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EXPLORING PROBLEM BASED LEARNING AND CLINICAL REASONING: AN ACTION RESEARCH STUDY WITH OCCUPATIONAL THERAPY STUDENTS

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ABSTRACT

Framed from a social constructivist perspective this action research study was undertaken to explore a problem-based learning approach and its relationship to occupational therapy students' clinical reasoning skills. Rich text provides support for the key findings reveled through this study. The findings are organized around three main categories; problem based learning, clinical reasoning, and the relationship between problem based learning and clinical reasoning. The findings have implications for occupational therapy and adult education

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CHAPTER 1

INTRODUCTION

This research study explored a problem based learning approach with occupational therapy students and its relationship to clinical reasoning skills. Inclusive in this chapter is the background of the study, purpose, problem statement and guiding research questions. Also included is an overview of the conceptual framework, the design and methodology. Finally, the significance of the study, definitions, assumptions and limitations of the research is discussed.

Background Information

Adult education occurs in a variety of settings, both formal and informal. Over the past several years, formal settings of higher education (colleges/universities) have seen a greater number of adult students enrolling in their undergraduate classes. According to recent statistics from the *U.S. Department of Education,* adult students are the fastest growing educational demographic; this growth is predicted to continue. In 1998 the number of college students 25 years or older had increased from 28 percent to 41 percent. The number of students age 35 or older in degree-granting institutions has more than doubled. Reports by the *Association for Nontraditional Students in Higher Education* (ANTSHE) show that adult students comprise 47 percent of the new and returning student population on college campuses (http://www.back2college.com/library/faq.htm). Institutions of higher education have an obligation to provide sufficient preparation to their students so they can perform the role for which they are being educated, whether they are adults returning to a classroom or students recently out of high school. Whatever the age of the student in college, however, it has been documented that reasoning skills are less than adequate. According to the 1998 report from the Boyer Commission on Educating Undergraduates in the Research Universities, students graduating from these institutions

are often unable to think logically, learn independently or solve problems by integrating and applying learned information. The Commission's report is disappointing, and is even more disturbing in light of the fact that many of these students, and especially adult learners, are preparing for critical careers in the human health care professions. The professions include medicine, nursing, and rehabilitation therapies such as occupational and physical therapy.

While logical thinking, independent learning and problem solving initiative are critical to numerous professions, these traits are especially necessary in healthcare fields. Logical reasoning and problem solving are vital components of the clinical reasoning process that healthcare professionals at all levels use on a day to day basis. Clinical reasoning is a global term that refers to thought leading to action in professional practice (Elstein, Schulman and Sprafraka, 1978; Greenwood, 1998 and Leighton & Sheldon; 1997).

Clinical Reasoning and Occupational Therapy Education

Clinical reasoning in occupational therapy practice refers to the thinking, decision-making and 'know-how' that therapist use in the process of collecting client data. It is the process of planning, directing, critically thinking, acting and reflecting on client care (Fleming 1991; Mattingly, 1991; Mattingly & Fleming, 1994; Mitchell & Unsworth, 2004). The term 'client' here represents all individuals who in some way receive occupational therapy services. When students become practitioners, they must be able to interact with clients to assess and evaluate their performance, set therapeutic goals, develop a plan, and implement treatment that enables the client to function better, whether physically, psychosocially, or both. Clinical reasoning is used throughout this process as the therapist analyzes data, uses specific knowledge bases and synthesizes awareness (Royeen, 1994; Neistadt, 1998).

Much of what is known about clinical reasoning in occupational therapy today has grown out of the seminal work of Mattingly and Fleming (1994). Their two year qualitative ethnographic study provided the profession with a deeper understanding of the diversity and complexity in clinical reasoning. Prior to this study, it was believed that occupational therapists engaged in a single type of reasoning strategy. Mattingly and Fleming, however, identified four different types of reasoning used by the occupational therapy practitioner: procedural, interactive, conditional, and narrative (Fleming 1991b; Mattingly, 1991). In addition, Schell and Cervero (1993) added a pragmatic facet to clinical reasoning, stressing the need to consider the personal and practice contexts. The researchers suggest that expert clinical reasoning incorporates all types of reasoning.

Clinical reasoning has always been considered an essential skill for competent practice. In recent years, however, the need for occupational therapy practitioners to demonstrate strong clinical reasoning skills has become more explicit. The World Federation of Occupational Therapists (WFOT) recently revised the minimum standards for the education of occupational therapists. The revised standards specify that clinical reasoning is one of five core knowledge, skill and attitude areas that graduates require. Prompting this renewed focus on therapists' clinical reasoning skills is the fact that occupational therapy practice areas have become more diverse and complex; thus requiring higher levels of reasoning.

Thus, in response to changing professional requirements, occupational therapy in the United States is undergoing significant transition. Until 2007 the minimum requirement for entry into the field was a bachelor's degree. Now, however, the minimum educational requirement for entry into the OT field is a master's degree or higher (AOTA, 2002).

Many authors in the occupational therapy literature advocate several different strategies for promoting the clinical reasoning skills of occupational therapy students: case-based learning (Neistadt, 1987; Neistadt & Atkins, 1996; Neistadt, Wight, and Mulligan, 1998), reflection (Tryssenaar, 1995), problem-based learning (Scaffa & Woosterand, 2004; Stern, 1997); evidence based practice (Tickel-Degnen, 2000). Limited empirical studies exist on the above mentioned strategies. In addition, the few research studies that exist reveal conflicting findings regarding both the nature of the clinical reasoning skills used by the occupational therapy students and the effectiveness of the curriculum design and teaching pedagogies used to foster clinical reasoning (Alnervik & Sviden, 1996). While some educators did begin to foster student clinical reasoning skills in their courses, more often the responsibility for development of such skills was assumed by the student's clinical supervisor during the fieldwork portion of the curriculum. Given the demands of the current health care climate, however, therapists who supervise occupational therapy fieldwork interns now expect students to use occupational therapy theory and fundamentals of practice in a clinically relevant way. According to Lindstrom-Hazel & Frasier (2004):

> Where once clinical supervisors had time to train students and allow observation time prior to having students begin treatment, students are now expected to be immediately ready to deal with the complexities of practice on their Level II field work experiences (p. 236).

The profession of occupational therapy is based on providing meaningful therapeutic encounters that are brought about by a holistic approach to the reasoning process. Failure to incorporate a holistic approach to therapists' reasoning results in "inappropriate treatment activities and alienation of clients" (Leicht & Dickerson, p.117).

To adequately prepare occupational therapy students for the demands of competent practice, it is essential that occupational therapy educators incorporate innovative teaching methods that facilitate efficient development of clinical reasoning skills in their undergraduate students. As a response to this need, one extremely promising pedagogy mentioned by both The World Federation of Occupational Therapy and The Boyer Report, is problem-based learning (PBL). PBL promotes active, self-directed learning, analytical reasoning and the development of collaborative problem-solving skills (http://www.wfot.org.au/siteSearchResults.asp).

Problem-Based Learning

Problem-based learning (PBL) is simply learning that results from the process of working towards the resolution of a problem (Barrows, 1986). Historical roots of PBL trace back to the question-and-answer dialectical known as the Socrates method; its threads have been woven throughout the centuries and gained intellectual credibility in the past hundred years under the influence of John Dewey (Dewey, 1997). Dewey believed students should be presented with real life problems and then helped to discover the information required to solve them. Dewey believed actual *engagement* in activities (not simply passive listening) was crucial for the students' development and growth (Dewey, 1997).

PBL was first implemented at the medical school of McMaster University in Canada in the late 1960's. Howard Barrows, a neurologist, is credited with developing the technique. He believed that traditional teaching approaches did not foster the strong clinical reasoning skills needed in the medical practice setting. He proposed that students needed stronger reasoning abilities that moved them beyond simply memorizing and recalling facts or understanding problems that have only one right answer. Instead of presenting students with information that they must simply remember, a PBL-based curriculum first presents students with a problem. This

allows them to identify, analyze and resolve learning issues using knowledge from previous experiences and learning.

Several meta-analyses of PBL (Albanese & Mitchell, 1993; Berkson, 1993; Colliver, 2000; Vernon & Blake, 1993) have been conducted. The analyses reveal somewhat conflicting conclusions on PBL's effectiveness in fostering clinical reasoning skills. For example, Vernon and Blake's (1993) meta-analyses reported that the clinical performance of PBL educated medical students was better than that of the traditional student. However, they admit that in many of the studies, variables related to clinical performance and skills were poorly defined and methods of measurements were inadequately described or validated. Further, Colliver's (2000) review of the major meta-analysis contrasted with Vernon and Blake's findings. He found no convincing evidence to support that PBL improves the knowledge base and/or clinical performance of medical students. He did, however, determine that "PBL may provide a more challenging, motivating, and enjoyable approach to medical education" (p. 266).

The limited studies evaluating PBL in occupational therapy have primarily focused on student and teacher satisfaction (Hammel, Royeen, Bagatell, Chandler, Jensen, Loveland, and Stone, 1999). For example, Hammel and her colleagues found occupational therapy students reported increased satisfaction with the learning environment when a PBL approach was used. Further, Stern (1997) reported that PBL enhanced occupational therapy students' abilities to clinically reason and synthesize concerns pertaining to clinical cases. It also offered parameters for thinking about cases and increased student awareness of the impact of personal biases.

Effectiveness of PBL in enhancing clinical reasoning skills remains controversial. Yet despite limited evidence regarding its effectiveness, PBL continues to be recognized as an effective teaching pedagogy to foster clinical reasoning skills in occupational therapy students.

To prepare occupational therapy practitioners who can enter the work force adequately prepared to meet the demands of an increasing complex and diverse healthcare system, occupational therapy educators need to employ evidence-based teaching strategies to enhance clinical reasoning skills. Therefore, it is critical that further research be undertaken to glean greater insight into the relationship between PBL and clinical reasoning skills. This research study added to the profession's understanding of this educational approach by exploring (through a classroom action research study) the relationship of PBL on occupational therapy student's clinical reasoning skills.

Conceptual Framework

The conceptual framework that informed this study was that of social constructivism. In the briefest of terms, constructivism views all knowledge as "constructed" because it does not reflect external "transcendent" realities; it is contingent on convention, human perception, and social experience (Palys, 1997; Richardson, 2001). Social constructivism contends that categories of knowledge and reality are actively created by social relationships and interactions. According to Vygotsky (1978), social interaction provides necessary language skills and understanding of cultural norms; it fosters learning. Fundamental to their influence upon the realm of education, social constructivists insist that knowledge creation is a *shared experience* (Fosnot,1996; Jadallah, 2000).

Social constructivism is an appropriate framework for PBL and clinical reasoning. The tenets of constructivism hold that learning is best served when it is *contextual* (taking into account the students' understanding), *active* (engaging students in learning activities that use analysis, debate, and criticism to receive and test information) and *social*, (using discussions that allow for direct interaction with teachers and peers). This viewpoint is consistent with the

principles underlying PBL. In PBL, learning experiences are contextualized so that learning activities are meaningful and relevant to the student's life. Notions of teacher as expert and student as receiver of expected knowledge are abandoned: student and instructor are active co-creators of knowledge. As learners identify and check the practicality of new ideas, they consider how social collaboration produces new knowledge. An underlying assumption of clinical reasoning is that meaningful treatment interventions are created through the process of discussion, negotiation and shared meanings of the illness or disability and not solely on the "expert" knowledge of the therapist. This perspective is consistent with the constructivist tendency to privilege multiple truths, representations, perspectives and realities (Jadallah, 2000; Fosnot,1996; von Glasserfeld, 1987). Problem based learning is consistent with the social constructivist viewpoint. In PBL knowledge construction is a shared experience. As learners identify and check the practicality of new ideas, they consider how social collaboration produces new knowledge.

Problem Statement

Clinical reasoning is vital in occupational therapy because it is the means by which therapists identify client's problems accurately and then determine effective treatment protocols. The extent to which a therapist is able to use clinical reasoning skills effectively determines the quality of care given to a client. It is therefore essential that the professional preparation of occupational therapy students include pedagogies that encourage the development of clinical reasoning skills. While some occupational therapy programs have incorporated a variety of PBL formats to address this need, empirical studies on PBL (specifically in terms of fostering clinical reasoning skills) are lacking. In addition, the few studies found in the literature offer conflicting findings. There is also a clear need to determine what specifically about PBL (if anything)

enhances students' clinical reasoning. In the most recent study of PBL's affect on occupational therapy students' clinical reasoning skills, Scaffa and Wooster (2004) cite the need for future studies to focus on in vivo observations of student's clinical reasoning skills and behavior. Their recommendation contributed to my motivation to address this need by doing a classroom action research study. This type of design is ideally suited for addressing a practice based problem in a specific context (Patton, 2002).

Purpose of the Study

The purpose of this action research study was to explore the practice of problem based learning with occupational therapy students and the relationship of PBL to the students' clinical reasoning skills. As the name implies, action research is intended to produce both change and understanding. The point of this study was to specifically use PBL, and to study the effects of it. With that as the backdrop to the study, this study was guided by the following questions:

(1) How do the occupational therapy students participating in this study make meaning of their PBL experience?

(2) What about the practice of PBL in particular helps students to improve their clinical reasoning skills?

(3) What aspects of PBL do the student and facilitator perceive to have contributed most to the development of clinical reasoning skills so that these eventual practitioners can provide their clients with quality care?

(4) How does clinical reasoning manifest in relationship to the PBL classroom experience?

Overview of the Design and Methodology

This study was concerned with implementing a PBL approach and studying its relationship to occupational therapy students' clinical reasoning skills. The literature has supported the need to incorporate teaching pedagogies that will foster clinical reasoning skills in occupational therapy students. As an educator of occupational therapy students I have an obligation to employ evidenced based teaching pedagogies that adequately prepare students for practice. Limited research supporting the effectiveness of PBL exists. By undertaking a classroom action research study using qualitative methods to describe what is happening in 'real time', and to understand the effects of PBL, I addressed a recognized need in the professional literature.

