957; Anderson & Jantzen, 1965; Mann & Banasaik, 1985: Best, 1994), it is in contrast to others who reported GPA was a positive predictor of all areas of clinical performance (e.g., Howard & Jerosch-Herold, 2000; Tan, Meredith, & McKenna, 2004). The reason for this discrepancy may be due to the fact that in other studies, academic grades were based on multiple rather than individual courses (Kirchner, Stone, & Holm, 2000), and this might explain why it was possible consistently to predict clinical performance.

As reported in the BSc (Hons) Occupational Therapy Clinical Education Manual (Tsang, 2000), Year 2 students concentrate on skill acquisition and development based on a strong conceptual foundation. By the end of their final year, they should be able to gather and distinguish essential data by identifying relevant sources. They need to be able to apply this knowledge into clinical practice, by identifying relevant sources of evidence and begin to recognise patterns of behaviour or symptoms. They should be able to recognize differences between theoretical expectation and presenting problems and incorporate contextual information into rule-based thinking. Though still procedural in approach, they should be able to recognize some patterns of behaviour or symptoms and be starting to prioritise data. They should be operating at an advanced beginner level prepared to take up their roles in professional practice. This fact has not only been substantiated in this research with Hong Kong occupational therapy students, but this study also showed that students first have to master knowledge and technical skills, the best preparation for new graduates would be to ensure that they have the basic mastery of skills, techniques, and domain-specific knowledge essential for practice (Dreyfus & Dreyfus, 1986; Robertson, 1996; Unsworth, 2001; Mitchell & Unsworth, 2005). This will allow them to develop the complex data-linking necessary to respond to cues from clients.

11.6.1.2 Decision Making based on Experience and Evidence

The ten items (1, 2, 3, 4, 5, 11, 18, 20, 24 & 25) of the SACRR in Grouping 2 collectively are related to seeking information by questioning others on how, what and why as a way of learning and seeking various solutions to problems before making judgments and proposing intervention strategies.

In occupational therapy understanding the client's point of view assists the student in prioritizing issues and actions to meet appropriate outcomes. Reasoning and decision-making are guided by personal values and beliefs that have been acquired over time and reflect physical, cultural and social environments in which development occurs (Bridge & Twible, 1997). The skill acquisition model (Dreyfus & Dreyfus, 1986) suggests that having an awareness of the client beyond technical concern does not develop until the student has passed from novice to the advanced beginner stage of practice. This evidence has been clearly shown in this research. The results of mean scores of SACRR for the subscale in this Grouping clearly indicated a greater change in students' clinical decision-making skills after CEII (post) placement. As reported in **Chapter 3**, these students had only two weeks of clinical observation placement (CEI) in their first year, and their first major clinical placement (CEII) with duration of 8-weeks was only at the end of their second year of study. This is a significant curricular implication, which clearly recognizes the fact that subjects in Year 1 appeared to be not directly contributing to patient treatment and unresolved clinical problems but also acknowledge that Year 1 is mainly a foundation year in which students are expected to learn theoretical knowledge from Biological subjects and Occupational therapy Theory and Process subjects. Furthermore, based on these findings, it is important to point out that students first have to master their knowledge and technical skills, the best preparation for new graduates would be to ensure that they have the basic mastery of skills, techniques, and domain-specific knowledge essential for practice (Robertson, 1996; Dasari, 2006b). In accordance with the CEII (post) clinical education placement objectives, these students start developing these complex data-linking skills necessary based on their clinical decisions and experience gained in CEII (pre) clinical education placement to respond to cues from clients and this is clearly evident from the findings of this research. Students in later years of their training need to be able to reason a best course of action and seek and propose interventions based on their experience within the context of the presenting circumstances and the health care system. By anticipating sequences of events in terms of identifying and assessing risk factors, students can decide upon appropriate intervention strategies to put in place, manage, or eliminate potential problems. As students gain skills and experience, this process may become intuitive (Benner, 1994).

In real clinical situations, cognitive processes can only be studied indirectly, either by observing behavior and inferring the underlying reasoning or by asking clients to give account of their thought processes. Since clinical judgment is defined as the outcome of thinking critically, in his (researcher of this study) view, judgment incorporates both reflection and meta-cognition in rationalizing or justifying decisions based on experience and is therefore a step beyond decision making. A challenge that faces educators is how to prepare novice students to become competent decision makers. In order to be competent health care professionals, they need to be able to demonstrate the value of professional practice based on their personal experience backed by sound evidence and decision making to know that their proposed interventions are the best possible for the client at that time. Furthermore, practical skills application, experiential learning, and clinical practice learning opportunities for students to trial decision-making and develop their skills throughout all aspects of the occupational therapy process is an important consideration which is clearly evidenced in this research. During a focus group interview, when students were asked 'what do you think has been the biggest change in you as a trainee occupational therapists as a result of the course?' students reported a big change in their learning by making it more evidence-based, which involved more objective decision-making and critical thinking after considering evidence from all perspectives. It is important to point out that students in this research also reported that in addition, case presentation, critical discussion, think aloud methods were found useful bringing into the open for sharing and discussion facilitated cognitive awareness of the judgments students were making clinical decisions.

11.6.1.3 Dealing with Uncertainty

The seven items (6, 13, 14, 15, 16, 19 & 22) of the SACRR in Grouping 3 includes the concepts of identifying issues and viewpoints while dealing with uncertainty. Although fieldwork educators and academics may not want to spend all their time teaching specific techniques, this is what the entry level undergraduate students perceive themselves as needing when making decisions on ill-structured problems which may result from their own anxiety, uncertainty, or insecurity.

The findings of this study show that exposure to the uncertainty of an unstructured methodology might foster more active participation by the students in clinical education placements and thus facilitate the transition from one mode or level of critical thinking to a higher order for better planning of clinical interventions. As noted in **Chapter 3** earlier, students in CEI clinical education settings are expected to identify mainly functional problems encountered by people with disabilities, and the roles and functions of an occupational therapist, as well as to observe the occupational therapy intervention process under close supervision of the clinical educators and as such students at this level are not expected to conduct an assessment or plan a treatment programme. The findings of SACRR clearly supported this view and confirmed that a change occurred in students' after their CEII (post) placement, which took place at the end of their second year of study. This trend was also noticeable from the Trend Analysis Graph in which results of mean scores present an increasing trend, which is significantly different from CEII (pre) to CEIV (post) for each SACRR subscale scores across four instances of clinical education placements. This is an important curricular implication which clearly acknowledges the fact that students first have to master their knowledge and technical skills, the best preparation for new graduates would be to ensure that they have the basic mastery of skills, techniques, and domain-specific knowledge essential for practice (Robertson, 1996). Furthermore, based on these findings, it is suggested that both professionals (clinicians and academicians) and students are required to respond to the situation in the context of their own knowledge and expectations from the beginning as their anxiety may be caused by a lack of knowledge or familiarity in the area of concern for "doing the right thing" or personal issues.

11.6.1.4 Self-Reflection and Reasoning

The four items (12, 17, 21, and 23) of SACRR in the grouping 4 appear to be homogeneous, reflecting on various hypotheses about clients' clinical problems before planning intervention and considering a different rationale for the proposed intervention. Despite low correlation of these four items in this study, it is important to recognize that the learning of models and theories is a developmental process and that encouraging students to value the critical examination of occupational therapy practice, one must simultaneously model reflection on their own practice.

Clinical educators act as powerful role models and mentors in assisting students to develop their intervention strategies as well as raising their awareness of how they consider different strategies for the proposed interventions. During supervision and integration with students, clinical educators begin to offer explicit explanations of their reasoning process. This kind of interchange can facilitate communication and self-reflection by both therapist and student. This view is clearly substantiated in this research; when students asked 'what you think you are better at as a result of the course?' during a focus group interview, all three groups (DB, SB & NB) of students reported greater improvement in the area of communication and self-reflection after their clinical placements. Students also reflected that real case presentation in the clinical education settings was an effective way of learning, which helped to develop their clinical reasoning skills.

From the qualitative findings of the focus group interview, it was evident that students expressed concern about their lack of experience working with real patients. They also reported that experience with real patients would help them to build on the fundamental theory that they learn in classroom. Furthermore, students also commented that proper guidance in clinical and classroom practice with real clients is necessary for them to be able to think and reason for effective treatment planning (Schwartz, 1984; Neistadt, 1987; Watkins, 2004). Although this is an important factor to be considered, it may not be always possible to provide this kind of opportunity in a classroom situation. A powerful tool for encouraging reflection on practice is the use of videotapes, which help students, clarify their assumptions regarding their own behavior and the impact of their own behavior on patients. If experienced therapists share videotapes of their own treatment sessions, they would be able to stop the action, discuss the reasoning behind their actions, and teach theoretical concepts.

To develop student's personal reflection, the researcher of this study designed a self-reflection exercise for the students in their seminar sessions. In these sessions, students have to reflect and share their attitudes and experiences with persons with musculoskeletal conditions. Also, one group of students has to role-play by pretending that they are patients with complex/complicated hand injuries. Their experience is videotaped by another group of students. Then this tape is shared with other peers in a seminar. All these kinds of first-hand reflection exercises stimulate the students' own perceptions, feelings, and thinking towards hand injured patients. Instead of viewing these patients at a distance, they have to work through their personal prejudice, fear and misunderstanding in encountering patients with multiple hand injuries. Furthermore, teaching the symptoms and etiologies of hand injuries, the researcher of this study focuses on the similarities of these symptoms with thinking patterns of a normal person.