The qualitative research paradigm used in this study is based on an interpretivist epistemology. In this view of knowledge, social reality is seen as a set of meanings that are constructed by the individuals who participate in that reality (Bogadan & Biklen, 1992; Merriam & Simpson, 2000). A major purpose of qualitative research is to discover the nature of those meanings. Several authors have identified prominent characteristics of qualitative research: (1) a belief in multiple realities; (2) the use of inductive data analysis; (3) a commitment to the participant's point of view; (4) the use of the natural setting to study the phenomena of interest, (5) the use of descriptive data reporting (including participant commentaries), and (6) the researcher acting as the primary instrument of data collection and analysis (Cook, 2001; Denzin & Lincoln, 1998; Lincoln & Guba, 1985; Merriam & Simpson, 2002; Patton, 2002). In a human enterprise such as occupational therapy, it is imperative that occupational therapists embrace a research tradition that provides the most meaningful ways for describing and understanding the human experience. Since this study sought to understand the PBL experience and how it

promotes clinical reasoning in the classroom from the perspective of the participants and the facilitator, a qualitative approach was deemed most appropriate.

Qualitative and action research methodologies share a deep appreciation of the subjective experiences, perspectives, and views of people who traditionally have been the "subjects" of research (Atweh, Kemmis & Weeks, 1998). Action research (AR) and qualitative research are considered distinct though related approaches (i.e., action research is occasionally described as a form of qualitative research). However, Greenwood and Levin (1998) dispute the notion that AR *must* be qualitative in nature. They argue that although there is significant overlap in their assumptions related to knowledge and in their critique of positivist assumptions, AR is not necessarily limited to qualitative methods.

AR has been used in psychology, education, industrial, and agricultural research and more recently in health services (Freebody, 2003; Kemmis, 1988). Inquiry includes learning about the practice from those involved in it, planning for changes in the practice, implementing those changes, and evaluating the success of the changes. The direct result of AR is the generation of practical knowledge that has the potential of helping a particular system improve. AR can (potentially) refine existing theory or help generate new theories by using knowledge derived from practice (Greenwood & Levin, 1998).

Kemmis and McTaggart (1988) identify key approaches that AR encompasses; one particular approach is classroom action research. Classroom action research involves "the use of qualitative, interpretive modes of inquiry and data collection by teachers with a view to teachers' making judgments about how to improve their own practices" (p.569). In this process, the research methodology acknowledges that teachers-as-researchers are better able to design useful educational research. As an educator of occupational therapy students, I am concerned about

how to best prepare my students for an increasingly diverse and complex health care environment. Are my teaching strategies effective in fostering the critical thinking skills and effective problem-solving abilities my students will need to become competent entry level practitioners? My concern with the professional preparation of my students contributed to my desire to explore the practice of problem based learning with occupational therapy student's and its relationship to clinical reasoning skills.

AR has been accepted by teachers in primary and secondary education as a scholarly way of studying and improving one's educational practice while developing a knowledge base for one's profession. The teacher/researcher, using primarily qualitative methods, examines his or her own practice and makes change based on the results. Gall, Gall and Borg (1999) offer five advantages of action research for education professionals: (1) it contributes to the theory and knowledge base needed for enhancing practice (2) it supports the professional development of practitioners by helping them become more competent in understanding and applying research findings and in conducting their own research (3) it can build a collegial networking system, possibly leading to interdisciplinary research (4) it helps practitioners identify problems and seek solutions in a systematic fashion (5) it can be used at all levels and in all areas of education (i.e. classroom, department, throughout an educational institution). Because my study focused on exploration of an educational practice based problem and involve student and teacher participation, my study was well suited for a qualitative classroom action research design.

This action research study was conducted at a Jesuit liberal arts university in northeastern Pennsylvania, in the Occupational Therapy Department where I am a faculty member. Because this study sought to explore the relationship of PBL to the clinical reasoning skills of occupational therapy students, the course I selected, Activity Analysis II, is directly related to the

practice of occupational therapy. This 200-level course is concerned with laying the foundation for practice by exposing students to theoretical frames of reference used in occupational therapy practice, the occupational therapy practice framework, and clinical reasoning skills required for activity analysis and the OT process. This type of course is required in all occupational therapy curricula because it addresses the development of core skills and abilities necessary for therapeutic practice and because it helps occupational therapy curricula to meet accreditation standards. Within this course I designed an eight-week long assignment utilizing PBL principles. An actual client case study was used to facilitate student thinking and problem-solving abilities. This eight-week case based assignment was the focus of my action research study.

The action research cycle is often an ongoing cyclical study of planning, acting, observing and reflecting. A more detailed discussion of this will be provided in Chapter 3; a brief overview is provided here. The planning phase of this study included a comprehensive review of pertinent literature. Classroom techniques included identification of a "problem", PBL group discussions and collaborative projects, group and individual research, and reflective papers. The action phase involved implementing the short term PBL assignment in the context of the Activity Analysis course. The reflection phase included the collection and analysis of various forms of data. Data collection included assessment of clinical reasoning abilities, participant observation, document analysis, informal focus groups, and post semi-structure interviews. These multiple forms of data facilitated results that were more meaningful with greater validity for practice (Kuhne & Quigley, 1997). Data was continuously analyzed throughout the semester to allow for any necessary modifications of techniques.

Significance of the Study

While some occupational therapy programs have incorporated a variety of PBL formats, only a few empirical studies on the effectiveness of PBL in fostering clinical reasoning skills in occupational therapy students exist. To date, (according to this author's review) no classroom action research studies on the relationship of PBL on fostering clinical reasoning skills in occupational students have been published. This action research study yielded findings that provided a clearer understanding of the students' lived experience and offered new insight on improving the educational practice of PBL. Results of this study could serve to address the concerns of fieldwork supervisors; OT students are not adequately prepared to take on the complexities of practice. Insights into this concern from this study also contributed to the knowledge base for the OT profession.

PBL has been extensively utilized in the medical and mathematical fields. My research was conducted in the realm of occupational therapy education and significantly added to and validated the knowledge base and the potential applicability of PBL across a broad range of topics and interests to adult educators. This study also strongly impacted the arena of adult education. Specifically, it served to support adult learning principles (such as self-directed learning, valuing of life experiences, and problem-centered orientation). Hart and Ryan (2000) claim that Knowles' (1990) andrologogical model of adult learning is fundamentally aligned with the teaching of clinical reasoning. Facilitation of students' transition from empty vessels waiting to be filled by the *expert,* to active, self directed learners able to bring their prior knowledge to bear on problems and construct new knowledge to solve problems are central assumptions of andrologogy. Hart and Ryan contend that these concepts are also essential for teaching clinical reasoning.

Finally, this study was personally significant because it provided an opportunity to solve a practice based problem. Occupational therapy practitioners are being challenged to base their intervention treatments on evidence-based practice. In the same vein, occupational therapy educators have a responsibility to engage in research to determine if PBL is an educational practice that successfully prepares occupational therapy students for modern health care environments. The challenge remains for occupational therapy educators (like myself) to contribute to the knowledge base of PBL, specifically in terms of clinical reasoning skills. This classroom action research study provided an appropriate avenue of inquiry to attain this goal. The findings of this research could be used to inform further decisions regarding the efficacy of occupational therapy programs.

Definition of Terms

To clearly understand the terms presented in this study, the following definitions are offered below.

Action Research: a family of research methodologies, which provide a framework for action, knowledge generation, empowerment, and reflection. The direct result of AR is the generation of practical knowledge that has the potential of helping a particular system improve (Patton, 2002).

Classroom Action Research: Involves "the use of qualitative, interpretive modes of inquiry and data collection by teachers with a view to teachers' making judgments about how to improve their own practices" (Carson, p.569). In this process, the research methodology acknowledges that teachers-as-researchers are better able to design useful educational research

Clinical Reasoning: A cognitive process that encompasses scientific, artistic and ethical elements. This reasoning process entails both critical thinking from a scientific reasoning

perspective along with a reflective process within a phenomenological perspective (Mattingly & Fleming, 1994).

Critical Thinking Skills: An analytical, logical, deductive process that stems from a positivist, empirical philosophy (Jones, 1998).

Occupational Therapist: An individual who has obtained a baccalaureate or masters degree in occupational therapy, has successfully passed the national certification examination, and complies with all state licensure regulations. According to the American Occupational Therapy Association (AOTA) the major function of the occupational therapist is to "provide quality occupational therapy services including assessment, intervention, program planning and implementation, discharge planning related to documentation, and communication. Service provision may include direct, monitored, and consultative approaches: (1990, p. 1093).

Problem-based learning: Learning that results from the process of working toward the understanding or resolution of a problem (Barrows, 1985).

Reflective Practice: For the purposes of this study refers to Schön's (1983) definition of the art of constructing and reconstructing theory, developing hypotheses, and testing and retesting solutions within the action of practice.

Social Constructivism: Refers to the co-construction of knowledge wherein learners in a social context (PBL groups) share in the construction and reconstruction of their ideas and beliefs (Kim 2001).

Assumptions of the Study

Assumptions made by the author at the onset of this study were as follows:

1. PBL is an appropriate teaching pedagogy to foster clinical reasoning skills in occupational therapy students

2. Occupational therapy students want to learn and have the motivation to take responsibility for their own learning
3. The use of clinical reasoning by occupational therapist is essential for competent practice.
4. Clinical reasoning skills can be fostered in occupational therapy students.
5. The clinical reasoning process can be examined, observed in the PBL setting where it occurs, and can be examined through an action research study.

Limitations of the Study

In the context of this study, the following limitations were considered:

1. My current beliefs about PBL may bias my ability to accurately perceive and describe the phenomena. Techniques used to control for researcher bias are presented in chapter three.
2. In qualitative research, trustworthiness is established by extended fieldwork. The length of this PBL assignment will not offer this prolonged engagement, as it was only 8 weeks in duration.
3. As instructor, I hold a position of power (evaluating the participants) that may interfere with the students' perception of free expression. In other words, students may simply provide responses that they think I want to hear. I tried to alleviate this by promoting the attributes of PBL, which seeks to establish an environment of trust. I also gave students the right to choose not to participate in this study; I would not have privy to that information until after they had received their final grades.
4. Participant selection in this study was determined simply by including the occupational therapy students who were required to complete this core course. By and

large, the occupational therapy classes at The University of Scranton are primarily composed of women; the male student perspective is absent.

5. This is also the first time I am engaging in action research. The brevity of experience I have in carrying out research may be considered a limitation of the study.

Structure of the Chapters of this Research Study

This first chapter outlined in brief the background of my study as well as the purpose of the research. The conceptual framework that guided my study along with the purpose statement, problem statement, and research questions were also discussed. Before concluding this chapter a brief overview of the design and methodology of the study, its significance of the study, a list of terms, and assumptions and limitations of the study were addressed. Chapter Two provides a detailed literature review of the major areas of study, including problem based learning, clinical reasoning, and social constructivism. Chapter Three contributes a detailed explanation of and rationale for the methodology and design. Chapter four presents the findings of my study. Chapter Five, the final chapter, will conclude with the relevant findings, conclusions and recommendations for future research.

CHAPTER 2

Literature Review

The purpose of this classroom action research study was to implement a problem-based learning approach and explore its relationship to occupational therapy students' clinical reasoning skills. This chapter describes literature relevant to the research purposes of this study. It is organized in three sections: (1) the theoretical framework surrounding this research on PBL and clinical reasoning; (2) the development, types, and research of clinical reasoning in occupational therapy; and (3) problem-based learning and its application to the medical and occupational therapy profession and its importance to the research for this study.

Theoretical Framework

The function of a theoretical framework is to establish a perspective through which the researcher examines a proposed inquiry. This study, which explored a problem-based learning (PBL) approach with occupational therapy students and its relationship to clinical reasoning skills, was viewed through the lens of social constructivism. The philosophical underpinnings of social constructivism and its suitability as a theoretical framework for this study will be discussed in the following section.

Social constructivism is one philosophical perspective about how we come to understand or know. It adheres to an epistemology that is significantly different from the dominant positivistic viewpoint (positivist epistemology supports a belief in a single, knowable reality that can be explained through observation of cause and effect). Over the past several decades, philosophers of several disciplines (including science and mathematics) have challenged and to some extent discredited the foundational positivist viewpoint (Kuhn, 1962; Tymoczko, 1986). Growing dissatisfaction with positivism has resulted in the emergence of an epistemology that

assumes reality is constructed through human activity (Berger & Luckmann, 1966). Related to this epistemology, is social constructivism.

Social constructivism emphasizes the social nature of knowledge and the belief that knowledge is constructed through social interaction and is a shared rather than individual experience. Hence, there is not an ultimate truth (Brooks & Brooks, 1993; Dewey, 1977; Duckworth, 1987; Kim, 2001; Palys, 1997). Learning occurs as a result of being an active participant (versus a passive recipient) in the construction (versus the reproduction) of knowledge. As stated by Duckworth (1987): "Meaning is not given to us in our encounters, but it is given by us, constructed by us, each in our own way, according to how our understanding is currently organized" (p.112). Our understanding is continually tested and examined through our social interchange with others. vonGlaserfeld (1989) noted, that language plays a role in this social interchange. According to vonGlaserfeld, other people are the greatest source of alternative views to challenge our existing views and hence to serve as the source of confusion that encourages new learning. Language turns our external verbal exchanges into internalized meanings. According to Gergen (1995), the function of language in social constructivism is not to 'transmit' knowledge between individuals, but rather to serve as a stimulus to negotiate, act, and construct knowledge. Social interchange and shared experiences are key parts of the philosophical framework of social constructivism.

Social constructivism, as described above, has the same philosophical alignment as occupational therapy: both understand that individuals are physical, social and spiritual beings that shape, and are shaped by, the environment (Crepeau, 1991; Mattingly and Fleming, 1994). The profession of occupational therapy holds that through active engagement within the internal and external environments, humans evolve, change, and adapt. This emphasis on the social

nature of knowledge and the premise that knowledge is constructed through social interchange becomes increasingly apparent as occupational therapists employ expert clinical reasoning. Clinical reasoning is a multi-faceted process that brings the therapist closer to understanding their client's view of his/her illness experience. Understanding the meaning that a disease, illness, or disability has to an individual is an aspect of clinical reasoning that extends past the scientific understanding of disease process and organ systems. Rather, it requires that practitioners find a way to comprehend the meaning of an experience from the client's perspective (Mattingly & Fleming, 1994). This client centered occupational therapy approach involves *doing with* the client, as opposed to *doing to* the client; a meaningful intervention cannot occur absent the client's input. As Blkhtin (1984) stated "truth is not to be found inside the head of an individual person, it is born between people collectively searching for truth, in the process of their dialogic interaction" (p.110). Practitioners must enter the life world of the client (and those persons important in the client's world) in order to better understand how to enable the individual to engage in meaningful occupations (Crepeau, 1991). This concept reflects a social constructivist notion of negotiated and reconstructed realities (Doolittle, 1999). Clearly, when authentic occupational therapy is being practiced, the client's viewpoint moves from the sideline to center stage. This is consistent with social constructivism, which challenges the superiority of 'expert' knowledge and encourages multiple perspectives and representations of content (Doolittle, 1999).