11.7 Summary

The main focus of this section has been to evaluate reflection and the reasoning process thereof as a fundamental dimension of clinical reasoning based on the four-factor model for 26 items of the Self-Assessment of Clinical Reflection and Reasoning (SACRR) instrument and to discuss the implications of SACRR findings to occupational therapy principles and practice.

As observed in this research, both students and practitioners not only require the clinical reasoning skills for making and defending clinical decisions but they also need to develop questioning skills which might prompt others to articulate the reasoning that underpins their client-related clinical judgments and decisions. From the findings of this study, it is important to recognize that students need professional knowledge, which includes propositional or theoretical knowledge, the "knowing that", the knowledge of theories of occupation, health and disability, and the tools of practice necessary to apply theory to practice. Students also need non-propositional, practical knowledge the "knowing how", including the art of therapy, the tacit or intuitive ways of knowing and personal knowledge (Benner, 1984; Dreyfus & Dreyfus, 1986; Schön, 1987; Fish, Twinn, & Purr, 1990).

Clinical educators provide opportunities for students in the clinical education placements to use their coping and reasoning skills as more independent thinkers. Clinical education placement should also provide opportunity for "doing" and reflecting on it both during and after practice, using formal theoretical perspectives as well as personal beliefs and values, refining their personal theory with the professional and theoretical context of what are acceptable (Fish, Twinn, & Purr, 1990; Bridge & Twible, 1997).

Although both clinical educators and academics may not want to spend all their time teaching specific techniques that is what the entry level undergraduate students perceive themselves in needing when making decisions on-structured problems which may result from their own anxiety, uncertainty, or insecurity. In handling uncertainties, students need to be able to rely on their accumulated experience when making clinical judgments. The novice needs to assimilate knowledge to have it available to serve decision-making processes. Advanced beginner level students may gain more in an ill-structured clinical case based strategy while novice students may learn from more effectively with a well-structured approach.

Both clinicians and academicians need to "empower their students to understand the knowing process in more complex and encouraging ways, accept uncertainty without being immobilized by it, and learn to use evidence to reason and make best judgments" so that they can make interpretive arguments and decisions (King, 2000). This was clearly evident in this study in that there was a progressive change in students from the end of their second year of study after CEII (post) clinical placement, which was their first major clinical placement of eight weeks duration. This has an important educational implication, which clearly emphasizes the fact that these students had strong background knowledge in skill acquisition and development. Furthermore, findings of this study also confirmed that students did not adhere to a particular model of clinical reasoning as formalism for the data collection and analysis.

In this study, the relationship between the academic grades (GPA) and clinical performance (SACRR) of occupational therapy students is examined to answer one of the questions: What is the evidence for the progressive development of Clinical Reasoning Skills as a result of four periods of clinical practice?

While the findings of this study are in agreement with some studies that found no, only a weak or low correlation coefficients between the academic grades and clinical performance (for example, Englehart, 1957; Anderson & Jantzen, 1965; Mann & Banasiak, 1985; Best, 1994), it is in contrast to others who reported GPA was a positive predictor of all areas of clinical performance (e.g., Howard & Jerosch-Herold, 2000; Tan, Meredith, & McKenna, 2004). A careful examination of the distribution of academic grades and clinical performance of students in this study suggests several reasons for failing to achieve high correlations. One of the possible reasons being that GPA is a fairly crude measure, which requires combining grades across a number of subjects, with little knowledge of how individual grades will be derived (Meyer, Parson, & Dunne, 1990; Beckworth, 1991).

From the qualitative findings of the focus group interview, students expressed concern about their lack of experience working with real patients. Review of the literature also revealed that the process of developing clinical reasoning requires students to gain skills in critically evaluating the presenting problems of clients, and planning and executing interventions (Fleming, 1991b) and the findings of this study clearly acknowledge this view. The findings have also indicated that communication among students, clinical educators and academics is important, even before the fieldwork begins in sharing with students the advantages and disadvantages of emerging fieldwork placements, so that the students have realistic expectations. The pre-clinical seminars are useful in providing a forum for students to share experiences, curriculum content and philosophy and problem solve issues raised in their placements.

In the next **Chapter 12**, an attempt will be made to discuss to what extent findings can be generalized and suggest ways to resolve conflicting evidence from this research and make recommendations to show how the discrepancy could be resolved in a new a study.

Chapter 12

CONCLUSIONS AND RECOMMENDATIONS

12.1 Introduction

The previous chapter provided an in-depth discussion of the findings of this study. This chapter closes the discussion in the form of drawing conclusions and making recommendations for present and future research and finally, from the researcher's perspective, a personal reflection on the process of actually completing this study. To remind readers, the aim of this study was to see if trainee occupational therapy students of the Hong Kong Polytechnic University:

- react differently when predisposed to a surface or deep approach to learning and
- show evidence for the progressive development of clinical reasoning abilities during initial training and education.

The reader may recall, at the beginning of this thesis, the main research objectives were set out in the introductory **Chapter 1** of the thesis. In order to meet these research objectives it had been necessary to obtain data from a sample of trainee occupational therapy students. The data included information on the learning approaches, learning preferences and development of clinical reflection and reasoning skills of these undergraduate students during their initial training from 1998 to 2001. Besides, the study explored the appropriateness of the research methodology and design used in **Chapter 9** and sought to describe how the study had answered the research questions in order of importance relative to the specific aims of the study in **Chapter 10. Chapter 11** was focused on the explanations of the observed outcomes in the light of the findings, emphasizing how they either supported or refuted previous work taking into consideration of the evidence from the literature review presented in **Chapters 2-8.** The conclusions (**Chapter 12**) for the present study are derived from an examination of the literature and from the empirical conclusions obtained from the findings. This chapter is based on principles of critical arguments, which summarize patterns from the findings, significance of the data, implication for practice and suggested recommendations.

12.2 Key issues arising from the research

This study began by examining the development of the clinical reasoning process during the four periods of fieldwork experience in trainee occupational therapy students, who followed a 3-year BSc (Hons) undergraduate programme in Occupational Therapy at the Hong Kong Polytechnic University. This was accomplished by using a range of measures, which provided some valuable insights into the pattern and process contained in the development of clinical reasoning abilities of this group of undergraduate occupational therapy students. The key issues emerged from the findings and discussions are outlined below.

12.2.1 Demographic Profile of the Study Population

The current study showed that as students become older they are less likely to adopt a surface approach and more likely to adopt a deep one. The possible explanation for this is that as students become older, and presumably more mature, the intrinsic interest in study grows. The results of this study confirmed that regardless of sex or academic year, the mature students tended to be less motivated by pragmatic concerns and to be prepared to adopt a deep-level approach to their study methods. The results may be of particular significance given increasing number of mature-age students enrolling at universities and supports the contention that this new clientele may require different teaching methods from those students straight from school or other routes. While this study investigated only one cohort of students, further investigation is needed to establish the degree to which these results were fostered by an educational program. Furthermore, interactions between contextual and personal factors and study methods are a complex area, which is rarely studied in a systematic way and therefore requires further investigation.

12.2.2 Students' Learning Approaches and Attitude toward Learning Environment

This study offered the resolution to one of the most central and baffling problems in the field of approaches to learning, namely whether students from Hong Kong or other parts of Asia are more prone to rote learning than their western counterparts; or alternatively whether there is a similar balance of students with propensities towards surface and deep learning approaches, and similar tendencies to be influenced by their learning context. The cultural differences identified in this study support the assertion by Biggs (1996) that the misconceptions that some western observers have reported in relation to the learning of Asian students "exist only by taking too narrow and a systematic view of the components in classroom learning" (p 196). Furthermore, the author of this study also believes that the anecdotal observation of rote learning in Chinese learner may also be explained by the nature of curriculum and the teaching environment rather than as an inherent characteristic of the student. The findings suggest that although students from different countries may differ in their ways of learning, the difference would be more subtle than those represented by their dichotomies (surface, deep and achieving) that many educators express. Moreover, the requirements of learning tasks, whether or not assessment is involved, and the behaviours of teachers also play a crucial role in determining whether and how often students use certain learning behaviours.

One of the note-worthy observations made about this problem is that learning in a second language may lead to a surface approach as students have to focus on well-defined 'important' topics, though this may be debated as the research literature including the findings of this study showed that Chinese learners in Hong Kong scored higher on deep approaches to learning than did Australian students (Salili, 1996).

Kember & Gow (1990) explained this phenomenon further as a survival strategy, noting that Chinese students' learning in a second language, were highly focused and selective in their learning.

Based on this study, it is reasonable to assume that trainee students need critical thinking skills and the ability to organize knowledge in a meaningful way. A student adopting a deep approach relates the content to meaningful contexts, theorizing about what is learned and how it relates to understanding the client's problems. The findings also supported a view that the achieving approach is different from the deep and surface approaches and according to Biggs (1991), the former refers to arranging the context for carrying out the task that is not to handle the content of learning, as do surface and deep learners, but to manage its context: organizing time, working space, and syllabus coverage in the most-effective way ("study skills"). Students need these skills in order to gain specific learning outcomes. The results indicate that novice students use theories and frames of reference for understanding clinical problems for planning and implementing treatment relevant to the patients/clients needs. From the study findings, it is also realistic to conclude that learning through experience calls on deep learning, that is learning for understanding and meaning rather than rote learning of facts and principles.