The profession of occupational therapy is unique and dynamic, grounded in core principles of occupation; it is constantly influenced by emerging knowledge and technologies. It is therefore essential that educators of future occupational therapists foster within their students the skills necessary to be constructor's of knowledge, not merely reproducers. Learning to think

critically, to analyze and synthesis information to solve problems in a variety of contexts and to work effectively in teams are crucial skills for today's occupational therapists. In the Official Documents of the American Occupational Therapy Association, occupation therapy educators are challenged to achieve this goal by recognizing that the process of learning involves more than just transmission and repetition, today, the process, involves the construction of meanings by the learner from what is said, demonstrated, or experienced. The need identified by AOTA for occupational therapists to be social constructors of knowledge and meaning resonates with principles which can be applied in occupational therapy education via a problem-based learning (PBL) approach. Indeed, the World Federation of Occupational Therapist (WFOT) has issued standards that find problem based learning to be: (1) an educational method that facilitates requisite knowledge, skills and attitudes; and (2) an educational practice that is informed by international educational theory and research.

PBL has been proposed as an effective social constructivist model of learning because of the prominence of meaning making and co-construction of knowledge through group collaboration, social interactions and self-reflection (Savery & Duffy 2001). Like PBL, social constructivism rejects the traditional knowledge transmission model where the student is a passive recipient of the teacher's expert knowledge. In a PBL environment, each student's lived experience is recognized and valued as an integral component in the shared meaning-making and construction of knowledge that occurs. As the PBL groups convene to solve an authentic problem, they must actively engage in the process of hypotheses generation based on their lived experience and previous knowledge. It is through this active discourse that group learning objectives are established. Learning is focused on thinking skills rather than working on the "right answer." Students generate their own strategies for defining the problem and working on

the solution through social negotiation. Students are able to engage in self-directed learning and reflective thinking and then come together again to challenge their thoughts, beliefs, perceptions and acquired knowledge by collaborating with other students. Through this social interchange, they assist one another in making connections between new ideas and prior knowledge, creating new meanings as they complete their task. Newman (1990) states:

> One of my current beliefs is that learning is a collaborative enterprise. People don't learn…in isolation. They learn by being members of a learning community. While we each construct an individual interpretation of a particular situation, our understanding is shaped by contact with other people's perceptions of what's gone on. Our interpretation will hold until we become aware of a discrepancy either through some direct personal experience or from something we've heard or read elsewhere and discuss it anew (p.8).

In summary, social constructivism is an appropriate framework for this study that explores a problem based learning approach with occupational therapy students and its impact on clinical reasoning skills. Social constructivism mirrors problem based learning in its emphasis of the social negotiation of real world problems, the acceptance of multiplicity of representations/viewpoints and the role of the teacher/therapist as guide. Additionally, social constructivism is philosophically aligned with the profession of occupational therapy, which is grounded in a subjective world where multiple meanings of health exist. These multiple meanings are negotiated through expert clinical reasoning. The process of enabling occupation requires therapists to use reasoning skills that consider the individual not in isolation, but as a person who interacts with others and his/her environment. This process mirrors core tenets of social constructivism.

Clinical Reasoning in Occupational Therapy

The above paragraphs provide an understanding of the study's theoretical grounding. One focus of the study, clinical reasoning, will now be examined. Clinical reasoning is the basis of all client-related thinking and decision-making. Clinical reasoning exists in multiple disciplines but this overview will focus on its role within the field of occupational therapy.

Occupational therapy practitioners work to identify an individuals problems that prevent engagement in daily life activities; therapists then select a course of action to bring about change. This process is referred to as clinical reasoning (Rogers, 1983; Schon, 1983, Mattingly and Fleming, 1994). Crucial in occupational therapy, clinical reasoning is the means by which therapists (in collaboration with the client) identify clients' problems *accurately* and determine *effective* treatment interventions. Furthermore, clinical reasoning is the means by which therapists are able to translate theory into practice (and, therefore, to truly practice theory-based therapy). It is essential that occupational therapy students be equipped with clinical reasoning skills prior to entering the practice setting as practitioners.

Development of Clinical Reasoning in Occupational Therapy

Clinical reasoning has been described as the types of inquiry or thinking that a therapist employs to understand clients and their occupational performance problems. Initially, clinical reasoning in occupational therapy mirrored the type of reasoning used by physicians; this approach, which focused primarily on finding a diagnosis using a hypothetical-deductive methodology, was called scientific or diagnostic reasoning (Fleming, 1991). Scientific reasoning is often equated with logical problem solving and reasoning abilities that parallel scientific inquiry. It is defined as a series of cognitive operations that occupational therapists perform to formulate the occupational therapy diagnosis (Schell, 2003, Rogers & Holms, 1991). The

cognitive process of this diagnosis formulation phase involves gathering pertinent patient data, formulating hypotheses regarding the cause of the problem, and then testing these hypotheses in order to reach an occupational therapy diagnosis. In 1991 Rogers and Holms added a second phase to this model. The second phase attends to the occupational therapy intervention (following diagnosis) and involves collaboratively formulating desired goals and intervention strategies with the client. Rogers and Holms (1997) identified four cognitive operations (cue acquisition, hypotheses generation, refinement and verification) that therapists use to form the core of their information processing model of diagnostic reasoning. Although they expanded their definition of clinical reasoning to incorporate collaboration with the client, the clinical reasoning process as outlined by Rogers and Holms favors a biomedical positivist approach to reasoning. This is typified by the value they place on factual scientific information and primary focus on the occupational diagnosis.

As the field of occupational therapy underwent a paradigm shift and began moving away from the mechanistic, reductionist medical model, concerns about the adequacy of physician-like diagnostic reasoning arose. In the early 1990's, a study sponsored by the American Occupational Therapy Association [AOTA] and the American Therapy Foundation [AOTF] was designed to "identify the reasoning strategy that occupational therapist used to guide their practice" (Fleming, 1991, p. 1007).

This study, by Mattingly and Fleming (1994), was one of the most influential studies of clinical reasoning in occupational therapy. The qualitative two-year study resulted in the identification of different types of reasoning that characterized occupational therapy practice. Their research has served as a framework for understanding how occupational therapists make sense of and take action regarding client problems and challenges in therapy (Kielhofner, 2006).

Based on findings from their study, Mattingly and Fleming (1994) expanded on Rogers conception of the clinical reasoning process by incorporating a second orientation, known as a phenomenological orientation, into the reasoning process. In their seminal work, Mattingly and Fleming (1994) presented a conceptual model that described how occupational therapists think and perceive in the midst of practice. They stated:

> Central to the occupational therapy approach to reasoning was the notion that treatment success was very dependent upon a process that the therapists referred to as 'individualization'…[which] runs counter to the assumption that true knowledge is generalizable and that scientific knowledge can be converted into law statements (p. 338)

According to Mattingly and Fleming (1994) clinical reasoning in occupational therapy can be described as:

> An integrated, dynamic thinking and meaning making process that involves critical thinking skills and reflective practice. In order to make meaning of the perceived client problem and understand a particular phenomenon, clinical reasoning incorporates a process of inquiry that centers on gaining understanding of clients in terms of their daily practices, life histories, social relationships, and long-term projects, all of which give them a sense of meaning and a sense of personal identity (1994, p. 65).

Role of Reflection in Occupational Therapy Clinical Reasoning

In Mattingly and Fleming's definition, the concepts of critical thinking and reflective practice are considered essential elements of the occupational therapy clinical reasoning process. Facione (1991) defined critical thinking as consisting of both skill acquisition and disposition in the ability to interpret, analyze, evaluate, infer, explain and self-regulate. Schon (1983) previously asserted that to deal competently with the uncertainties and dilemmas of the

practitioner's role, the therapist must not only use critical thinking, but must also engage in reflective practice. According to Schon (1983), reflexive practice consists of much more than abstract theoretical or technical knowledge. When techniques cannot resolve the therapist's concern, or when a situation becomes problematic, the therapist follows a series of cognitive processes to reconstruct and test new theory. This process is known as reflection-in-action (Merriam, 1999). Reflective practice allows one to make judgments in complex and vague situations, judgments based on experience and prior knowledge (Merriam, 1999). The reflection component recognized in clinical reasoning involves reflection by the therapist on his/her practice, examining it for bias and inconsistency. Although Mattingly and Fleming identified reflection as a key component in occupational therapist's clinical reasoning process, Alnervik and Sviden (1996), in their study on occupational therapists' patterns of reflection on practice, concluded that novice and experienced therapists were involved in very little reflection on practice. Further studies are indicated to determine the effects of reflection on occupational therapists' clinical reasoning skills.

Prior to the AOTA/AOTF study, it was believed that OT practitioners used a single strategy for clinical reasoning. Fleming (1991b), however, postulated that occupational therapists simultaneously used three different types or tracks of reasoning: procedural, interactive and conditional. Fleming believed therapists employ different types of reasoning in response to particular features of the clinical problem or to serve different purposes in therapeutic treatment. She contended that therapists address clients at three different levels: (1) the physical or functional disability, (2) the client as a person, and (3) the client within their total social context.

Additional Types of Clinical Reasoning

Thus far, this discussion has focused on the development of clinical reasoning in occupational therapy. As described above, the intellectual underpinnings of the development of clinical reasoning skills has evolved significantly from simply copying the physician-like single process of scientific or diagnostic reasoning, to developing specific definitions for clinical reasoning. The definition of clinical reasoning described above included a multi-phase process in which reflective practice plays a key role. Furthermore, researchers discovered that the cognitive process of clinical reasoning in occupational therapy actually encompasses several additional types of clinical reasoning. As described above, Fleming (1991b) identified procedural, interactive, and conditional reasoning. Additionally, literature describes narrative, pragmatic, and ethical reasoning. These additional types of clinical reasoning, as well as related research, will now be discussed.

Procedural Reasoning

One of the types of clinical reasoning identified by Fleming (1991b), is procedural reasoning. The therapist is using procedural reasoning when he/she emphasizes the client's physical or functional ailment and/or procedures to lessen the physical problem or remediate the client's functional performance problems (Mattingly & Fleming, 1994). This reasoning is the process of defining the client's diagnostically related occupational performance problems and choosing appropriate interventions (Neistadt, 1996). Procedural reasoning bears similarity to Rogers and Holms' (1983; 1991) diagnostic reasoning in that both use cognitive problem solving process. Procedural reasoning, however, according to Fleming (1991), places less emphasis on the clinical diagnosis and more on treatment selection. Procedural reasoning is often seen as a

starting point for the clinical reasoning process whereby occupational therapists commence with problem identification, goal setting and treatment.

Procedural reasoning research studies within occupational therapy have suggested that this form of reasoning is often seen to the exclusion of other types in the novice practitioner. Liu, Chon, and Hui-Chan (2000) found that sixty percent of the junior level occupational therapists (mean of 1.7 years experience) and zero percent of the senior group (mean of 8.1 years of experience) used procedural reasoning as one aspect of the decision-making process. These therapists used an assessment tool, the Canadian Occupational Performance Measure (COMP), to identify patients' occupational performance deficits. This research is consistent with the research findings of Slater & Cohen (1991) which showed clinical reasoning at the procedural level is the most frequent used mode of reasoning for recent graduates. Other studies, in contrast, have suggested that many experienced therapists focus primarily on procedural reasoning and fail to attend to other types of clinical reasoning (Clark, 1993; Neistadt, 1995). The literature offers support that other types of clinical reasoning are used during the occupational therapy treatment process. Indeed, Fleming (1991b) noted that therapists did not *always* use procedural reasoning, sometimes they chose other forms of reasoning instead. Interactive reasoning is another type of clinical reasoning that has been identified in various studies; it will be discussed next.

Interactive Reasoning

Interactive reasoning is the second type of reasoning identified by Fleming (1991b). This type of reasoning is used to help the therapist better understand and interact with the person. According to Mattingly and Fleming (1994), "interactive reasoning is reasoning that takes place during face to face encounters" (p. 17). Interactive reasoning yields an understanding of what the

disability means to the client (Neistad, 1998). It requires active judgment related to the therapist's own values and ethical, moral decision-making skills (Kegan, 1982, Perry, 1970).

The use of interactive reasoning by occupational therapists is supported in the literature. In the Liu, Chon and Hui-Chan study (2000) of novice and experienced therapists, twenty-eight percent of the reasoning process was attributed to interactive reasoning. In another study, Schwartzberg (2002) conducted thirty-nine interviews with therapists from a variety of settings to determine their perspective on interactive reasoning. The therapists were asked to respond to two main questions:

1) What would you consider to be the elements of best interactive practice?
2) What would you consider to be the elements of reasoning in this type of practice?

Five themes and techniques were identified. They included (a) active participation and collaboration, (b) engaging/connecting with the person and creating a holding environment, (c) exploring and interpreting motives as well as occupational-based meanings, (d) listening, and (e) understanding and use of narrative/symbolic. Five techniques characterized practice in all settings and with all populations: (1) selling, (2) giving back, (3) engaging the mood, (4) validating, and (5) holding (Schwartzberg, 2002).

Conditional Reasoning

The third type of reasoning discussed by Fleming is conditional reasoning. This reasoning represents higher-level thinking about the patient within their social context both prior to and with their disabling conditions. Conditional reasoning revises treatment moment by moment to meet the client's needs (Neistadt, 1998). It differs from interactive reasoning in that it moves beyond the specific concerns of the person and the family to the broader social and contextual issues. The therapist's engagement with the client in forming new concepts and

images of the future is achieved through the narrative storytelling process. [Although procedural, interactive and conditional reasoning are each distinct forms of reasoning, Fleming (1991b) maintained that therapists are able to shift effortlessly between each of them].