From the results, it is also noticeable that some scales and subscales, particularly, surface strategy, deep motive, deep approach, achieving approach were not found to be correlated with students' academic grades. Although, it would be expected that students' approaches to learning would influence their academic performance, findings of this study, however, do not fully support this. The results may, however, suggest that it may be due to the fact that the correlations are a reflection that university grades are often not a true indicator of the quality of learning outcomes (Tang & Biggs, 1996). It would seem logical that students who do well in their academic studies would do well in their clinical performance. However, results of this study do not fully support this evidence and are in agreement with other studies (Mann & Banasiak, 1985). While SPQ is a quite useful predictor of academic achievement, it is evident from other research studies that there may be differences in teaching styles of faculty and their relationship with GPA scores (Kember & Gow, 1994; Watkins, 1996; Watkins & Biggs, 1996).

This study has provided evidence that Biggs' Study Process Questionnaire (SPQ) can be used validly to assess student learning in a number of countries differing in terms of cultural values, ethnicity, and educational systems. Even for Hong Kong students for whom the extensive SPQ reliability and validity evidence is encouraging, further work is needed to fully justify cross-cultural comparisons of student learning and if appropriate extend the use of SPQ and other instruments measuring approaches to learning as an evaluation strategy for educational innovation in other locations.

Overall, the findings of this study reinforced previous research and support the proposition that the move from stage one of study to the next higher stage can increase students' preference for independent thinking and thus promote deep learning in all three types of students, surface, deep and no-bias approach. It is important to recognize that different students may perceive a learning environment differently, based on their learning preferences and styles, understanding the learning behaviour may provide insights into students' learning across cultures and into individual students' learning needs. Therefore, educators should pay more attention in determining how students' learning preferences and styles affect their attitudes and study skills (Gow et al, 1989; Entwistle, McCune, & Walker, 2000; Coffield et al, 2004; Entwistle & Peterson, 2004).

12.2.2.1 Students' Learning Styles and Preferences

The balance between the design of a learning environment and students' perceptions of that environment, and their approaches to learning is a very delicate one. The results from the analysis of pre-and post course Moore & Fitch Inventory of Learning Preferences (originally cited in Woods, 1994) drew attention to the fact that a student's experience of learning does have considerable influence on his/her perception of environment, and subsequently the approaches he/she adopted in learning. Furthermore, this study also suggested that attitudes to learning did have strong impact on a student's perception of their teachers and course content. The study findings also indicated a need for support to assist Chinese students in the effective organization of their study and in the development of a conceptual framework in the subject matter. In addition, from the findings, it is also possible to conclude that learning and satisfaction are inextricably intertwined. Thus teachers need to attend to factors that contribute to student satisfaction and motivation as well as content knowledge.

Furthermore, the results of the Moore & Fitch Inventory of Learning preferences (cited in Woods, 1994) reported a change in the affective outcomes of students' surface, deep and no-bias approach. This is an important conclusion. The findings indicated that a preference for didactic lecture-based courses would shift towards independent student-centred leaning and move away from a traditional teacher-centred learning environment in which students are often regarded as passive in receipt of learning. The students' post-course questionnaire responses showed that they preferred less direction and expertise from their teacher who would provide all the theory and necessary course information needed for rote reproduction.

From the analysis of the Moore & Fitch Inventory of Learning preferences (cited in Woods, 1994), it is arguable that some of the differences in students behaviours were due to Asian students being shaped by their previous educational experiences and that

Chinese culture emphasises discipline and proper behaviour in accordance with CHC tradition. Therefore, educators should pay more attention to both similarities and subtle differences between students from different cultures or countries, rather than assuming that students from certain cultures or countries behave in certain ways.

12.2.3 Development of Clinical reasoning skills: Expert-Novice differences

Clinical reasoning is an interactive and conditional process in which all aspects are integrated to resolve both current and future occupational performance. The development of clinical reasoning occurs as a function of experience and reflection on that experience. Results from this study clearly illustrate that there is no single way to look at clinical reasoning – rather it is a multifaceted and complex.

The important outcome of this study suggests that it is both possible and desirable to explore the Dreyfusian Model of skill acquisition further as the novice to expert continuum with a view of developing and expanding on these concepts of clinical reasoning strategies for application to occupational therapy principles and practice. For students in the early stages of their professional training, this model allows for a developmental approach to reasoning in that not all people achieve an expert level in their skills, but only a small fraction of beginners can even master the domain. Even though both students and clinical educators should find the Dreyfusian Model of skill acquisition to be easily applied in the clinical settings, it warrants further exploration.

Although both clinical educators and academics may not want to spend all their time teaching specific techniques that is what the entry level undergraduate students perceive themselves as needing when making decisions on ill-structured problems which may result from their own anxiety, uncertainty, or insecurity. The findings of this study clearly supported this view in that there was a progressive change occurring in students from the end of their second year of study after CEII (post) clinical placement, which was their first major clinical placement of 8 weeks duration. This is an important educational implication, which clearly emphasizes the fact that these students had strong background knowledge in skill acquisition and development. In this respect Dreyfus & Dreyfus Model provided a strong conceptual foundation with which students were able to evaluate knowledge claims more fully, to explain and defend their points of view on controversial issues more convincingly and to apply this foundation into clinical practice by identifying relevant source of evidence.

12.2.3.1 Knowledge and Theory application

Based on the findings of this study, it is reasonable to conclude that students are expected to develop their clinical reasoning skills by integrating theoretical concepts and constructs, contextual information, formal theory as well as personal theory of professional practice based on the culturally accepted practice of occupational therapy and this was clearly confirmed by the Pearson correlations. Findings also indicated a big jump in students' correlation scores of the SPQ scales and subscales which is expected as they attend their first major CEII clinical education placement in which students are provided with opportunity to consolidate and apply occupational therapy knowledge, attitudes and skills learned in PolyU to assess, plan, and implement occupational therapy intervention for various patients/clients such as interview techniques, assessment procedures and implementation, specific treatment techniques and programme evaluation (See **Appendix 3.4.3a**).

12.2.3.2 Decision-making based on Experience and Evidence

As pointed out earlier, first year students tend to be dependent on theory, book learning and the authority of the teacher in developing their professional knowledge. As novice students, their epistemological views of the world are limited by their lack of experience. They need to "see" for themselves the reality faced by their future clients. They also need to reflect on their own personal views and establish how these views might influence their interactions and delivery of health care services.

12.2.3.3 Dealing with uncertainty

Based on the evidence gathered from this study, it is reasonable to suggest that both professionals and students are required to respond to the situation in the context of their own knowledge and expectations when making decisions on ill-structured problems. Underlying assumptions and behaviors that may have resulted from their own anxiety, uncertainty, or insecurity may influence this. The anxiety may be caused by a lack of knowledge or familiarity in the area of concern for "doing the right thing" or personal issues. In order to be competent health care professionals, they need to be able to use personal theory backed by sound decision-making and judgment to ascertain that their intervention is the best possible solution at that time.

12.2.3.4 Self- reflection and Reasoning

Clinical education placements should also provide opportunities for "doing" and reflecting on it both during and after practice, using formal theoretical perspectives as well as personal beliefs and values, refining their personal theory with the professional and theoretical context of what is acceptable (Fish, Twinn, & Purr, 1990). During supervision and integration with students, clinical educators begin to offer explicit explanations of their reasoning process. This kind of interchange can facilitate communication and self-reflection by both therapist and student and would help them identify the theoretical models and frames of reference that guide practice as well as raise awareness of how they use personal interpretation of occupational therapy values and philosophy in their practice.

12.2.4 Predictors of Occupational Therapy Students' Clinical Performance

As discussed earlier, given the importance of clinical placements, it is critical that their common indicator of success, that is, student clinical performance, is more closely examined. Most studies that have investigated factors related to student clinical performance have focused on the relationship between academic and clinical performance (Mann & Banasiak, 1985; Howard & Jerosch-Herold, 2000; Kirchner, Stone, & Holm, 2000; Tan, Meredith, & McKenna, 2004). The results of this study also added to this growing body of literature that emphases the relationship between the students' academic performance and their clinical performance. The most striking interest were that the findings from this study did not show any correlations between students GPA (Grade Point Average) and SACRR subscales except one subscale (Dealing with Uncertainty in Year 2 and 3 and one other subscale (Decision making based on experience and evidence in Year 1. This is an important curricular observation in that the SACRR instrument appears not to be highly predictive of students' academic performance. In the light of this observed outcome, this study refutes previous research studies. One of the possible reasons for this disagreement between these study findings and others being that GPA is a fairly coarse measure, which requires combining grades across a number of subjects, with little knowledge of how individual grades will be derived. Furthermore, the results also support those of other studies (Mann & Banasiak, 1985; Best, 1994; Kirchner & Holm, 1997; Howard & Jerosch-Herold, 2000; Kirchner, Stone & Holm, 2000), which have concluded that a complete set of predictors of student clinical performance is difficult to find. More research on these and other potential predictors is therefore, needed to provide evidence to those factors that influence student clinical performance.

12.2.5 Implications for Teaching and Learning of Clinical Reasoning

The main, direct contribution of the study findings to the teaching and learning of clinical reasoning skills to undergraduate occupational therapy students lies in the areas of decoding fieldwork educator's insights and the dissemination of practical reasoning skills by linking theory to practice. This study also raised a bearing on the current and future education of beginning practitioners and provided a rationale for the use of appropriate techniques and methods for the teaching and learning of complex thinking skills, which have been discussed earlier in this thesis.