Few studies have focused on conditional reasoning. One reason may be the difficulty noted in the literature of explaining this elusive concept (Crabtree, 1998; Mattingly & Fleming, 1994). The Liu, Chon and Hui-Chan (2000) found that both novice and experienced therapists (using the COPM to evaluate occupational performance deficits) relied on conditional reasoning to help with decision-making. Difference between novice and expert practitioner reliance on this type of reasoning was again apparent. While novice occupational therapists provided comments indicative of conditional reasoning only ten percent of the time, senior therapists' comments indicated a much higher usage - seventy-four percent. A study by Creighton et al. (1995) also found conditional reasoning to be used more frequently by experienced therapists. The study examined the clinical reasoning of four experienced occupational therapists as they presented and modified therapeutic activities to treat clients with spinal cord injuries. Findings showed that the therapists demonstrated conditional reasoning in their treatment activity decisions.

Narrative Reasoning

Thus far, Fleming's three types of clinical reasoning within occupational therapy (procedural, interactive and conditional) have been reviewed. As the research noted, these various types are engaged by the therapist in a non-linear fashion; Therapists move among the three types. Other types of clinical reasoning in occupational therapy have also been identified.

While working on the AOTA/AOTF clinical reasoning study, Mattingly (1991) proposed a fourth form of reasoning known as narrative reasoning. She believed that narrative reasoning is the central form of clinical reasoning in occupational therapy. According to Mattingly (1991), a

narrative approach shifts the therapist's vantage point from a focus on disability to a focus on how the illness experience affects the life of the individual. Narrative reasoning was also found to be used by therapists as a method of "puzzling out a problem and enlarging each therapist's practical knowledge through vicariously sharing other therapists' experience" (Leicht & Dickerson, p. 118).

There is a scarcity of research on narrative reasoning. The literature reveals one study by Strong et al. (1995). This qualitative study asked nine expert clinicians and ten occupational therapy students, "What is involved in clinical reasoning?" Forty factors were identified by the students while twenty-six were identified by the expert clinicians. The students focused on the narrative and pragmatic types of clinical reasoning while the experts focused on the scientific and narrative types of clinical reasoning. Narrative and scientific reasoning have been discussed previously. One final type of clinical reasoning, pragmatic and ethical reasoning, will now be reviewed.

Pragmatic and Ethical Reasoning

Pragmatic reasoning was introduced by Schell and Cervero (1993) as another type of reasoning used by the occupational therapists. This form of reasoning considers the context within which occupational therapy treatment occurs. Context as explained by Schell and Cervero is considered from two perspectives: the practice context and the personal context. The personal context includes the therapist's motivation, negotiation skills, and ability to read the culture. The practice context includes organizational and political environments, and economic influences such as resources and reimbursement. Pragmatic clinical reasoning is consistent with situated cognition in that mental activities are shaped by the situation and learning in one context does not necessarily transfer to learning in another situation.

Schell and Cervero's conception of clinical reasoning also alludes to an ethical component, which they believe is included in the personal context of the OT practitioner. Decisions made regarding the treatment of a client are likely to be a reflection of what the practitioner knows how to do and that which he or she is willing to do. Several authors have addressed the ethical aspect of clinical reasoning (Fondiller, Rosage, & Neuhaus, 1990; Howard, 1991; Peloquin, 1993; Rogers, 1983), However, no studies identifying this particular type of reasoning were located in the literature.

Studies examining clinical reasoning confirm that occupational therapy practitioners both actively consider and are influenced by their practice contexts (Creighton, Dijkers, Bennett, & Brown, 1995; Schell, 1994; Strong, Gilbert, Cassidy, & Bennett, 1995). Strong et al. (1995) found that, when asked to identify what was involved in clinical reasoning, students focused heavily on pragmatic reasoning factors while the experts did not. Reasons given for this finding suggested that students may have been better prepared to address these factors or, the students may have been disillusioned about the reality of clinical practice, and the students may have found it easier to consider the concrete aspects of this type of reasoning as compared to other types.

Summary of Clinical Reasoning in Occupational Therapy

Clinical reasoning in occupational therapy is a complex, multidimensional concept. The value of the occupational therapy process rests on the clinical reasoning of its practitioners. The various types of clinical reasoning include; procedural, interactive, conditional, narrative, pragmatic, and ethical. It should be noted that the primary types of clinical reasoning evolved from one major study supported by the profession's national organizations. Subsequently, many of the studies found in the occupational therapy literature have focused on these forms of

reasoning. The AOTA/AOTF clinical reasoning study indicated that the types of clinical reasoning used by novice practitioners differed from expert practitioners with decreasing emphasis on procedural reasoning and increasing utilization of the phenomenological reasoning tracks. Although the richness and complexity of occupational therapy reasoning has been frequently articulated, studies suggest that an over reliance on procedural reasoning exists, thus limiting the quality and growth of other therapists' clinical reasoning skills (Lui, Chan & Hui-Chan 2000; Neistadt, 1995; Neistadt & Atkins, 1996). It has already been established that clinical reasoning, core to the decision making process of occupational therapy therapists, is a critical element of occupational therapy practice and thereby occupational therapy professional academic preparation. The following section will examine what methods have been used by educators to develop clinical reasoning skills in their students so they are best able to meet the needs of clients

Teaching Clinical Reasoning in Occupational Therapy

While the previous section discussed the various aspects of clinical reasoning, they offer little insight into how or if occupational therapy students can be taught clinical reasoning skills. This study will implement a problem based learning approach with occupational therapy students and explore its relationship to occupational therapy students' clinical reasoning skills. It is pertinent, therefore to review the literature that addresses how educators within the field of occupational therapy have attempted to develop their students' clinical reasoning skills.

One of the greatest challenges for educators is to foster clinical reasoning skills in their students. It has been observed in medicine that clinical reasoning skills are difficult to teach (Schuwirth, 2002). This difficulty is also apparent in occupational therapy. For example, Creighton, Dijkers, Bennett, & Brown (1995) found in a study that therapists found it difficult to

teach students didactically how to modify activities. One therapist observed: "I can tell a student how to do the treatment, but I do not know if you can verbally instruct somebody in why, and how you know, and what to look for…" (p. 316). Nevertheless, attempts have been made by occupational therapy educators to facilitate clinical reasoning skills. These approaches include use of case studies (Buchanan, Moore & van Niekerk, 1998; Van Leit, 1995), fieldwork (Buchanan, Moore & van Niekerk, 1998; Sladyk & Sheckley, 1999), journaling (Tryssenaar, 1995), classroom as clinic activities (Cara, 2000), PBL assignments (Scaffa & Wooster, 2004). In addition to these single pedagogical approaches, a few curriculum wide approaches have been undertaken to promote students' clinical reasoning abilities. These models include clinic to classroom (Neistadt, 1996) and problem-based learning (Royeen, 1995).

The most predominant pedagogical approach for promoting occupational therapy students' clinical reasoning skills within the academic setting is a case study approach (Lui, Chan & Hui-Chan, 2000; Neistadt, 1996; Ranka & Chapparo, 2000). Traditionally, when a case study approach is used, the "case" is introduced *after* the students have completed lectures or lab units. They apply learned theories to real-life situations. PBL (which uses case studies) by comparison, exposes students to the content for the first time when they read the problem scenario. The articles located in the literature offered several conceptual pieces on how to develop clinical reasoning using case studies. However, none offer empirical evidence regarding the effectiveness of the approach in developing clinical reasoning skills. The same is true for articles on promotion of classroom-as clinic activities as described by Cara (2000) and the use of evidence-based practice as discussed by Tickle-Degnen (2000).

Tryssenaar (1995) puts forth the use of reflective journals as a means of promoting clinical reasoning skills. Through a retrospective content analysis of students' interactive

journals, her study suggests that students' clinical reasoning skills improved with the use of a reflective journal. Ranka and Chapparo (2000) suggest that a specific type of clinical reasoning; procedural reasoning can be fostered by using 'ill structured' case studies. To facilitate ethical reasoning, the same authors recommend the use of narrative interpretations, role-playing and the use of multiple perspective case studies. Neistadt (1996) believes in order to promote narrative and interactive reasoning strategies such as reading and analyzing disability literature, journal writing, case studies, and use of an assessment known as the Canadian Occupational Performance Measure (COPM) should be considered. While several authors conceptualize the development of clinical reasoning through these suggested approaches, little more than anecdotal evidence can be found to support these claims. Some of the studies that were located in the literature will be discussed in the following section.

Several of the studies indicated that current educational approaches to teach clinical reasoning are in effect focusing primarily on procedural reasoning. These approaches fail to promote a holistic view of reasoning (Lui, Chan & Hui-Chan 2000; Neistadt, 1995; Neistadt & Atkins, 1996). For example, Neistadt (1995), in her first study on clinical reasoning, supports the view that current pedagogies for enhancing clinical reasoning are insufficient. Through the use of a survey, she investigated methods of assessing clients' priorities in adult physical disability settings. Survey participants were asked to give an example of a concern commonly cited by a client as important and to identify if the information was enough to direct the choice of treatment activities. Almost all of the participants indicated that client priorities for treatment were regularly identified. However, most of the practitioners used informal interviews rather than tools such as the COPM or the Occupational Performance History Interview (OPHI). Even though client goals obtained through informal interview were vague and not related to

occupations, most participants stated that they used these goals to establish appropriate interventions. Neistadt believes that therapists must be using generic treatment plans if they are comfortable being guided by general goals such as, “I want to walk” or I want to take care of myself.” Occupations that were meaningful to the client (a key consideration with any occupational therapy intervention) were not revealed through informal interview, this suggests that therapists were deciding on goals and treatment activities in a manner that reflected the medical model of their practice. While recognizing the value of the informal interview for establishing rapport, Neistadt remarks that the use of formal tools (such as the COPM) to give clients control over the process of identifying problems has already been established in other studies. The purpose of collaborative goal setting is to provide treatment interventions that focus on meaningful occupations for the client. Failure to establish an understanding of what the client identifies as meaningful undermines the effectiveness of this collaboration process. Neidstadt summarily suggests that occupational therapy education may have failed to provide graduates with the tools and skill necessary for client-centered and holistic clinical reasoning that practice requires.

In another study, Neistadt and Atkins (1996) analyze the occupational therapy curriculum at an American university. These authors found that the physical rehabilitation courses stressed procedurally oriented reasoning but neglected the narrative aspects of reasoning. They report that “the occupational therapy education process is one influence on the types of clinical reasoning therapists may later choose to accent in practice” (p. 670). These findings indicate that educators are favoring procedural reasoning over narrative reasoning in courses that are more physically oriented. Lui, Chan & Hui-Chan (2000), also found that novice occupational therapists most often relied on procedural reasoning. Like the studies conducted by Neistadt, and Neistadt and

Atkins, they believe these findings indicate a need to improve educational approaches in order to foster the use of other reasoning strategies in practice. However, Vroman and MacRae (1999) hold a different viewpoint then their colleagues. They suggest that since procedural reasoning was the most cited mode of reasoning used by new graduates, then this type of clinical reasoning should be intentionally fostered and evaluated.

Paterson and Adamson (2001) conducted an international study of educational approaches to clinical reasoning. All occupational therapy schools from Australia, Canada, New Zealand, South Africa and the United Kingdom were sent surveys. In order to facilitate clinical reasoning, 92% of the schools stated that they used case studies, followed by experiential learning (83%), seminars (76%) and didactic teaching (68%). Interestingly, case studies are the most common method used to promote clinical reasoning skills as a whole; however, evidence suggests that this method is considered to primarily promote procedural reasoning, most often associated with the medical model.

Authentic occupational therapy practice requires the integration of all of the various facets of reasoning regardless of the setting it occurs. However, as occupational therapy practice moves into the community and other non-traditional practice settings, the need for therapists to integrate and utilize clinical reasoning skills outside of the medical model has been made even more explicit. Recently, various authors have discussed the use of problem-based learning to promote the clinical reasoning process beyond the traditional medical model (Royeen, 1995; Hammel, Royeen, Bagatell, Chandler, Jensen, Loveland, & Stone, 1999; VanLeit, Crowe & Waterman, 2000).

Clinical reasoning can be facilitated through PBL teaching strategies that include small group discussions, active student-centered learning, case study formats and facilitation of critical

thinking and reflection by facilitators (Neidstadt, 1996; Royeen, 1995; Stern, 1997). According to Royeen (1995) the premise for PBL implementation is for the advancement of critical reflection and development of clinical reasoning skills. She visualizes this process to include the appreciation system (values, knowledge, theories and practice), attitudes and abilities for critical reflection and the process of critical reflection. Her PBL model at Shenandoah University embraces a philosophical orientation to student centered learning. The curriculum is organized around a mixture of course and content blocks. The primary mode of instruction includes the use of tutorial group discussions centering on clinical cases, decreased lecture time and increased active learning opportunities, and a research component. In order to promote the development of critical thinking skills some educators have proposed the use of class dialogue, discourse and debate within and outside (via discussion boards on information systems such as blackboard) of the classroom (Hettinger; 1995; Jones, 1998; Robertson, 1996). PBL utilizes small collaborative discussion groups to promote higher level thinking and reasoning through the co-construction of knowledge.

Ensuring that occupational therapy practitioners possess strong clinical reasoning skills is vital for competent practice. Ways to foster these skills is emerging as an important pedagogical approach for occupational therapy educators. While there are a number of research studies in the medical field to indicate PBL is a viable teaching method for stimulating critical thinking and problem solving skills associated with clinical reasoning, further research is needed to ensure this method adequately prepares the occupational therapist to face the complexities of practice.

Therefore, this classroom action research sought to implement and explore a problem based learning approach with occupational therapy students and its relationship to clinical reasoning skills. It contributed to a better understanding of educational approaches used to foster

clinical reasoning. The following section will provide an in-depth review of problem-based learning.

Problem Based Learning: An Overview

Compelling real-world problems are the basis of problem based learning (PBL). Such problems form the context and stimulus for student learning. According to Sandifer-Stech and Gerhardt, (1999) "complex problems hook students; they draw students in, making them interested in and responsible for their own learning" (p.10). Rather than offer precise definitions of problem based learning, the literature provides various descriptions. PBL has been described as an educational method or learning process linked to the development of reflective judgment, problem-solving skills, clinical reasoning and reflective practice, professional behavior and life-long learning (Barrows, 1980, Royeen, 1995, Stern, 1997). According to Barrows, PBL is learning that results from the process of working toward the understanding or resolution of a problem. Kelly, Haidet, Schneider et al (2002) highlight the social nature of PBL by describing it as an instructional method that emphasizes learner-led, small group learning. O'Grady (2002) believes the appeal of PBL is its enormous potential for developing understanding since encapsulated in PBL are explicit expectations that students will:

> explore knowledge concepts within different contexts; articulate and apply prior knowledge; identify and seek out information in respect to what they don't know, denote how new information connects with prior knowledge; reveal and check the practically of new ideas and reflect how they personally constructed knowledge and became meaning makers" (p.3).

Royeen and Salvatori (1997) point to ambiguity surrounding PBL, and acknowledge that it can be considered both a product (resulting from active involvement of the student) and a

process (lifelong) of learning. According to Stern (1997) not all problems are equivalent, and thus problem solving is not a rote activity. Therefore, PBL can take on many forms of both processes and products. While these various descriptions offer subtle nuances of PBL, at its core remains the shared negotiation of ill structured, authentic problems resulting in the acquisition of higher order thinking skills. Following a review of the early history of PBL, the basic characteristics of PBL—with ill structured, authentic problems as a central theme—will be discussed.

Early History of Problem Based Learning

Historical roots of PBL trace to Socrates. The question and answer dialectical approach favored by the famous philosopher is evident in PBL. American philosopher and educator, John Dewey, is another prominent figure closely linked to PBL. Dewey believed students should be presented with real life problems and then helped to *discover* the information required to solve them. He believed actual engagement in activities (not simply passive learning) was crucial for students' development and growth (Dewey, 1997). Bruner (1996) concurred that learning is an active process in which learners construct new ideas or concepts based on their current and/or past knowledge. The learner selects and transforms information, develops hypotheses, and makes decisions, relying on their cognitive structures.

PBL, as it is most widely recognized today, was first implemented at the medical school at McMaster University in Canada in the late 1960's. Neurologist Howard Barrows is credited with introducing PBL as a new method of learning to more adequately prepare medical students for their careers. As an educator, Barrows was dissatisfied with his medical student's ability to *apply* knowledge during clinical clerkships. To address his concern, Barrows incited a change from the traditional teaching pedagogy (that emphasized rote memorization) to an educational

method that facilitated learning by exposing students to 'real life' problems and the problem solving techniques used by actual physicians. Barrows believed this approach would better equip students to develop their own set of analytical and clinical reasoning skills (Barrows, 1980). Over the past forty years, PBL has transformed curriculum design in medical schools worldwide including Harvard University; the University of Limburg at Maastricht, The Netherlands; and the University of Newcastle, Australia (Hendry, Frommer, & Walker, 1999). Additionally, the PBL approach has been integrated into elementary, secondary and graduate levels of education and in subjects as diverse as business (Stinston & Miller, 1996), nursing (Brandon & Majumdar, 1997; Rideout, 2001), mathematics (Seltzer, Hibert, Maceli, Robinson & Schwartz, 1996) and physical and occupational therapy (Saarinen & Salvatori, 1994). While PBL has escalated in popularity among many disciplines, its origins lie primarily in health professions. As Barrows contended, health care providers such as physicians, nurses, physical therapists and occupational therapists require strong clinical reasoning abilities when applying knowledge to the assessment and care of clients. He believed traditional teaching approaches did not facilitate learning that moved the student beyond simply memorizing and recalling facts or understanding problems that have only one 'right' answer.

Tenets of Problem Based Learning

Just as Barrows sought a more optimal method of preparing medical students for the real life situations they would ultimately encounter as physicians, the central focus of PBL is real life problems. One of the main assumptions of PBL is that students are intrinsically motivated to learn when they can connect learning encounters to real life situations. According to Weiss (2003) students are motivated when they see the relevancy of the problem to real life. This assumption generates related PBL characteristics. In PBL, problems form the basis, focus, and

stimulus for learning; the problem, as the basis of PBL activity, should motivate the student. Problems should require the students to apply content in ways indicative of emerging professionals; hence, the problem should be ill-structured. Jonassen, (2000), refers to ill structured problems as "messy", much like the problems that are faced in everyday life and in professional practice. One benefit of ill structured problems is that they often transcend discipline boundaries; this introduces students to higher order learning as the problem forces them to draw from a number of different fields to solve the problem (Brown, Collins, & Duguid, 1989).

Another assumption of PBL is that students do not approach the learning encounter as 'blank slates' but rather bring their own valuable background, history and knowledge. Based on this assumption, PBL is learner centered. In stark contrast to the teacher as expert and student as an empty vessel expected to ingest the knowledge given by the teacher, PBL places a high value on what the student brings to the classroom. The student's prior knowledge is deemed important. In a problem based learning environment, student knowledge and experience is respected; students are encouraged to bring this into play when solving problems. PBL challenges learners to question their existing knowledge and potentially identify any long held biases.

PBL also assumes that the student is a self-directed learner. Students want to learn; they possess the attributes and motivation necessary to take responsibility for their own learning. Given this assumption, PBL requires students to identify relevant learning issues, direct their own course of study and seek out information. Students are expected to be active participants who direct the course of their learning, not passive recipients who wait to be told 'absolute truths.' In the PBL environment, knowledge is not simply a product to be accumulated, but an active process in which the learner attempts to make sense in the world. Knowles (1975) defined

self-directed learning as a process in which the student takes the initiative in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. Barrows (1996) stated that self-directed learning develops as a result of the PBL process of situational analysis, determination of learning needs, independent study, application of knowledge, critiquing of information and resources, and reflection on the process as a whole. Studies undertaken in the past have supported Barrows' claim (Norman & Schmidt, 1992; Blumberg & Michael, 1992). In a study by Kaufam and Mann (1996) medical students perceived that engagement in PBL advanced their sense of being self-directed learners.

A further assumption of PBL is that knowledge is constructed through collaboration. Collaboration in small groups fosters interaction and active engagement of the learner. Given this assumption, PBL problems require collaboration among students. A well designed problem necessitates that the group synthesize their ideas and make decisions throughout the course of the PBL activity. Duch (2001) states, "The acts of synthesizing ideas, making decisions and resolving controversy will require students to socially negotiate learning issues inherent to the problem and defend among themselves the feasibility of those solutions" (p. 48). In contrast, methodologies proposed by some professors as 'group projects' do not actually facilitate collaboration. Drummond-Young and Mohide (2001) describe one such puzzle-piecing approach wherein individual group members separately complete portions of an assignment and then, with no collaboration, assemble the pieces to form a completed 'whole'. This approach is not sufficient for promoting the higher order thinking facilitated by PBL. In a problem based learning environment, knowledge construction is a shared experience. As learners identify and

check the practicality of new ideas, they consider how social collaboration produces new knowledge.

The assumptions described above yield central PBL characteristics: small group tutorials and self-directed study are at the core of problem based learning. Albanese and Mitchell (1993) note that, "other instructional methods (lectures, labs and clinical skills sessions) are not eliminated but are kept to a minimum and are coordinated with the patient problems" (p.54). Additionally, there is considerable variation between educational curricula in terms of the amount of control that students have over the learning process. The degree to which a PBL course is student-directed versus teacher-directed is determined by the faculty member with consideration given to the following factors: the size of the class, the intellectual maturity level of the students, and the instructional goals of the course (Hay, 1997; Saarinen & Salvatori, 1994; Stern, 1997).

Implementation of Problem Based Learning

The integration of PBL into the academic setting has occurred on a continuum. While some curricula have just begun to experiment with the implementation of PBL into one or two courses, some settings have developed their entire curriculum around problem based learning. This type of curriculum, such as the medical school curriculum at McMaster University (where each course involves the students achieving learning objectives via negotiation of medical case studies) is considered 'pure' or fully integrated (Barrows & Tamblyn, 1980). Through the years, medicine and numerous other disciplines in higher education have embraced their own versions of PBL; this has resulted in hybrid curriculum forms of PBL. For example, Saarinen-Rakiika and Binkley (1998) describe three different curriculum structures, or stages of the PBL continuum: (a) completely integrated programs wherein PBL is the primary learning method, (b) a

transitional curricula, which uses more traditional approaches in the beginning stages of the program then gradually shifts to PBL as students progress through the curriculum, and (c) single-course programs in which PBL is implemented in one or more courses across a curriculum. Factors impacting the decision to implement a PBL curriculum include administrative and faculty commitment, and availability of resources.

Just as settings vary in their approach to implementing PBL, they also differ slightly in the way they describe their PBL model. There is a consensus, however, on how learners in the respective PBL environment generally proceed. Rideout (2001) compared various models used to describe the PBL process. Learners respond to the learning scenario (problem) by:

1. Selecting the problem, identifying unfamiliar language or concepts and beginning to brainstorm/generate hypotheses
2. Identifying learning issues and information
3. Gathering research through self-directed learning
4. Discussing and critically analyzing information
5. Applying general knowledge to the problem
6. Reflecting and evaluating the learning experience

The ‘steps’ described above are not accomplished in a strictly linear fashion, but rather groups tend to go back and forth as needed to clarify and redefine learning as they move through the problem scenario (Goodall, 1990; Jensen & Chilberg, 1991). The process is at times spherical, as students revisit various steps when they identify additional learning issues. Depending on the description of the PBL process, models are articulated differently. McMaster’s University describes a five-step process (Barrows & Tamblyn); Harvard Medical School a six-

stop process (Davis & Harder, 1999); Maastricht University in the Netherlands a seven-step process (Schmidt, 1983).

Effectiveness of PBL

The implementation of PBL is most likely significantly influenced by PBL's effectiveness claims. Some suggest that PBL delivers benefits in terms of knowledge, understanding, clinical reasoning, problem-solving, communication/interaction skills, and self-directed and life-long learning (Bernstein et al., 1995; Donner & Bickley, 1993; DeBruyn, 1998; Schwartz, Burgett, Blue, Donnelly, & Sloan, 1997, Stern, 1997). The following section will examine the empirical research to determine if these effectiveness claims are true. Since my study sought to explore the implementation of a problem based learning approach and its relationship to occupational therapy students' clinical reasoning skills, it is naturally prudent to review relevant studies from the field of occupational therapy. However, the paucity of occupational therapy research on PBL necessitates a broader search of the literature. Problem based learning has been most widely implemented in medical schools; therefore, the majority of empirical studies on PBL come from the field of medicine. Studies conducted with medical students can be used to inform the field of occupational therapy since both the medical profession and occupational therapy are concerned with educating competent practitioners capable of clinical reasoning and directing their own learning. The usefulness of the medical studies, however, does have limitation; this will be discussed later.

Medical studies and PBL

The most comprehensive review of outcomes and implementation of PBL in the medical field is provided by the meta-analyses conducted by Albanse & Mitchell, 1993; Vernon & Blake; 1993; and Colliver, 2000. These reviews, however, yield somewhat conflicting conclusions on

PBL's effectiveness (Albanese & Mitchell, 1993; Vernon & Blake; 1993 Colliver, 2000). Albanese & Mitchell offer plausible explanations for the different conclusions: (1) evaluation of PBL is complex as the actual practice that is called PBL is widely variable, and (2) there is no consensus regarding the outcome criteria that should be used to measure PBL success. In their review, Albanese & Mitchell admitted that although PBL did not show conclusive evidence demonstrating its superiority over other approaches, it did reveal that both staff and students enjoyed PBL. Vernon and Blake's (1993) study reported that in several of the outcomes measures examined, the overall results of the meta analysis did support the superiority of the PBL approach over more traditional methods. However, they did acknowledge that in many of the studies, variables related to clinical performance and skills were poorly defined; methods of measurements were inadequately described or validated. Colliver's (2000) review of the major meta-analysis contrasted with Vernon and Blake's findings. He found no convincing evidence to support that PBL improves the knowledge base and/or clinical performance of medical students. Colliver did, however, determine that "PBL may provide a more challenging, motivating, and enjoyable approach to medical education" (p. 266).

The meta-analysis studies discussed provide information pertaining to the effectiveness of PBL in general. Additional studies have been completed that more specifically address the effectiveness of PBL as related to clinical reasoning. Enhancement of clinical reasoning skills is often cited as a benefit of using a PBL approach. As my study sought to explore the implementation of a problem based learning approach and its relationship to occupational therapy students' clinical reasoning skills, it was prudent to review these additional studies.

In their PBL outcomes study, Distehorst, Dawson, Robbs, & Barrows (2005) compared the characteristics and outcome data of students from a PBL curriculum with the data from

students in a standard curriculum. The results of the study showed that the PBL students performed significantly better in two of their required clerkships. Those students also performed better in the clerkship subcategories of clinical performance, knowledge, and clinical reasoning. This study supports the results found by Vernon and Blake (1993).

Van Gessel et al. (2003) developed a program at the University of Geneva, School of Medicine, where, as part of fourth year medical students' problem based learning, a twelve-week unit of clinical reasoning was introduced. Students' feedback after completing the unit indicated that their level of confidence in gathering, interpreting, and weighing relevant patient data increased. They concluded that the unit was useful in easing their "transition from the preclinical years" by giving them an "opportunity to train their clinical reasoning processes on standardized and prototypical problems, before encountering real patients with more ill-structured problems during clerkships" (p. 966)

A longitudinal study that compared PBL with the traditional lecture-based format was conducted by Hmelo (1998); the study evaluated the problem-solving performance of medical students. Results showed that the PBL approach yielded important cognitive benefits. These cognitive benefits, which include reasoning strategies, assist the clinical decision making process in actual practice settings. The longitudinal design of the study permitted consideration of nonequivalence issues and allowed examination of change over time.

All of the studies examined thus far have pertained to the field of medicine. Despite the implementation of a variety of PBL formats by many occupational therapy programs, there is a lack of empirical studies on the effectiveness of PBL in occupational therapy education. A few studies have looked at the effect of PBL on occupational therapy students' clinical reasoning skills. These studies will be examined next.