For students in the early stages of their professional education and training, the Dreyfusian Model allows for a developmental approach to reasoning in that it moves from presentation of contextual, observable and case-specific information through increasing levels of abstraction to theoretical and philosophical backings. Though these students at this stage were still procedural in approach, they should be able to recognize some patterns of behaviour or symptoms and be starting to prioritise data. They should be operating at an advanced beginner level (Dreyfus & Dreyfus, 1986) prepared to take up their roles in professional practice. By the end of their final year, after they had completed two more major clinical placements (CEIII & CEIV) in their final year, they were able to gather and distinguish essential data by recognizing the differences between theoretical expectations and presenting problems, incorporating contextual information into rule-based thinking, and recognizing more subtle ethical issues.

The study findings have also brought to the surface, knowledge about clinical reasoning to beginning practitioners that contains a number of implications for occupational therapy education. These relate in particular to the objective of teaching students to be reflective practitioners, being able to analyse and evaluate their own practice and offering cogent arguments in defense of their clinical decisions and professional beliefs.

To understand the development of clinical reasoning skills and related implications for teaching, these skills have been a challenge to occupational therapy educators and clinical supervisors throughout the profession's history. Considerations of ways in which students and practitioners might learn to articulate their clinical reasoning skills has led to the observation that they not only require the skills necessary for making and defending clinical decisions but they also need to develop questioning skills by which means they might prompt others to articulate the reasoning that underpins their clinical judgments and decisions. So, what can be done to help occupational therapy learners acquire expertise in clinical reasoning?

From the findings of this study, it is reasonable to conclude that deep vs. surface learning approaches should not be seen as permanent characteristics of students themselves (Martin, 1999; Prosser & Trigwell, 1999). Learners adopt specific strategies, and thus approaches, depending upon the circumstances of the situation in which they find themselves. As such students cannot be categorized as deep or surface learners in a permanent fashion. Rather, as Martin (1999) argues, deep or surface learning approaches are encouraged by contextual variables such as teaching the approaches witnessed by the students. Nonetheless, as Prosser & Trigwell (1999) argue, approaches to learning can provide a good indication of the quality of learning, deep approaches being associated with higher quality learning.

Many academics are uncomfortable with the terms 'deep' and 'surface' arguing that in using them an implicit value judgment is being made. In the opinion of the author of this study, there is an implicit value system expressed in the language and he believes that it is justifiable. Furthermore, based on his research, the author of this study also notes that the terms deep and surface refer not to the students but to the different approaches that they adopt. At different times the same students can and do adopt different approaches as evidenced in this study.

The findings also confirmed that Hong Kong students see their learning not just as rule-governed activity that they had to follow, or that something spontaneously 'came' to them. However small the changes in their mean scores may be, it helped Hong Kong students to change the way they learn. Although results showed that there were no significant decreases in mean scores for deep strategy and achieving motive regardless of gender and age, females appeared to be more likely than the males to show interest in their courses and to adopt a deep-level approach to their work.

From the qualitative findings of the focus group interview, students expressed concern about their lack of experience working with real patients. Review of the literature also revealed that the process of developing clinical reasoning requires students to gain skills in critically evaluating the presenting problems of clients, and planning and executing interventions (Fleming, 1991b) and the findings from this study clearly support this view. Further, this view was also shared by Rogers & Holm (1991) who highlight that the real case study creates a clearer image of a client as an individual who has specific interests, values, and abilities than the information provided in traditional paper case studies (Schön, 1987; Schwartz, 1991; Pollock, 1993).

The findings have also indicated that communication among students, clinical educators and academics is important. Communication is important even before the fieldwork begins in sharing with students the advantages and disadvantages of emerging fieldwork placements, so that the students have realistic expectations. The pre-clinical seminars are useful in providing a forum for students to share experiences, curriculum content and philosophy and problem solve issues raised in their placements.

While assessment routines may have the advantage of guiding the novice learner in data collection and in helping experienced clinician to methodically assess difficult and problematic cases, when used uncritically they may be time consuming and can result in unnecessary and confusing data. Similarly, treatment protocols may be used as a routine as opposed to conducting an individual reasoning process for each client's condition, circumstances, abilities and needs in order to obtain an optimal treatment. In addition, to enhance the reasoning processes, it is incumbent upon both the teacher and the learner to explore the values or belief systems of the students, to ensure that they explore new ideas and process information in appropriate ways (Refshauge & Higgs, 2000).

12.3 Curriculum Design and Framework

In this study, Dreyfus & Dreyfus (1986) five–stage model of skill acquisition was presented as an organising framework to distinguish expert-novice differences in relation to clinical problem solving strategies. As this model postulates that with increasing competence, practitioners progressively depart from a reliance on abstract principles and increasingly rely on past, concrete experiences to guide action, this model provided a unifying framework for understanding the dynamic process of human skill acquisition that involves the five career stages, which represent increasingly complex ways of responding to practice. Furthermore, this model also fitted very well with the other models, most relevant in this case being that of Benner (1984).

The study also revealed that the educators must put an end to extensive content-based learning and refocus their efforts on promoting the centrality in the curriculum of reflection and reasoning. This is essential in preparing the student to deal with the complexities and risks of current practice realities. Every effort must be made in the curriculum to help students to develop as reflective thinkers. To this end clinical educators, who with the academics share the responsibility for the education of future professionals, must also be offered opportunities to develop appropriate clinical reasoning skills so that they too may develop as reflective practitioners. As noted in the literature review, the theories, methods and the techniques are readily available. They require only the motivation, the vision and the will to employ them in the designing of a thinking curriculum for future professionals.

From the literature review, it was noted that at present, clinical reasoning in occupational therapy might be taught as a separate subject within a curriculum or as an integral part of all areas/subjects within a curriculum. At present, clinical reasoning aspect of the curriculum is taught as an integral part of all subjects within the BSc (Hons) Degree in Occupational Therapy Programme at the Hong Kong Polytechnic University. Shepard & Jensen (1990) refer to explicit and implicit curricula. Both these forms of curriculum reinforce students' learning. Everingham & Felletti (1999) emphasize the importance of using both explicit and implicit curricula to promote reflection in learning and the development of reflective knowledge and skills. Such abilities can help both novice learners and experienced clinicians to deal with what Schön (1987) labels `the indeterminate zones of practice' or uncertainty, uniqueness and value conflicts which characterize human situations.

Although occupational therapy students in this study had only two weeks of clinical observation placement (CEI) in their first year, these students' first major clinical placement (CEII) is at the end of their second year of study. This means that these students have two years of academic study before entering a major clinical education placement. By the end of their final year, after they have completed two more clinical placements (CEIII & CEIV), they were able to gather and distinguish essential data by identifying relevant sources. They were also able to recognize differences between theoretical expectation and presenting problems and incorporate contextual information into rule-based thinking. Though still procedural in approach, they were able to recognize some patterns of behaviour or symptoms and be starting to prioritise data. They were operating at an advanced beginner level prepared to take up their roles in professional practice.

12. 4 Limitations of the Study

Having drawn some important conclusions, it is important to review the limitations of this study. The use of questionnaire for the collection of data introduces threats to both internal and external validity. Due to the same cohort, the possibility of significant error in the data set might be possible, and one must use caution in generalizing results. Furthermore, whatever the findings from this study, the results represent views from one cohort of students from one school. Hence, these findings cannot be assumed representative of the World as a whole, since educational requirements may vary from country to country. Without further evidence from other cluster populations within the Occupational Therapy schools around the World, it would be incorrect to claim the results in this research could be generalized to the world populations.

While the SPQ provides a useful evaluation of the learning outcomes consistent with the deep approach construct, whether the nature of the evaluation can be generalized to a wider context outside Hong Kong is open to debate since the studies were conducted in a naturalistic style in a limited setting. It certainly does, though, seem to be appropriate to extend the use of SPQ and other instruments measuring approaches to learning as an evaluation strategy for educational innovations in other countries. With regard to the SACRR instrument, as it was not clear from the original authors (Royeen el al, 1994) whether the SACRR instrument was based on uni-dimensional or multi-dimensional construct, the researcher of this study carried out the factor analysis method. While the factor analysis was used as a more favourable method (Burnett & Dart, 1997), further evidence is required to investigate to what extent factor analytic evidence supports the use of SACRR instrument as a measure of clinical performance. The use of Moore & Fitch Inventory of Learning preferences instrument in this study raises some doubts on the validity of this instrument for Chinese students in the absence of valid evidence in the literature. The findings from Moore & Fitch Inventory of Learning preferences, therefore must be interpreted with caution and require replication because any comparative analysis may be limited by confounding factors including self-selection effects, other intervening variables, and measurement error.

The review of the research design has highlighted the strengths of the study as well as some areas of weakness in the methodological and practical considerations. Notwithstanding some weaknesses, the author of this study however believes that most identified areas of weakness within this research study have been minimised through the careful design of the study, and the utilization of a triangulation of research methodology. As Denzin & Linclon, (2000) identifies that the triangulation of data sources improves the reliability of a piece of research, as information may be cross-referenced as a check on the 'truth' of data

A study may encompass more than one methodological approach, particularly if it addresses more than one research question as in this study, leading to a combination of designs or hybrid research designs (Sim & Wright, 2000). Based on these assumptions, this study adopted a mixed method design, which allowed developing a triangulation of data, which would not have been possible with any other methodology. Moreover, a focus group interview alone would not have been able to capture the holistic view of the data. The focus group interviews in this study not only strengthened the relevance and appropriateness of the theory but added new perspectives to ensure data validity.