Scaffa & Wooster (2004) conducted a quantitative study on PBL's effect on clinical reasoning skills. They found that PBL did significantly facilitate the development of students' clinical reasoning skills. Their five-week, thirty hour PBL course was studied using a quasi-experimental pretest-posttest design. The Self-Assessment of Clinical Reflection and Reasoning (SACRR) was used to measure changes in the clinical reasoning thought processes and behaviors of 48 undergraduate occupational therapy students. The SACRR consists of 26 items that are rated on a five-point Likert scale with a rating of "5" indicating "strongly agree," and a rating of "1" indicating "strongly disagree." Each item addresses a different aspect of clinical reflection and reasoning. The clinical reasoning strategies that were perceived to increase in use included identifying assumptions, developing hypotheses, comparing and contrasting options, and contemplating 'what if…' scenarios.

Two important aspects related to the effectiveness of PBL are the perceptions of the students and the perceptions of the faculty. While the studies described above pertain to PBL effectiveness, they do not focus on student/faculty perceptions. The remaining review will relate to student and faculty perceptions. It is important to note that there is a dire need for further occupational therapy research: these remaining studies (along with the work done by Scaffa & Wooster) represent (from the author's search) the entire body of literature available that provide outcomes of PBL in occupational therapy.

Occupational therapy literature yielded five articles that provide outcomes of PBL in occupational therapy (Hammel et al., 1999; Stern, 1996; Stern & D'Amico, 2000). All of the studies were situated in formal settings of higher education. Four of the studies focused exclusively on students' perception of PBL, while Hammel et al. (1999) included both student and faculty perceptions in their participatory action research study. From a methodological

perspective, two studies were qualitative in design and two were quantitative. All of the studies involved case examples wherein one or more classes were followed throughout a particular educational event ranging from seven weeks to two years. A common thread appeared in the method of research gathering: the analysis of focus group content and student surveys.

A recurring theme in the studies was 'deep learning' (Hammel et al., 1999; Saldo, 1997; Stern, 1997). First, the studies suggest that students using PBL approach learn the differences between 'information' and 'knowledge' more quickly. Second, these students are better able to manage their time and grapple with ambiguities (all of which repeatedly arise in professional contexts but cannot be taught 'by the book'). For example, Stern (1997) reported that PBL enhanced students' abilities to clinically reason and synthesize concerns pertaining to clinical cases. It also offered parameters for thinking about cases, and increased student's awareness of the impact of their personal biases. The study by Hammel et al. (1999) reaffirmed this perception of 'deep learning.' Students reported that they viewed PBL as a process, one that prepares learners for a future professional role that demands a lifelong learning approach to continuing competence:

> You have to go and find the information, so you're learning the whole process; they're not just throwing it in your lap and saying, 'This is the question and this is the answer.' You have to go and find out where to look for the right answer and come up with it on your own. It's a tool you can take with you (Hammel et al. 1999, p. 202).

However, analysis of student descriptions of clinical reasoning showed a lack of insight into the interpretive and conditional aspects of this process.

In her study of 225 occupational therapy students from six schools, Saldo (1997) showed that "students studying in the most 'pure' PBL courses had very strong perceptions of

independence and choice, and felt that their assessment methods had fewer adverse consequences on learning" (p. 101).

Thus, while the results of PBL programs appear positive (even measurably so to a certain extent), what is more compelling is the fact that no measurable, significant *negative* impacts can be seen. That is, there is no evidence that suggests that students who learn under a PBL approach are deficient in any of the professional-level competencies. Nor does it harm students in their attempt to acquire factual knowledge, useful for standardized test. Additionally, the majority of the studies demonstrated that student progress was in line with the goals of the faculty.

A common concern cited in all the studies was the need for more research regarding the role of PBL in occupational therapy learning. One of the bigger weaknesses of PBL identified in the studies is that students tend to fair more poorly on standardized tests that emphasize rote knowledge and memorization, particularly multiple-choice tests. The study by Hammel et al. (1999) pointed out that the nature of these tests is changing to reflect a more PBL approach. Indeed, at the Occupational Therapy Program Directors Meeting in the fall of 2006, discussions on the revision of the profession's certification exam was a primary issue. The National Board for Certification in Occupational Therapy, Inc. (NBCOT) is a not-for-profit credentialing agency that provides certification for the occupational therapy profession. The revisions to this certification exam would mean that the current format (multiple choice questions) would be altered in order to incorporate simulations designed to test clinical reasoning ability; the significance of this impending change is immense.

Overall, empirical studies on the effectiveness of PBL in occupational therapy education are lacking. While clinical reasoning has been studied much more extensively in medicine and PBL has been shown to foster clinical reasoning in medical students, occupational therapy *is*

different from medicine. Application of data gleaned from studies conducted with medical students is, therefore, somewhat limited. The diagnostic clinical reasoning process used in medicine may not be adequate to identify occupational therapy problems that occupational therapists try to address. For example, Hammel et al. (1999) concluded that there is a need for further study of the extent to which clinical reasoning skills can be enhanced though professional education programs. Vroman and McCrae (1999) investigated the use of problem based learning in occupational therapy and concluded that "The validity and efficacy of PBL to achieve the desired educational outcomes of occupational therapy educational programs has yet to be examined (p. 533). They recommend that educators collaborate on creative research endeavors that explore the relationship between PBL and the development of clinical reasoning. Just as occupational therapy practitioners are being challenged to base their intervention treatments on evidence-based practice, occupational therapy educators have a responsibility to engage in research to determine whether or not PBL is an educational practice that successfully prepares occupational therapy students for modern health care environments where critical thinking and the ability to analyze and solve complex problems is essential. The challenge remains for occupation therapy educator to explore--through empirical research--the impact of PBL as a teaching pedagogy to foster occupational therapy student's clinical reasoning skills. This classroom action research study (which explored a problem based learning approach with occupational therapy students and its relationship to clinical reasoning skills) initiated that process.

CHAPTER 3

METHODOLOGY

"There are lies, damned lies and statistics." *Mark Twain*

Could this quote by Mark Twain have been the result of his frustration with scientific inquiry into an identified problem, based on testing a theory, measured with numbers, and analyzed using statistical techniques? Is it possible that he, like others, had begun to realize that the world is not the fixed measurable phenomenon it is assumed to be in quantitative research? Perhaps Twain had begun to envision a research method where the emphasis on processes and meanings is thoroughly examined, but not measured in terms of quantity, amount or frequency. It is possible that he had longed for a method that did not begin with preconceived ideas, one where the generations of hypotheses did not replace the testing thereof, where explanation replaced measurement, and understanding replaced generalizability. While we may never know the inspiration for Twain's quote, we do know that over the course of time, a type of scientific inquiry with the above-described assumptions gained credibility. Today this inquiry, known as qualitative research, is a prominent tool for gathering and understanding information in the social sciences and applied fields of practice (Merrian, 2002). Because action research is often considered a subset of qualitative research, an overview of qualitative research will be offered first. The initial subsection of this chapter provides a brief overview of qualitative research, and then a consideration of action research relates why a qualitative research study was most appropriate for this study – the purpose of which is to explore the relationship of problem-based learning on occupational therapy students' clinical reasoning skills. This chapter also discusses the guiding research questions; a brief background of myself as the researcher; participant

selection strategies; data collection procedures and methods, data analysis; and verification of the study.

Qualitative Research Paradigm

Once the focus of my study was established, I began to explore the various research strategies that best addressed my research question. I was immediately drawn to qualitative inquiry, and ultimately to qualitative action research. Perhaps this is due in part to the fact that the values, beliefs, and language of occupational therapy seem to coincide with those of the qualitative paradigm, as evidenced by Kielhofner (1997)

> Qualitative researchers' purposes are to study people and process in their natural world, learn the person's perspective, understand people's worlds and their subjectively constructed realities, tell a story, which shares that understanding, and make a difference through that understanding. Occupational therapists affirm the value of occupation and emphasize a client-centered practice and respect for the subjective perspectives of clients and patients. These themes also affirm that therapy is a process of active engagement and empowerment (p.88).

The qualitative research paradigm is based on an interpretivist epistemology, and often refers to inquiry approaches that rely on holistic accounts of the context under study. Drawing primarily from the fields of anthropology, sociology, and the behavioral sciences, qualitative research provides people with a means to better understand a world that cannot be *solely* understood in terms of numbers and objectivity. Rather, a major goal of qualitative research is to explore the nature of meaning. This view of knowledge, in which social reality is seen as a set of meanings, constructed by the individuals who participate in that reality (Bogadan & Biklen, 1992; Merriam & Simpson, 2000), is quite germane to a human enterprise such as occupational

therapy in which describing and understanding human experience is fundamental. A major purpose of qualitative research is to discover the nature of those meanings. In my study on PBL, understanding of the nature of the experience emerged from direct observation of students engaged in activity (allowing me to view students 'living' their PBL experience).

Qualitative research has other characteristics that lend itself to a study focused on implementing problem based learning (PBL) pedagogy designed to explore the relationship of PBL to occupational therapy student's clinical reasoning skills. These include the researcher acting as the principal mechanism for collecting and analyzing data (Merriam, 2002); a commitment to the participant's point of view (Denzin & Lincoln, 2000); and providing rich details and insights on the participant's experience (Lincoln and Guba, 1985). Each characteristic warrants further examination.

In qualitative research, the researcher is the primary instrument of data collection and analysis. As the researcher for my qualitative action research study, I was the facilitator of the PBL groups and the collector of data. In light of this I had a responsibility to identify any biases that might impact the study. According to Merriam, 2002, in order to understand how one's subjectivity shapes the investigation and its findings, one must be able to account for his/her biases. I will discuss my biases and assumptions thoroughly in another section.

Commitment to participants' viewpoints is another essential characteristic of qualitative research and one, which seems to be of key importance in a study exploring the relationship of PBL to students' clinical reasoning because reality is constructed by the participants as they interact in their PBL learning communities. Rather than employing an instrument that only yielded statistical data; I used open-ended questions and fieldnotes that allowed students' voices

to be heard. Spradley (1979) expressed the value of the participants' viewpoint in this way:

> I want to understand the world from your point of view. I want to know what you know in the way you know it. I want to understand the meaning of your experience, to walk in your shoes, to feel things as you feel them, to explain things as you explain them. Will you become my teacher and help me understand? (p. 34).

Rich descriptive data is the hallmark of qualitative research. Patton (2002) stated that 'thick description' provides the foundation for qualitative analysis and reporting. 'Thick description' takes the reader into the setting being described in such a way that he/she can understand the phenomenon studied and draw his or her own interpretations about meaning and significance. My study was conducted in the natural setting (classroom) which provided numerous opportunities to listen to and engage in conversational-dialogue and to collect and analyze descriptions and reflections from the participants. Various types of research fall under the qualitative paradigm, but one in particular, Action Research, with its orientation to action in order to address a practice problem with the goal of bringing about change, is what I used; consequently, it is addressed in the next section.

Action Research

Qualitative and action research methodologies share a deep appreciation of the subjective experiences, perspectives, and views of people who traditionally have been the "subjects" of research (Atweh, Kemmis & Weeks, 1998). Action research (AR) and qualitative research are considered distinct although related approaches (i.e., action research is occasionally described as a form of qualitative research). McKernan (1998) defines action research as "a form of self-

reflective problem solving, which enables practitioners to better understand and solve pressing problems in social settings" (p.6).

AR can be portrayed as a family of research methodologies, which provide a framework for action, knowledge generation, empowerment, and reflection. In general this is accomplished by using a cyclic or spiral process. The process alternates between action and critical reflection. The later cycles are continuously refining methods, interpreting data in light of understanding developed in the earlier cycles and coming up with additional activities to facilitate learning more deeply and then to explore how these interventions affect the learning process. It is therefore an evolving process, which takes shape as understanding increases; it as an iterative process converging towards a better understanding of what happens (Denzin & Lincoln, 1994; Patton, 2002; Reason & Bradbury, 2001). Thus, embracing an action research approach to explore the relationship of PBL to occupational therapy students' clinical reasoning skills, allowed for critical reflection upon my craft, with input from the students, with the aim of improving it.

Historically, AR is traced to Kurt Lewin's work on group dynamics and human relations (Carr & Kemmis, 1986). Lewin's research would often consist of investigating a phenomenon as it naturally occurred in the field. He felt research that had implications for practical application was of more value and interest than 'pure research' (Denzin & Lincoln, 1994). AR has been used in psychology, education, industrial and agricultural research and more recently in health services (Freebody, 2003; Kemmis, 1988). Inquiry includes learning about the practice from those involved in it, planning for changes in the practice, implementing those changes, and evaluating the success of the changes. The direct result of AR is the generation of practical knowledge that has the potential of improving a particular system.

Kemmis and McTaggart (1988) identify key approaches that AR encompasses; one in particular is classroom action research (also referred to as teacher research and educational research). Classroom action research involves "the use of qualitative, interpretive modes of inquiry and data collection by teachers with a view to teachers' making judgments about how to improve their own practices" (p.569). In this process, the research methodology acknowledges that teachers-as-researchers are better able to design useful educational research. Dick (2002) explains that classroom action research is used when the goal is to achieve understanding and change at the same time. Action research maintains rigor through a cyclical process that holds critical reflections is crucial to the research process. Such an approach seems particular salient to me. As an educator of occupational therapy students, I am concerned about how to best prepare my students for an increasingly diverse and complex health care environment. Are my teaching strategies effective in fostering the critical thinking skills and effective problem-solving abilities my students will need to be competent entry level practitioners? My concern with the professional preparation of my students contributed to my desire to explore the relationship of problem-based learning to occupational therapy student's clinical reasoning skills through a classroom action research design.

AR is client-centered and focuses on practical problems of importance to its constituents. In healthcare, AR is being used to better understand the concepts of empowerment (Corrigan & Garman, 1997; DeGroot, 1988) and to examine clinical practices (Street & Robinson, 1995; Mattingly & Gillette, 1991). AR has been accepted by teachers in primary and secondary education as a scholarly way of studying and improving one's educational practice while developing a knowledge base for one's profession. The teacher/researcher, using primarily qualitative methods, examines his or her own practice and makes change based on the results of

the research. Gall, Gall and Borg (1999) offer five advantages of action research for education professionals, all of which support my research goal of exploring the impact of PBL on occupational therapy students' clinical reasoning skills: (1) it contributes to the theory and knowledge base needed for enhancing practice (2) it supports the professional development of practitioners by helping them become more competent in understanding and applying research findings and in conducting their own research (3) it can build a collegial networking system, possibly leading to interdisciplinary research (4) it helps practitioners identify problems and seek solutions in a systematic fashion (5) it can be used at all levels and in all areas of education (i.e. classroom, department, throughout an educational institution).

Various approaches to educational action research have been used to focus on professional development of educators in higher education (Zuber-Skerritt, 1992). Educational action research has also been used to promote democratic forms of education and collaboration among teachers, students, and others in the educational community (Carr & Kennis, 1988; Bunbury, Hastings, Henry, & McTaggart, 1991). Because my study focused on exploration of an educational practice based problem and involve student and teacher participation and collaboration, my study was well suited for a qualitative classroom action research design.

Design of Study

Action research is an iterative process that is spiraling in nature and cycles through four phases: reflection, planning, action, and observation. (Kemmis & McTaggart, 1988; Winter, 1989) To ensure that the concern is thoroughly examined, the cycle of the steps is repeated as needed. The following paragraphs apply these phases of action research to my study; they will also provide an overview of the study.

Planning Phase

The plan is a map for action that will be shared with the students and others who may be affected by the action. The plan identifies what is to be done, by whom, where, when, and how. Planning results from the identification of the problem and requires critical examination of any planned change.

Identifying the problem. The problem addressed in this action research study was the need to explore the relationship of PBL to occupational therapy students' clinical reasoning skills. As an occupational therapy practitioner and educator, I am aware that clinical reasoning is fast becoming widely recognized as a crucial component of the occupational therapy process. The complexity of today's practice requires increasing accountability in decision making as part of the process of providing desirable patient outcomes (Royeen, 1995). There is a growing realization that traditional teaching methods may not be the most effective means to foster clinical reasoning in occupational therapy students (Neidstat, 1998; Stern, 1997). An approach that supports the co-construction of knowledge as opposed to the transmission of truth warrants investigation. PBL embraces a constructivist epistemology; the main goal of education is to teach students to search and construct knowledge through collaborative problem solving. This approach provides students with opportunities to become actively engaged in their learning experience, rather than act as passive recipients of knowledge. One important assumption of clinical reasoning is that it is a product of the interaction between the client and the therapist. Through this process of meaning making, both client and therapist collaborate to increase understanding and ideally construct knowledge that will enhance the treatment process.

Defining the project. An outcome of understanding the problem is the identification and implementation of a new teaching strategy (PBL). My action research study was conducted at a

private Catholic, Jesuit University in Northeastern Pennsylvania, in the Occupational Therapy Department where I am a faculty member. The student population, including adult, part-time and graduate students, was approximately 4,800. The occupational therapy student population including graduate and undergraduate students was approximately 144. Because this study sought to explore the relationship of PBL on occupational therapy student's clinical reasoning skills, the course I chose, Activity Analysis II, was directly related to the practice of occupational therapy. This 200-level course is concerned with laying the foundation for practice by exposing the student to theoretical frames of reference used in occupational therapy practice, the occupational therapy practice framework, and basic clinical reasoning skills required for activity analysis and the OT process. This type of course is required in all occupational therapy curricula because it addresses the development of core skills and abilities necessary for therapeutic practice and because it helps occupational therapy curricula to meet accreditation standards. Within this course, which I taught in the spring semester of 2007, I designed an eight-week long assignment utilizing PBL principles. An actual client case study was used to facilitate student thinking and problem-solving abilities. This eight-week case based assignment was the focus of my PBL action research study. Students in this study were observed for the development of clinical reasoning skills. The students attended (1) fifty minute lecture and (2) two hour PBL group sessions per week. In the first week of the project, students were introduced to PBL and formed PBL groups consisting of 6-8 members. In the second week, they were given a 'problem' (in the form of a case study) in which they identified their learning issues and developed a natural course of study. They also completed the pre-test on Self Assessment of Clinical Reflection and Reasoning (SACRR). During the third and forth weeks, the students continued through the PBL process of identifying/revising learning objectives, self-directing their learning,

and co-constructing knowledge through group collaboration. In the fourth week, the students met the client and performed an evaluation (occupational profile and performance analysis). Students spent the rest of the week and part of the fifth week developing an intervention plan based on the data they gleaned from the evaluation. The students also completed an activity analysis form on one of their planned treatment interventions. At the end of the fifth week, students met with the client and initiated the treatment intervention, wrote a treatment note, reviewed their treatment session and based on that reflection planned for their next treatment session. During the sixth week, students carried out the second treatment intervention session with the client. Concluding with the seventh and eighth weeks, students reflected on their intervention and outcomes, completed documentation on their treatment and discharge notes. Students were also given time to work on compiling their case study paper and writing their individual reflection papers. Finally, they completed the post test on Self Assessment on Clinical Reflection and Reasoning (SACRR).

Determining What Information to Gather. This part of the planning phase involves identification and selection of appropriate methods for gathering qualitative data. The decision about what data are collected for an action research study is largely determined by the nature of the problem. My aim was to understand and explore the relationship of PBL on occupational therapy students' clinical reasoning skills. Data collection methods that I believed contributed to this goal and embraced a qualitative perspective included; participant observation, informal focus groups, pre-post test, post interviews and document analysis (fieldwork notes, student reflection papers and projects, Blackboard postings). In this study, I gathered data related to occupational therapy students' PBL experience and their clinical reasoning skills. Descriptions from Mattingly and Fleming (1994) and Schell & Cervero (1993) of clinical reasoning were used to identify the

nature of the clinical reasoning utilized by the occupational therapy students during their PBL experience.

Action Phase and Data Collection Methods

The action phase of action research involves implementing the intervention and observing the results. Critical to this phase is reflecting on what is occurring and adapting the plan and or collection methods necessary.

Throughout the eight week PBL project I engaged in participant observation. According to Spradley, (1980), participant observation is undertaken with at least two purposes in mind, "To observe the activities, people, and physical aspects of a situation, and to engage in activities that are appropriate to a given situation that provide useful information." (p. 245). The collaborative PBL discussion groups and Blackboard postings offered ample opportunities for participant observation to occur. Fieldnotes served as a record of what was attended to during the course of observation. Daily review of these fieldnotes kept me attuned to what was occurring in the PBL groups and enabled me to offer guidance on unexpected student responses. Another format for obtaining information pertinent to the study was the use of informal focus groups.

A focus group is "a semi-structured group session, moderated by a group leader, held in an informal setting, with the purpose of collecting information on a designated topic" (Carey, 1994, p.226). This method assumes that an individual's attitudes and beliefs do not form in a vacuum and that people often need to listen to other perspectives in order to form their own (Marshal & Rossman, 1999). The above assumption highlights the compatibility of this method with the constructivist underpinnings of this study representing an additional opportunity for co-construction of knowledge through social interaction. Additionally, focus groups are appropriate for evaluation of a new course design (Carey, 1994). Because I was interested in exploring the

relationship of the eight week PBL experience on occupational therapy students' clinical reasoning skills the use of focus groups allowed me to understand the students' perceptions of the relationship of PBL to their clinical reasoning skills (Gray, 1996).

In this study, focus groups were conceptualized as open, semi-structured, small group discussions that focused on specific prompt questions intended to stimulate discourse on clinical reasoning. Three informal focus groups occurred at week two, week four, and week eight. The fieldwork coordinator came down to each of the three labs and acted as moderator to direct the interaction in an unstructured manner (Denzin & Lincoln, 1994). The focus groups yielded important data for this study and were augmented by other data sources including the use of document analysis and questionnaire. Documents can provide a rich source of information about programs as well as the values and beliefs of the participants in the study (Patton, 2002); I examined students' written assignments, Blackboard postings and my field notes of classroom observations. These documents provided a valuable opportunity for participants to reflect on aspects of each class. It was necessary to continuously reflect on the various phases of the project and the nature of the clinical reasoning that emerged.

Questionnaires can provide information regarding the distribution of characteristics, attitudes or beliefs (Marshall & Rossman, 1999). In this study The Self-Assessment of Clinical Reflection and Reasoning (SACRR), developed by Royeen et al. (2001) was administered at the beginning of the PBL assignment, and again on the last day of the assignment. This tool was chosen because my study sought to explore the relationship of PBL on occupational therapy students' clinical reasoning skills. According to Royeen et al. (2001), the SACRR can be used to evaluate the effects of different educational methods on clinical reasoning.

During the action phase I also established a written description of each process known as an audit trail. This made it possible for an external 'auditor' (OT colleagues) to examine the processes of data collection, analysis, and interpretation (Guba, 1981).

Reflection

A crucial step of the action research study involves a reflection on the whole process. As the researcher, I continually reviewed the data and reflected on my own experiences (as well as the participants'). This ongoing reflection helped me to interpret, explain, and draw conclusions about the relationship PBL had on fostering clinical reasoning skills. I modified my classroom program as appropriate based on this process. The reflection stage is also the first phase of data analysis.

Evaluating the results. This step of the reflection stage is characterized by the analysis of data. Thorne (2000) states, "Unquestionably, data analysis is the most complex and mysterious of all of the phases of a qualitative project" (p. 68). It is important to emphasize that in action research, data analysis is occurring throughout the course of the study so that necessary adjustments can be implemented. It is imperative that the researcher remains flexible so plans can be modified to better address the needs of the participants (Hopkins, 2002).

In this action research study, I reflected on the experience and process each week by looking at the data and trying to understand what was happening and why. This reflection process provided insight that was applied to the next phase of the project. Once an initial draft of major themes was identified, I solicited student feedback on the tentative understanding of their responses. Students were asked to identify any areas of importance that were missed and comment on how well the researcher represented their experiences and concerns. The final stage of my action research study involved working collaboratively with the students to translate the

implications of these finding into designing new interventions to promote clinical reasoning skills

As interviews and observations were conducted, notes were kept and constantly reviewed to add questions that needed to be asked and to offer descriptions of findings. The purpose of my study was to explore the relationship of PBL on occupational therapy students' clinical reasoning skills. The qualitative data pertaining to clinical reasoning was sorted, coded, and reviewed using descriptions by Mattingly and Fleming (1994) and Schell & Cervero (1993) of various types of clinical reasoning. This assisted in identifying the various forms of reasoning used by the students as they carry out the evaluation and intervention. Collecting and analyzing multiple forms of data allowed for triangulation.

Study Participants

I used a convenience sample because the students involved in my PBL study were sophomore occupational therapy students enrolled in my Activity Analysis II course; this sampling afforded me easy access to an appropriate population for my study. The classroom was comprised of 36 females with a mean age of approximately 19-20 years old with a largely white student body at a university that is limited in its diversity of racial and ethnic representation. Because students were given a grade for this course, they were given an opportunity to decide if they wish to participate in this study. Students were given a form on the first day of class. They indicated whether they would or would not participate in the study. A colleague collected the forms, placed them in a sealed envelope and mailed them directly to the committee chair, Dr. Taylor. The researcher did not know who had agreed to participate in the study until after the end of the semester, after grades were received by the students. At this time the researcher contacted Dr. Taylor and he informed her that all the students in the class had agreed to participate.

Strategies to Ensure Quality

Researchers use various strategies to promote qualitative research credibility, transferability, dependability, and confirmability (Guba, 1981). Attention to these concepts will help the researcher ensure the quality of their work. These strategies and how they related to my study will be discussed in the following section.

Credibility

Greenwood and Levin (1998) define credibility in relation to AR as "the arguments and the processes necessary for having someone trust research results" (p. 80). By virtue of conducting a classroom action research study, I immersed myself in the setting and spent a prolonged amount of time at the site. Because I collected various forms of data from the participation observation, documents, pre-post test, post interviews and informal focus groups, I ensured data triangulation. To conduct credible AR, accurate representation of participant meaning and rigor in data collection and analysis must occur. Because of the collaborative nature of AR, the inquiry must then be credible to the group generating it. Low inference descriptors include direct quotations from interviews as well as narratives of behavior and activity that provide the reader with multiple examples from the field notes. These descriptors are generally considered most credible. The low inference notes from my study were analyzed and presented in excerpts to substantiate inferred categories of analysis (Cook, 2001).

Transferability

Transferability occurs when the qualitative researcher provides thick description that enables someone interested in the study findings to identify with the setting. According to Lincoln and Guba, (1985) the notion of transferability is not an attribute of the researcher, but is an aspect that lies, rather, with the person doing the transferring. In essence it is the reader of the

report who determines whether the findings of the study can be applied to other settings. Interviews, focus groups, Blackboard postings and PBL group discussions with the students provided information to meet the component of transferability.

Dependability

Dependability refers to the stability of the data (Guba, 1981). "In qualitative research the understanding of reality is really the researcher's interpretation of someone else's interpretation" (Merriam & Simpson, 1999, p. 101). Various approaches can be utilized to reduce researcher bias and ensure an interpretation that is as close to reality as possible. Triangulation is the process of using different data-collection techniques to study the same program (Marshall & Rossman, 1999). To ensure dependability in my study I used two types of triangulation: multiple data and method sources (interviews/focus groups, field notes, students' case study/ Blackboard postings [information delivery system that allowed students to form electronic discussion forums] and direct observation). Triangulation works in concert with ideas of saturation and member checks as being validating methods. Member checking was done in my study by sharing my interpretations of the student's viewpoints with the students. This allowed me to clear up areas of miscommunication. Furthermore, triangulation fits well with the idea of constant comparative method described by Glaser and Strauss (1992) wherein researchers regularly check their inquiry by comparing new data with already acquired data and comparing data from different approaches (Patton, 2002). In my study data was analyzed by using the constant comparison method. Coding, sorting and arranging themes and constructs served to develop and describe emerging response patterns.

Another way in which dependability was supported in my study was through peer review. The study received ongoing periodic reviews from my occupational therapy colleague, who

offered useful challenges and insights. Finally, my study utilized reflexivity; this is a qualitative research strategy that addresses our subjectivity as researchers related to people and events that we encounter in the field. Reflexivity enhances the quality of research through its ability to extend our understanding of how our positions and interest as researchers affect all stages of the research process. I engaged in critical self-awareness on potential biases and predispositions. (Merriam, 2002; Patton, 2002).