From the literature review, it is seen that there appears to some major deficiencies in the field of learning due to lack of longitudinal studies and investigation with students from third world countries. In the opinion of this study's author, longitudinal studies are important as they can contribute knowledge as to whether or not approaches to learning are consistent over time. Such a knowledge may lead to better understanding both of the way that students change their learning strategy during their lengthy progress through the educational process and of ways of encouraging the adoption of strategies which lead to higher level learning outcomes.

12.5 Recommendations

Based on the findings of this study, the following positive recommendations to academics and clinicians alike can be made:

- Findings of this study failed to find substantial and hard empirical evidence that matching the learning styles of students and teachers improves the attainment of the students significantly. Some researchers even suggest that a policy of deliberate mismatching should be adopted to prevent students becoming bored by having the whole curriculum presented in the preferred learning style. For instance, Vermunt (1998) favours what the terms "constructive friction" where the teacher pushes students to take more responsibility for the content, process and outcome of their learning.

- While it is important to recognize that students may differ in the ways they learn, educators should make no assumptions that certain cognitive activities would be linked with specific observable, overt actions. Students from different, or even the same cultures or countries may differ in their learning behaviours that may manifest when they are engaged in the same cognitive activities. Therefore, instead of being assigned a particular learning style, it would be more beneficial for students to appreciate the relative advantages and weaknesses of a range of learning styles and preferences.

- Many other valuable considerations such as the teaching of different modes of reasoning, the learning of patterns and processes of reasoning both to give meaning to clinical decisions and to explain action, and the teaching of appropriate techniques for accessing encrypted knowledge fall within the ambit of a thinking curriculum. As an area of advanced specialism, it is now in the forefront of professional practice. Consequently it needs to be accorded a special place in the undergraduate curriculum. Similarly, because of the cognitive complexity inherent in clinical reasoning it seems evident that this area of practice provides an advanced knowledge base for the teaching and learning of clinical reasoning skills in preparation for complex practice.

- This study makes an offer to one of the most crucial and baffling problems encountered in the field of clinical reasoning, namely the extent to which clinical reasoning can be articulated and explained to beginning practitioners in their undergraduate curriculum. One way to address this is to provide continuing education workshops to fieldwork supervisors that focus on clinical reasoning concepts. Then, during supervision and interaction with students, therapists could begin to offer explicit explanations of their reasoning processes.

- Understanding and acknowledging the similarities and differences is the first step to diversity management, taking action to address issues of differences is the next step. At the institutional level, there needs to be support and resources for developing innovative strategies for diversity management, including cross cultural training programmes for staff and academic acculturation programmes for students. At the classroom level, there needs to be adjustments to the curriculum, for adoption of more inclusive approaches to teaching and learning, and the modification of teaching styles to accommodate students' diverse learning styles (Gow et al, 1989; Coffield et al, 2004).

12.6 Further Research

This study has reached the point where the question of how this piece of research has contributed to the development of trainee students' clinical reasoning skills, understanding of their approaches to learning and attitudes to learning environment within the framework of a novice-expert continuum. This study has created a large number of questions, these have not been listed but categories of future research are suggested.

From the literature review, it is noted that occupational therapy research in the area of clinical reasoning is particularly lacking in spite of the heightened attention currently directed towards teaching and learning of different modes of clinical reasoning (CR). A high percentage of what has been researched is concerned with models of CR rather than its implications to clinical practice. This study has only been able to report on one area of interest in the development of clinical reasoning skills as a Novice-Expert continuum in the undergraduate curriculum but it has also had the effect of drawing attention to the need for further research into the many facets of the client-therapist relationship. For example there is a need for a comprehensive picture of the ways in which interactive strategies and tactics are used to gain cooperation and compliance. Real case studies of a qualitative nature would be valuable in illuminating both the complexities of practice and the reasoning that supports it and may be used as an adjunct to education and practice. This kind of encrypted meaning deserves further study, as does the application of different models of reasoning and reflection. Furthermore, more studies of a similar nature would be needed to evaluate the extent to which Dreyfus & Dreyfus (1986) model of skills acquisition provides a useful framework for the teaching and learning of clinical reasoning skills in a Novice-Expert continuum framework

Gender issues remain an interesting subject within student learning literature, requiring special attention. William Perry (1970) first described epistemological beliefs in a longitudinal study of male college students. Belenky et al, (1986) studied 135 females from academic and non-academic backgrounds. Using a sample of both male and female college students, Baxter Magolda (1993) postulated stages of epistemological developments similar to those described by Perry (1970) and Belenky et al, (1986). There are other studies, which have found no differences or are inconclusive (Kirchner, Stone, & Holm, 2000; Baxter Magolda, 2000). There is a need for more studies that explore the potential gender-related matters in epistemological theories.

Although adult learning and development theories would strongly suggest that mature-age students are often negatively stereotyped in terms of their needs rather than their strengths, according to the British study (Richardson, 1995), however, mature-age students achieve slightly better marks than younger-age students and this is very much true in the cohort of this study, where some of the mature-age students graduated with distinction. Although mature students' seem to possess well-organized study skills than the younger age group students, to what extent these results are due to intellectual maturation of students or well-organized teaching methods; this would certainly require further research to establish the degree to which these qualities were fostered by an educational program. It is important that universities help develop an educational program which supports mature students and allows them to feel confident about tackling their academic work and reaching their final goal.

While SPQ offers a tool for directly assessing the quality of students' learning processes which are known to have a strong impact on the quality of learning outcomes, further research is needed to fully justify cross-cultural comparisons of student learning, in particular the possibility of cross-cultural differences in social desirability and context. Furthermore, even the extensive SPQ reliability and validity evidence is encouraging for Hong Kong students; it may be possible to tailor the items to reflect differences from Western students in terms of both motives for learning and the use of memorizing and understanding strategies. The author of this study hopes to investigate the culture/learning approach more thoroughly through the administration of SPQ scales representing a range of Hofstede's (1997) cultural dimensions such as individualism-collectivism and masculinity-feminity.

Although, there was no significant evidence in the literature, it is clear to some extent from the results of this study and other studies (e.g., Biggs, 1979; Watkins & Hattie, 1981) that the relationship between contextual and personal factors and study methods is a complex one, which requires further investigation. From the literature review, it was clear that interactions between contextual and personal factors had rarely been studied in a systematic, research-oriented way. The results reported in this study have tried to explore in a systematic way the relationship between various contextual factors such as sex, faculty, and age. What, then, are effects of these complex contextual factors on students' approaches to learning? Clearly, there is a need for more research in this area, from both a 'qualitative' and 'quantitative' perspective.

In order to produce a competent beginning therapist, a curriculum design must delineate competencies and professional roles. The philosophical case of occupational therapy provides guidance for education and practice for development through research. As noted elsewhere, attention has been drawn to those issues in education and practice that should be pursued in the future, but little has yet been said about research. The outcome of this study leads the researcher to assume that it is possible and desirable to explore this area further. Absence of evidence from other occupational therapy schools does not equate to evidence of absence. This study suggests that some schools do seem experience difficulty in their early practice. Given these findings, it is the researcher's opinion that this situation warrants further exploration.

One factor of note however, is that learning in a second language may lead to a surface approach as student have to focus on well-defined 'important' topics, though this may be debated as the research literature including the findings of this study shows that Chinese learners in Hong Kong scored higher on deep approaches to learning than did Australian students (Biggs, 1987c; Salili, 1996; Kember & Gow, 1999; Dasari, 2006a) explained this phenomenon as a survival strategy, noting that Chinese students learning in a second language are highly focused and selective in their learning.

12.7 Personal Reflection...this is only beginning

This study was conceived and undertaken whilst the researcher is in full-time employment and that the many years of teaching experience informed the perspective of this research. Overall, this research has been an interesting experience, which at times has been highly challenging. This study has offered me an opportunity not only to learn about the many issues surrounding a novice-expert practitioner in the development of their clinical reasoning abilities, but also given the chance to explore and challenge my own thoughts and assumptions.

As this study arose from a longstanding interest in the initial training and education of occupational therapy students, with particular reference to how they develop their clinical reasoning abilities and move progressively from one stage to the next stage in their undergraduate curriculum, I am aware that my own views have shifted, now learning more about novice- expert continuum and valuing more highly the mixed method design and the importance of client-centred approach.

Looking back at the research itself, there has been many turns and twists in this arduous process. Now, nearing the end of this phase, the journey has been different from that which I expected to take at the start of this project. At times the road ahead was unclear when dealing with outcome measures and their implications to teaching and learning of the multi-facetted CR skills and its impact on clinical practice and other times, the road was mystified - I could not see. However, new roads were built and journey continued with the help of my supervisor, who guided me through this demanding route. Along this hard and rough journey, there have been many fellow travellers who shared their experience with whom many useful signposts were erected. I have learned much from this venture, and am deeply grateful to all who are part of this process. The journey does not end here...this is only a beginning.

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Clinical Calendar for OT 2001/2002, Dept. of RS (endorsed)

Wk No.	Wk Begin	Clinical Education	Mon	Tues	Wed	Thurs	Fri	Sat	Remark
0	27/08						*		*Opening Ceremony, RS
1	03/09		+						+1st semester commences
2	10/09								Add/drop period 3-15 Sep
3	17/09								
4	24/09								
5	01/10								Ed Info Day, classes suspended
6	08/10								
7	15/10								
8	22/10								
9	29/10								
10	05/11								
11	12/11								
12	19/11								7th Congregat'n, class suspend
13	26/11								
14	03/12	CEIII						++	++Classes for 1st sem. ends
15	10/12								Revision period 10-12 Dec
16	17/12								Exam. period 13 Dec to 29 Dec
17	24/12		+++						+++No exam. 24 Dec
18	31/12								
19	07/01								
20	14/01				#				#Finalise exam. results
21	21/01		+						+2nd semester commences
22	28/01								Add/drop period 21 Jan- 2 Feb
23	04/02								
24	11/02	CEIV	^						^ Evening classes suspended
25	18/02								
26	25/02								
27	04/03								
28	11/03								
29	18/03								
30	25/03								
31	01/04								
32	08/04								
33	15/04								
34	22/04							++	++Classes for 2nd sem ends
35	29/04								Revision week 29 April-4 May
36	06/05								Exam period 6-18 May
37	13/05								
38	20/05								
39	27/05								
40	03/06	CEI						#	#Finalise exam results
41	10/06								
42	17/06								
43	24/06								Reassessment period (2 weeks)
44	01/07								24 June-6 July
45	08/07								
46	15/07							$	$Finalise reassess. results
47	22/07	CEII							
48	29/07								
49	05/08								
50	12/08								
51	19/08								
52	26/08							^	^Academic yr 2001-02 ends

Examination Holiday University Function

N.B. Subject Assessment Review Panel and BoE meetings will be held in weeks 19, 39-40 & 46, pending FB schedule. This calendar only includes key dates relevant to our department. Please refer to Academic Calendar issued by the AS for more details.

Clinical Education Aims

Clinical Education I	Clinical Education II	Clinical Education III	Clinical Education IV
AIMS • Provide students with the opportunity to appreciate various roles and functions of occupational therapists, and the value of the occupational therapy (OT) intervention process in a variety of clinical settings, for example, different units within one or more settings, different stages of OT intervention with similar patients/clients, the same intervention with different patient/client groups etc.; • Provide students with the opportunity to identify functional problems encountered by patients/clients of occupational therapy; • Guide students to conduct activity analyses and implement therapeutic activities; • Guide students to develop appropriate professional behaviour.	AIMS • Provide students with the opportunity to consolidate and apply occupational therapy (OT) knowledge, attitudes and skills learned in The Hong Kong Polytechnic University to assess, plan, implement, evaluate, and modify, under guidance, OT intervention programmes for clients/clients with common conditions in Hong Kong; • Provide students with the opportunity to apply occupational therapy techniques learned in The Hong Kong Polytechnic University, to train patients/clients under supervision in occupational therapy • Provide students with the opportunity to communicate and function appropriately as a member of the multidisciplinary/rehabilitation team; • Prepare students for more advanced studies in Year III and/or for elective fields of occupational therapy.	AIMS • Provide students with the opportunity to integrate, consolidate, and evaluate, through self-directed approaches, knowledge, skills and attitudes learned in The Hong Kong Polytechnic University, to OT practice in a particular field of occupational therapy; • Provide students with the opportunity to practice, with respect to management theories and techniques learned, basic managerial functions for independent occupational therapy practice and day-to-day administration of the occupational therapy department; for example, using appropriate administrative procedure, keeping records, working out schedule for supporting staff etc.; • Prepare students to evaluate the application of occupational therapy theories to practice in major fields of occupational therapy practice in their final stage of study.	AIMS • Provide students with the opportunity to integrate, consolidate, and evaluate, through self-directed approaches, knowledge, skills and attitudes learned in The Hong Kong Polytechnic University, to OT practice in a particular field of occupational therapy; • Provide students with the opportunity to practice, with respect to management theories and techniques learned, basic managerial functions for independent occupational therapy practice and day-to-day administration of the occupational therapy department; • Prepare students to evaluate the theoretical base of occupational therapy principles relevant to particular settings in their final stage of study.

Clinical Education Objectives

Clinical Education I	Clinical Education II	Clinical Education III	Clinical Education IV
OBJECTIVES • abide by the professional Code of Ethics stipulated in the Supplementary Medical Professions Ordinance; • identify patients/clients performance in terms of occupational function-dysfunctions; • identify various roles and functions of occupational therapists in a variety of clinical settings; • identify the occupational therapy intervention process in a variety of clinical settings and/or with a variety of clients; • conduct simple activity analyses and implement therapeutic activities; • interact with patients/clients and members of rehabilitation/multidisciplinary team appropriate to the professional standard.	OBJECTIVES • abide by the professional Code of Ethics stipulated in the Supplementary Medical Professions Ordinance; • identify patients/clients problems in occupational performance resulting from developmental, physical, mental illness or ageing; • apply OT knowledge and skills to assist patients/clients to develop an adaptive cycle of occupational functions, for example, time management of daily events in order to promote self-confidence, motivation and drive for mastery of tasks etc.; • evaluate and modify OT intervention programmes designed for patients/clients as required; • present verbal and written OT reports as an effective means of professional communication; • interact with patients/clients and members of the multidisciplinary team appropriate to the professional standard; • identify OT related problems encountered in the clinical field in order to prepare for further in-depth enquiries and studies.	OBJECTIVES • select, in collaboration with a clinical educator, patients/clients appropriate to Clinical Education III; • gather relevant information to facilitate the selection, application and evaluation of assessment procedures; • select, plan, conduct, and evaluate appropriate treatment modalities/programmes for specific patients/clients in a clinical setting and/or an appropriate rehabilitation environment; • evaluate the effectiveness of treatment programmes; • present verbal and written occupational therapy reports as an effective means of professional communication; • be professionally accountable in accordance with the Code of Ethics of Supplementary Medical Professions Ordinance;	OBJECTIVES • select, in collaboration with a clinical educator, patients/clients appropriate to Clinical Education IV; • gather relevant information to facilitate the selection, application and evaluation of assessment; • select, plan, conduct, and evaluate appropriate treatment modalities/programmes for specific patients/clients both in a clinical setting and in an appropriate rehabilitation environment; • evaluate the effectiveness of treatment; • present verbal and written occupational therapy reports as an effective means of professional communication; • account professionally in accordance with the Code of Ethics of Supplementary Medical Professions Ordinance; • conduct preliminary evaluation on different treatment approaches to prepare for further in-depth evaluation and studies in The Hong Kong Polytechnic University.

(Source : BSc (Hons) in Occupational Therapy, *Clinical Education Manual*, The Hong Kong Polytechnic University, 2000.

2nd July 1999

CONSENT FORM

Dear Students,

I am a doctoral student at the University of Hull (UK) in the Department of Educational Studies. The purpose of this study is to seek insights into the phenomena of how novice and experienced clinicians maintain noticeably different reasoning skills and provide a rationale for the development of clinical reasoning skills from a novice to an expert therapist and its implications for curriculum design. The study involves an investigation by the administration of the three sets of questionnaires to explore students' approaches to learning and their self-assessment of clinical reflection and reasoning ability including their ideal learning preferences. The focus group (selected students only) is designed to probe students' understanding of clinical reasoning process and the application of this to a novel clinical problem solving.

All information collected will be kept in the strictest confidence; the researcher will be the only person who will involve in the handling of data collected in this study. In the analysis of data, all information will be number coded to ensure the confidentiality of the participants (that is names of participants will not appear on files or labels). Only the investigator and his supervisor will see the data. If you have any questions about the study, or the nature of your participation, please feel free to contact Bhoomiah Dasari on 27666729 at the Department of Rehabilitation Sciences, The Hong Kong Polytechnic University.

My hope is that findings from this research study add to the understanding of the development of clinical reasoning skills and could inform the design and contents of courses for newly qualified therapists. If you wish to receive a copy the summarised results of the study, you may contact me after the project is completed.

I thank you for your cooperation and time.

I, ______________________________, agree to participate in the above study conducted by Mr. B. D. Dasari. The details of study procedure have been made clear to me. I understand that my participation is voluntary and that I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice to my present or future career. I also understand that all data collected will be confidential.

Signed: ______________________________

Student ID. No: ______________________________

Contact Tel. No: ______________________________

Date: ______________________________

SPQ

Study Process Questionnaire

研習過程問卷

What the SPQ is About

On the following pages are a number of questions about your attitudes towards your studies and your usual ways of studying.

There is no *right* way of studying. It all depends on what suits your own style and the courses you are studying. The following questions have been carefully selected to cover the more important aspects of studying. It is accordingly important that you answer each question as honestly as you can. If you think that your answer to a question would depend on the subject being studied, give the answer that would apply to the subject(s) most important to you.

「研習過程問卷」是什麼？

問卷內的問題是關於你對求學的態度和你慣常的研習方法。

實際上沒有一種所謂「正確」研習方法，全在乎它是否切合你的個人風格和你所修讀的學科。問卷內的問題是經過細心挑選，務求包括研習的較重要性質。因此，你對每一問題誠實作答是很重要的。如果你認爲某一問題的答案，會因不同的學科而有所不同的話，請把問題應用於你覺得最重要的學科上，然後作答。

How to Answer

For each item there is a row of boxes for a five-point scale on the Answer Sheet:
1 2 3 4 5 . A response is shown by marking *one* of the five boxes for an item to underline the desired number.

The numbers stand for the following responses:

1 – this item is *never* or *only rarely* true of me
2 – this item is *sometimes* true of me
3 – this item is true of me about *half the time*
4 – this item is *frequently* true of me
5 – this item is *always* or *almost always* true of me

如何回答？

在答案紙上，每條問題都有一行分為五級的格子：
1 2 3 4 5 請在你所選擇的號碼下所附空格內畫線，以表示你的答案。

每個號碼代表以下的答案：
1 ——這句子對我來說，完全不適用或甚少適用。
2 ——這句子對我來說，有時適用。
3 ——這句子對我來說，大概一半時候適用。
4 ——這句子對我來說，常常適用。
5 ——這句子對我來說，永遠適用或差不多永遠適用。

Example

I study best with the radio on.

If this was almost always true of you, you would underline *5* thus:

1 2 3 4 5

If you only sometimes studied well with the radio on, you would underline *2*, thus:

1 2 3 4 5

學例

「開着收音機時我的研習做得最好。」

如果你認為這句子對你來說是永遠適用，就請在5號下的空格內畫一橫線，如下圖：

1 2 3 4 5

如果你認為只是有些時候開着收音機對你的溫習有幫助的話，就請你在2號下的空格內畫一橫線，如下圖：

1 2 3 4 5

Underline the number on the Answer Sheet that best fits your *immediate* reaction. Do not spend a long time on each item: your first reaction is probably the best one. Please answer each item.

Do not worry about projecting a good image. Your answers are CONFIDENTIAL.

劃線於最能夠代表你即時反應的號碼空格內。不要花太長時間在一條問題上：你的第一個反應是最好的。請回答所有問題。

不用刻意建立一個良好形像。你的答案是保密的。

Thank you for your co-operation.

謝謝合作。

Study Process Questionnaire
研習過程問卷

1 I chose my present courses largely with a view to the job situation when I graduate rather than because of how much they interest me.
我選擇現在的學科，主要是考慮到將來畢業後的就業情況，並非因爲它們吸引我。

2 I find that studying gives me a feeling of deep personal satisfaction.
我發現研習可以帶給我很大的滿足感。

3 I want top grades in most or all of my courses so that I will be able to select from among the best positions available when I graduate.
在多數或全部的學科中我都想得到高分，因爲在我畢業後，我將能選擇一份最好的工作。

4 I think browsing around is a waste of time, so I only study seriously what's given out in class or in the course outlines.
我認爲博覽羣書是一種浪費時間，因此我祇認眞地研讀那些在課堂上派發或已在課程大綱上列明要讀的。

5 While I am studying, I think of real life situations to which the material that I am learning would be useful.
當我讀書時，我會思索現在所學的東西在現實生活中有多大用處。

6 I summarize suggested readings and include these as part of my notes on a topic.
我會將建議的閱讀資料做撮要，並把它們放在同一課題的筆記中。

7 I am discouraged by a poor mark on a test and worry about how I will do on the next test.
我會因測驗分數低而感到灰心，並擔心下次測驗的成績會如何。

8 While I realize that truth is forever changing as knowledge is increasing, I need to discover what is truth for me right now.
因爲我知道隨着科學的進步，眞理是會改變，因此，我必須要尋找在現時什麼是眞理。

9 I have a strong desire to excel in all my studies.
我有強烈的慾望要在所有的學科上比別人優勝。

10 I learn some things by rote, going over and over them until I know them by heart.
我是靠死記的方式來學習，一次又一次的背誦，直到我能牢記爲止。

11 In reading new material I find that I'm continually reminded of material I already know and see the latter in a new light.
當閱讀新的資料時，我不斷想起已經學過的東西，並對這些東西有新的了解。

12 I try to work consistently throughout the term and review regularly when the exams are close.
我盡力在整個學期中不斷溫習。當考試臨近時，更定期復習。

13 Whether I like it or not, I can see that further education is for me a good way to get a well-paid or secure job.
不論我喜歡讀書與否，我明白到高等教育能助我他日獲得一份高薪或穩定的工作。

14 I feel that most topics can be highly interesting once I become involved in them.
我覺得祇要我肯投入，大部份課題都能變得很有趣。

15 I would see myself basically as an ambitious person and want to get to the top, whatever I do.
基本上，我覺得自己是個有野心的人，無論做任何事，我都要成爲最出色的一個。

16 I tend to choose subjects with a lot of factual content rather than theoretical kinds of subjects.
我選讀那些內容包括較多事實的學科，而不大選擇那些着重理論性的學科。

17 I find that I have to do enough work on a topic so that I can form my own point of view before I am satisfied.
我發覺我要在一個課題上很用功，以致我能建立自己的觀點，才會感到滿足。

18 I try to do all of my assignments as soon as possible after they are given out.
我接到作業後，便盡快把它們做完。

19 Even when I have studied hard for a test, I worry that I may not be able to do well in it.
就算我在測驗前已好好地溫習，但仍會擔心自己可能考得不好。

20 I find that studying academic topics can be as exciting as a good novel or movie.
我發覺研究學術性課題，就如一本好小說或一套好電影那樣能令人感到興奮。

21 If it came to the point, I would be prepared to sacrifice immediate popularity with my fellow students for success in my studies and subsequent career.
如果在同學中受歡迎會和在學業及將來事業上的成功有衝突時，我會放棄前者。

22 I restrict my study to what is specifically set as I think it is unnecessary to do anything extra.
我祇閱讀那些特別指定的資料，因爲我認爲沒有需要做額外的。

23 I try to relate what I have learned in one subject to that in another.
我嘗試把在某一學科中學到的知識與另一學科的聯繫起來。

24 After a class/lecture or lab I reread my notes to make sure they are legible and that I understand them.
下課後或實驗課後，我會把筆記重溫一遍，以確保它們清楚易讀及我能明白它們的意思。

25 Teachers/lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.
老師是不該期望學生花太多時間去溫習一些人人都知道不會考的東西。

26 I become increasingly absorbed in my work the more I do.
我做事是越做越專心的。

27 One of the most important considerations in choosing a course is whether or not I will be able to get top marks in it.
當選科時，其中一個最主要的考慮因素是我能否在該學科中取得優異成績。

28 I learn best from teachers/lecturers who work from carefully prepared notes and outline major points neatly on the blackboard.
如果老師有細心預備的筆記，並把重點整齊地寫在黑板上，我會學習得最好。

29 I find most new topics interesting and spend extra time trying to obtain more information about them.

我發覺大部份新課題都是有趣的，而且會花額外的時間去加深我對它們的認識。

30 I test myself on important topics until I understand them completely.

我在重要的課題上測驗自己，直至完全明白爲止。

31 I almost resent having to spend a further three or four years studying after leaving school, but feel that the end results will make it all worthwhile.

我幾乎爲了中學畢業後還要花三、四年時間去讀書而很不高興，但想到最終的結果，便覺得這是值得的了。

32 I believe strongly that my main aim in life is to discover my own philosophy and belief system and to act strictly in accordance with it.

我堅信我人生的主要目標是尋找一套自己的人生哲學及信念，然後緊照着它而行事。

33 I see getting high grades as a kind of competitive game, and I play it to win.

我把取得高分視爲一項競賽。我參與其中，並且要獲勝。

34 I find it best to accept the statements and ideas of my teachers/lecturers and question them only under special circumstances.

我發覺最好是接納老師的意見和想法，並只在特別的情況下才向他們發問。

35 I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.

在不同課堂上討論過的課題，只要是有趣的，我都會花很多空餘時間去增加我對他們的認識。

36 I make a point of looking at most of the suggested readings that go with the lectures/class presentation.

大部份與課堂或研討報告有關的閱讀資料我都會認眞去讀。

37 I am at polytechnic/university mainly because I feel that I will be able to obtain a better job if I have a tertiary qualification.

我入理工或大學讀書，主要因爲我覺得大專畢業的資格能使我找到一份較好的工作。

38 My tertiary experience has changed my views about such things as politics, my religion, and my philosophy of life.

我的大專生涯改變了我對政治、自己的宗教及人生哲學的看法。

39 I believe that society is based on competition and schools, polytechnics and universities should reflect this.

我相信社會是建基於競爭之上，因此學校，理工及大學應反映這個情況。

40 I am very aware that teachers/lecturers know a lot more than I do and so I concentrate on what they say is important rather than rely on my own judgment.

我深信老師們比我識得更多，所以我較專注於他們認為重要的事上，多過依賴自己的判斷。

41 I try to relate new material, as I am reading it, to what I already know on that topic.

我嘗試把現在閱讀的新資料與那些在同一課題上已知道的聯繫起來。

42 I keep neat, well-organized notes for most subjects.

我大部份學科的筆記都是整齊而有系統的。

Student No: ____________________ Class: ________________________

Pre-test ☐ Post-test ☐

Date: ________________________

MOORE and FITCH Inventory for Learning Preferences

Each of us has an ideal learning environment. Think how you learn best. Try not to focus on one particular course or one particular instructor.

You have 10 check marks (√) to distribute among 34 questions. Put a check mark in the * column next to the statement that best describes your ideal learning environment.

Student No: ____________________ Class: ________________________

Pre-test ☐ Post-test ☐

Date: ________________________

	My ideal learning environment	*
1	Would provide assignments with practical everyday applications.	
2	Would have the professor give me all the theory and information I need to know.	
3	Would be where I would have a lot of control over the course content and class discussion.	
4	Would be where I take effective notes on what is presented in class and reproduce that information on tests.	
5	Would emphasise class discussion but I would expect the professor to tell us the right answer.	
6	Would be where I have my own opinions and I can think for myself.	
7	Include grading that is by a prearranged point system (for homework, tests, final) since I think that is most fair.	
8	Would include straightforward, not `tricky' tests, covering only what has been taught and nothing else.	
9	Would let me learn on my own because I hate being spoon-fed by professors.	
10	Would be where the professor doesn't tell me the answers; rather he/she shows me how to find the answers for myself.	
11	Would provide a flexible class where I can explore independent learning options.	
12	Is where my opinion counts, but I have to support it with factual evidence.	
13	Would be where the professor is an expert who knows all the answers.	
14	Would provide experiences and material that is relevant to what I need to know.	
15	Would be where the learning is a mutual experience where I contribute to the teaching and learning in class.	
16	Would have the focus on having the right answers rather than on discussing methods on how to solve the problems.	
17	Would value my classmates as sources of information, not only as companions.	
18	Would reward me with high grades for independent thought.	

Student No: ____________________ Class: ______________________

Pre-test ☐ Post-test ☐

Date: ________________________

	My ideal learning environment	*
19	Would be where the professor provides me with clear directions and guidance for all course activities and assignments.	
20	Would take learning seriously and be where I feel personally motivated to learn the subject.	
21	Would reward me the good grades when I worked hard to learn the material.	
22	Would provide me with a professor who is a source of expertise only in a particular subject area	
23	Would let me learn from my classmates and peers.	
24	Would provide a classroom atmosphere of exploring and debating new ideas.	
25	Would encourage me to learn using lots of different learning methods.	
26	Would allow peers the right to have their own opinions.	
27	Would include exams and assessment as part of the learning process.	
28	Would be lectures since I can get the information I need to know most efficiently.	
29	Would have the professor who was not just an instructor, but more an explainer, entertainer and friend.	
30	Would be a 'free-flowing' class that does not follow a strict outline.	
31	Would provide a workshop or seminar atmosphere so that we can exchange ideas and evaluate our own perspectives on the subject matter.	
32	Would provide a relaxed atmosphere where discussion is encouraged.	
33	Would be where I could listen intently to the professor and not to classmates and peers for answers to questions.	
34	Would be where I can make connections among various subject areas and am encouraged to construct an adequate argument.	

Self-Assessment of Clinical Reflection and Reasoning (SACRR)

CE I ☐

CE II ☐

CE III ☐

CE IV ☐

☐ Pre-test

☐ Post-test

Student No: ____________________ Class: ____________________

Sex: ☐ Female ☐ Male

Date: ____________________

Response key: DS = strongly disagree, D = disagree, U = undecided, A = agree, SA = strongly agree

	SD	D	U	A	SA
1. I question how, what and why I do things in practice.	☐	☐	☐	☐	☐
2. I ask myself and others questions as a of learning.	☐	☐	☐	☐	☐
3. I don't make judgements until I have sufficient data.	☐	☐	☐	☐	☐
4. Prior to acting, I seek various solutions.	☐	☐	☐	☐	☐
5. Regarding the outcome of proposed interventions, I try to keep an open mind.	☐	☐	☐	☐	☐
6. I think in terms of comparing and contrasting Information About a client's problems and proposed solutions to them.	☐	☐	☐	☐	☐
7. I look to theory for understanding a client's problems and proposed solutions to them.	☐	☐	☐	☐	☐
8. I look to frames of reference for planning my intervention strategy.	☐	☐	☐	☐	☐
9. I use theory to understand treatment techniques.	☐	☐	☐	☐	☐
10. I try to understand clinical problems by using a variety of frames of reference.	☐	☐	☐	☐	☐
11. When there is conflicting information about a clinical problem, I identify assumptions underlying the differing views.	☐	☐	☐	☐	☐
12. When planning intervention strategies, I ask "What If" of a variety of options.	☐	☐	☐	☐	☐

CE I ☐

CE II ☐

CE III ☐

CE IV ☐

☐ Pre-test

☐ Post-test

Student No: ____________ Class: ____________

Sex: ☐ Female ☐ Male

	SD	D	U	A	SA
13. I ask for colleagues' ideas and viewpoints.	☐	☐	☐	☐	☐
14. I ask for the viewpoints of clients' family members.	☐	☐	☐	☐	☐
15. I cope well with change.	☐	☐	☐	☐	☐
16. I can function with uncertainty.	☐	☐	☐	☐	☐
17. I regularly hypothesise about the reasons for my client's problems	☐	☐	☐	☐	☐
18. I must validate clinical hypotheses through my own experience.	☐	☐	☐	☐	☐
19. I clearly identify the clinical problems before planning intervention.	☐	☐	☐	☐	☐
20. I anticipate the sequence of event likely to result from planned intervention.	☐	☐	☐	☐	☐
21. Regarding a proposed intervention strategy, I think, "What makes it work?"	☐	☐	☐	☐	☐
22. Regarding a proposed intervention, I ask, "In what context would it work?"	☐	☐	☐	☐	☐
23. Regarding a particular intervention with a particular client, I determine whether it worked.	☐	☐	☐	☐	☐
24. I use clinical protocols for most of my treatment.	☐	☐	☐	☐	☐
25. I make decisions about practice based on my experience	☐	☐	☐	☐	☐
26. I use theory to understand intervention strategies.	☐	☐	☐	☐	☐

From "Preparing the Reflective Practitioner: Transforming the Apprentice Through the Dialectic," by R. Roth, 1989, Journal of Teacher Education, 40, pp. 31-35. Copyright 1989 by Sage Publications. Readers can obtain a copy of this questionnaire from the first author.

Grade Point Average (GPA) Results of the Study Cohort

No.	Student No.	Sex	W.G.P.A	G.P.A
1	98140456D	F	3.69	3.64
2	98904422D	F	3.69	3.60
3	98130188D	M	3.55	3.46
4	98074463D	M	3.47	3.36
5	98226509D	F	3.44	3.41
6	98905117D	F	3.42	3.37
7	98081583D	F	3.39	3.39
8	98095144D	F	3.38	3.37
9	98225737D	M	3.34	3.34
10	98902975D	F	3.34	3.28
11	98183513D	F	3.33	3.32
12	98327004D	F	3.31	3.25
13	98081636D	F	3.31	3.32
14	98048816D	F	3.31	3.30
15	98190592D	F	3.30	3.22
16	98087393D	F	3.27	3.24
17	98087850D	F	3.27	3.23
18	98182844D	M	3.26	3.19
19	98163109D	F	3.26	3.21
20	98234556D	F	3.25	3.24
21	98216994D	F	3.24	3.19
22	98228703D	F	3.24	3.21
23	98122040D	M	3.23	3.13
24	98245971D	F	3.22	3.17
25	98181151D	M	3.21	3.18
26	98200206D	F	3.17	3.18
27	98211126D	F	3.16	3.12
28	98242230D	F	3.16	3.09
29	98131742D	F	3.15	3.13
30	98280177D	F	3.15	3.13
31	98243870D	F	3.15	3.10
32	98037776D	M	3.14	3.05
33	98130970D	F	3.13	3.11
34	98918611D	F	3.13	3.05
35	98085723D	F	3.12	3.13
36	98272625D	F	3.12	3.13
37	98242292D	F	3.12	3.05
38	98051409D	F	3.11	3.13
39	98217211D	M	3.11	3.12
40	98125690D	F	3.10	3.06

No.	Student No	Sex	W.G.P.A	G.P.A
41	98214142D	F	3.10	3.05
42	98200359D	F	3.10	3.07
43	98235811D	M	3.09	3.06
44	98161448D	M	3.08	3.02
45	98205311D	F	3.08	3.04
46	98946394D	F	3.08	3.08
47	98270005D	M	3.08	3.05
48	98177162D	F	3.07	3.04
49	98918659D	F	3.07	3.03
50	98916629D	F	3.05	3.11
51	98275873D	F	3.05	2.97
52	98258801D	M	2.99	2.97
53	98006909D	F	2.99	3.02
54	98116974D	F	2.98	2.97
55	98046404D	M	2.98	2.99
56	98906950D	F	2.95	2.96
57	98231281D	F	2.94	2.91
58	98243428D	F	2.93	2.88
59	98051992D	F	2.92	2.91
60	98012099D	F	2.92	2.93
61	98207072D	M	2.91	2.87
62	98200268D	F	2.90	2.87
63	98905443D	M	2.88	2.88
64	98131053D	M	2.88	2.86
65	98220842D	F	2.87	2.87
66	98171821D	F	2.86	2.83
67	98244721D	F	2.85	2.86
68	98175724D	F	2.82	2.79
69	98155267D	M	2.81	2.77
70	98024119D	M	2.80	2.78
71	98183446D	M	2.73	2.74
72	98283703D	M	2.73	2.70
73	98269965D	M	2.72	2.75
74	98185949D	F	2.70	2.68
75	98231164D	M	2.69	2.70
76	98926696D	F	2.69	2.66
77	98237077D	M	2.64	2.65
78	98129000D	M	2.63	2.66
79	98211231D	M	2.63	2.63
80	98268789D	F	2.62	2.59