Confirmability

Confirmability refers to the neutrality or objectivity of the data collected. Confirmability of the research data is achieved by showing that the findings are based on the data and that interpretations of the study are logical. Guba (1981) suggests that confirmability is established through the practice of triangulation and reflexivity. Reflexivity is practiced by intentionally revealing underlying assumptions or biases that cause the researcher to formulate a set of questions in a particular way and to present findings in a particular way. One way that I practiced reflexivity was by keeping a journal detailing each PBL session.

Summary

In a recent issue of the American Journal of Occupational Therapy, occupational therapists were encouraged to consider future research initiatives that seek to increase occupational therapy knowledge through action research. Action research is a legitimate approach to knowledge development that expands the notion of traditional research in a way that reflects a student-centered understanding of knowledge. The knowledge that comes from qualitative research often challenges our assumptions about our world; it opens our eyes to new ways of seeing what is already familiar to us. For educators, these challenges lead us to new ways of seeing ourselves as teachers, including our relationships with students, our teaching

methods, the institutional forces of the educational system and even our own reflexive processes. In selecting a classroom action research study, I sought to improve my educational practice. The study allowed me the chance to explore the relationship PBL to occupational therapy students' clinical reasoning skills.

CHAPTER 4

FINDINGS

"We must get beyond textbooks, go out into the bypaths and untrodden depths of the wildness and travel and explore and tell the world the glories of our journey."
(John Hope Franklin)

The purpose of this classroom action research study was to implement and explore a problem based learning (PBL) approach and its relationship to occupational therapy students' clinical reasoning skills. The action research study was carried out over eight weeks during the spring 2007 semester at the University of Scranton. The course, titled Activity Analysis II (OT 241), was required for sophomore occupational therapy students. The research study was guided by the following questions:

1. How do the occupational therapy students participating in this study view their PBL experience?
2. How can PBL pedagogy aid an occupational therapy educator in fostering students' clinical reasoning skills?
3. What aspects of PBL do the students perceive to have contributed most to his/her development of clinical reasoning skills?
4. What was the nature of the clinical reasoning skills demonstrated by the students during their PBL assignment?

This chapter begins with a brief overview of the students participating in the study. It also provides information about the planning and progression of the PBL assignment (as it relates to the action research cycle). In reviewing the 8 week study, it became obvious that the participants' responses to the PBL experience and their development of clinical reasoning could be categorized in four distinct phases. These phases are classified in the following way:

orientation to PBL, case study introduction, meeting the client, and final reflections. The findings of the study will be presented as they relate to each of these four phases.

Overview of Participant Group and Course

This section will provide the reader with a brief overview of the participant make-up of the class as a whole. Additionally, the course objectives, the instructional design and the format of the Activity Analysis II course will be presented. Students participating in this classroom action research study were recruited from the OT 241 Activity Analysis course; all 36 students enrolled in the course agreed to participate in the study. All the students were second year, white females between the ages of 19-20 years with no previous experience with the PBL approach. Each student had completed prerequisite courses including OT 240, Activity Analysis I, for which I was also the course instructor. One student had transferred out of the OT major, leaving the course after three weeks of the study.

This core course, OT 241, is required during the second semester of the students' sophomore year. It is a foundational course with seven key, multifaceted objectives:

1) Recognize that participation in meaningful, purposeful therapeutic activities can restore, reinforce, and enhance occupational performance (which includes one's role function, adaptation, health, and well-being).

2) Define and describe occupational therapy's 'Domain of Concern' or parameters within which the profession operates. This objective focuses on understanding the interactive relationships among the domain's variables. These variables determine a specific client's performance and characterize holistic practice.

3) Develop skills in matching the client's goals, beliefs, and motivations to activity demands and environmental characteristics.

4) Develop an understanding of how occupational therapy theoretical concepts, principles and approaches to practice influence task analysis and the selection and design of therapeutic activity.

5) Continue to develop and refine skills in teaching and the ability to work with others through small group tasks, collaborative team projects, classroom discussions, and oral presentations.

6) Become familiar with the process and the implementation of documentation protocols as applicable to analysis of activity and occupational performance.

7) Continue to develop professional skills in time management, dependability, initiative, clinical reasoning, and interpersonal and written communication.

The instructional design and format of the course is varied. The course, which is three credits entails one hour of lecture and four hours of lab each week. During the course of this study students met every Monday at 9:00am for lecture. The lecture took place in a traditional classroom with individual desks aligned in rows. The classroom was multimedia equipped (with computer internet access, DVD, CD and VHS player/recorder).

Even though the Monday sessions were labeled 'lecture' time, the tasks I planned were primarily active learning activities; hence the lectures did not place the student in a position where they received information passively. I wanted to provide the students with opportunities to *apply* the information they were researching. For example, one of my 'lectures' included having the students watch a video of a man who had sustained a cerebral vascular accident (CVA). I had students then analyze the CVA's impact (physical, emotional, etc.) on his occupational performance. Another lecture entailed a visit from a community occupational therapist (OT). Our guest presented the students with a patient dilemma, and then involved the class in determining

possible OT diagnoses, ethical considerations and treatment suggestions. These and other lecture events will be discussed in greater detail in the following paragraphs.

The labs met twice a week (on Tuesday and Thursday) for 2 hours each day. Students were divided into three sections for lab. One section met at 8:00am; it consisted of one PBL group with 8 members. The two other lab sections each had two, 7 member PBL groups; one section met at 10:00am and the other met at 1:00pm. The lab room is a spacious area equipped with two long tables and stools. The lab is multimedia outfitted in a similar manner to the lecture classroom; it also has several wall mounted dry erase boards. The lab adjoins to a second lab. Within this second lab there are several round tables with chairs. This room also offers computer access and several dry erase boards. A student reading room and a computer lab are located on the same floor. Students had open access to these additional areas throughout their scheduled lab period. The next section discusses several of the activities students engaged in during the first phase of this study; Orientation to PBL.

Orientation to PBL

In this first phase of the study, Orientation to PBL (which encompassed lecture 1, 2 and Lab Week 1), students were introduced to the concept of PBL. This was accomplished by having them address a 'practice' PBL problem. This practice problem was intentionally constructed to promote student learning about PBL while simultaneously actively engaging them in the PBL process. The following section describes their lecture and lab experiences during the orientation period.

Lecture 1

During the first lecture, I provided the students with a general course overview and syllabus review. Although I did indicate that we would be using a PBL approach in the course, I deliberately did not expand on the meaning of PBL and how it was going to be used in this class. I chose not to explain the particulars of PBL to the students because I wanted them to develop their understanding of PBL by experiencing it first hand. I did, however, ask if anyone in the class had prior experience with PBL. All students indicated they were unfamiliar with it. While the students certainly exchanged looks of confusion, at the time no one posed any further questions or comments. Although the students were accustomed to having lecture topics pre-determined on the course syllabus, I explained that I had intentionally omitted this from the syllabus. I told my students that they now had an opportunity to identify their own their learning needs. This would allow them freedom to choose the related topics they wished to explore. The students looked perplex, but they remained silent. I was however, able to glean some insight into their initial thoughts after reading their blackboard postings and reflection papers. Stella's posting stated "when we entered class and learned that we would be using a type of learning

dubbed problem based learning, I was overwhelmed. As I glanced around the class, I saw that others looked as puzzled as I did thinking to themselves "what the heck is PBL?!"

Danielle reflected:

> Over winter break I eagerly anticipated Activity Analysis II because I enjoyed and learned so much in Activity Analysis I during the fall semester. However, when I received the syllabus and saw I would be completing an 8 week project on something called PBL I was extremely confused and a little disappointed. I knew this semester would be quite different than the last.

Sharing similar feelings, Mary summed up her initial reaction this way:

> We start our day at 8am, take a seat at our desks, and pull out our notebooks. The teacher begins the lecture and all of the students try frantically to copy down word for word what the teacher says. This has become the typical day for a student…but what if the typical day was altered. What if this day began not with a teacher, but with the combined efforts of a student and his/her peers, determined to learn what they felt was necessary? This is exactly what happened to our class. We were thrown into a loop hole!

As this sampling of student postings and reflections demonstrates, initial reaction to the use of PBL in Activity Analysis II was met with a mixture of surprise, disappointment and uncertainty.

Following the overview of the course and syllabus, students were invited to take part in the study. I asked the OT fieldwork coordinator to provide the students with information about the study and invite their participation. I had someone other than myself solicit the student's participation because my position as course instructor (and grader) might have been perceived as one of 'power'. If this had been the case, students may have felt pressured to participate. The

students' motivation and participation under these conditions could have affected outcomes of the study.

Once introductions between the fieldwork coordinator and students were made, I excused myself from the classroom. The fieldwork coordinator provided the students with an overview of the study. She also informed them that in conducting this research I was fulfilling my dissertation requirements. The students were assured that choosing to participate or not participate in the study would in no way affect their grade. They were told that I would not know who had agreed to participate in the study until after each student had received her final semester grade. Students were provided with consent forms and envelopes in which to place them. The consent forms were subsequently collected by the fieldwork coordinator and mailed to the researcher's dissertation chair. At the end of the semester I was informed by my chair that all the students enrolled in the course had agreed to participate in the study.

Week 1 Labs

During each of the first lab sessions, students were given an overview of the PBL process. They were informed that PBL entails collaborative relationships, and that this experience would therefore include not only group work but an overall group grade. I then assigned the students to their PBL groups. Once this was accomplished, I informed the students that each of the 5 PBL groups had been allocated space on the University's information system, 'Blackboard'. Students were familiar with this technology since they had used it in previous classes. To ensure students understood how to readily access their specific groups, however, I provided a step by step demonstration. This also enabled me to show students the tools available for their use: email, instant messaging, chat room availability, file exchange, and discussion

board. I informed the students that I, as their group facilitator would have access to all 5 groups. Students would only have access to their assigned PBL group.

Blackboard was used for several reasons. As part of the PBL assignment, students were required to engage in weekly discussion about their PBL experience. I informed students that over the course of the eight week assignment, I would be reading their postings; I would also be posing questions, sharing resources and providing input in their discussions. I did not impose formal structure on the weekly discussions. However, I occasionally posted questions specifically designed to help me better understand the students' thinking process. This was especially true during the second phase (case study introduction) and the third phase (meeting the client) of the PBL experience.

In addition to using blackboard as a tool for implementing class requirements, I also encouraged students to use blackboard as an effective, efficient method for disseminating information that would enhance their learning (citing resources, posing questions, clarifying issues, sharing feelings, etc.).

The next step was to have the students develop contracts that would guide their group's behavior, expectations, and consequences for failure to fulfill group requirements (Appendix A). A sample contract was provided to assist students with this task. After that, each group elected a group leader and a group recorder. The primary role of the group leader was to keep the group on topic, while the group recorder's role was to keep notes of the learning issues identified and addressed by the group. I explained that in PBL, the traditional faculty role is reconceptualized. Instead of functioning as a content expert, faculty acts as a facilitator for each PBL group. As that facilitator, I would ask questions, seek students' rationales for their thinking, and, when needed, help guide the process.

Next, a weekly self and peer evaluation form was distributed to the students (group assessment is seen as an essential component of any PBL experience). Students were required to complete the form each week. The intended use of this assessment is to reinforce not only the group's contractual obligations but also the general underlying expectations for group behavior. This assessment process also increases the students awareness of those 'soft skills' vital for professional practice. Additionally, in completing these forms, students gain skills in giving and receiving feedback. (Appendix B).

Finally, students were encouraged to discuss ways they might adapt their environment (physical & social) so it was most conducive to their learning. While working to complete my doctorate, my classmates decided to take turns bringing in food each week. This practice was warmly embraced as we found it fostered a more social learning atmosphere. I modeled this to my students on their first day of lab (and subsequent labs) by bringing in homemade baked goods and inviting students to help themselves. Students respond excitedly to this new flexibility. I wrote in my fieldnotes, "the students became very vocal after hearing they could choose which rooms to work out of, have the liberty of arranging seating to their liking, bring in their own laptops, coffeemakers, etc." In her reflection paper, one student specifically commented on the practice of incorporating food into the learning process:

> I believe one of the key factors that made PBL less stressful was the presence of food. Although this might seem like a very stupid, minute aspect to the entire project, it really played an important role. PBL learning can be a very stressful experience; tension rises between peers and disgruntled feeling towards the teacher may arise. The food helps relieve some of those feelings and keeps them at bay.

One PBL group decided to lay mats on the floor in the shape of a circle when doing group work. A student from this group commented in her reflection paper "I found the whole atmosphere a lot more laid back and relaxed. I found it easier to concentrate and do my work when we weren't being told what to do, in a sometimes stuffy classroom." Elaine agreed as noted in her reflection paper:

> …another strength is the environment in which problem based learning takes place. In this environment students teach themselves and can be more comfortable to move around and become involved mentally and physically. This is not something you find in a typical classroom where students sit at a desk and take notes. I feel that is the best way to lose a students attention and especially their interest.

With the above tasks completed, I presented the students with a suggested model of how the PBL process works. I explained that the model was not intended as a recipe, but rather as a way to familiarize oneself with various steps taken in the PBL process (Appendix C).

Finally, I presented this learning scenario to my students: *During the next 8 weeks you will be following the principles of PBL. You all indicated that you are unfamiliar with PBL. Why might an OT educator use PBL?*

I distinctly remember being surprised that the students in each of the labs seemed lost, as if they were uncertain what to do. An entry in my field notes captured these feelings and my subsequent response to the situation:

> I fully expected the students to commence in productive dialogue; however, I was surprised to see students simply staring at one another (with only a few students attempting to initiate a discussion). I overheard two students stating that they had no idea how to begin. With a growing sense of panic I tried to think of ideas for moving them

forward. I quickly decided to momentarily divert the students' attention from the PBL problem: I asked them to help me with a dilemma. I told them my professor requested that I be in frequent contact with him over the upcoming week as proposed changes within the department could require my immediate attention. Unfortunately, I would be traveling over the next few days and knew it would be difficult to find pay-phones along the highway in order to check in. I asked if they had any ideas on how I could resolve this dilemma. The students stared at me open-mouthed for a split second before responding almost in unison, "get a cell phone!" Obviously, this was the expected answer. My intention was to use this non-threatening (albeit contrived) dilemma to lead them through the PBL steps. I asked if anyone knew anything about cell phones. This question spawned a flurry of responses regarding the various types of cell phones. Simultaneously, students retrieved their cell phones, holding them up for me to see. In so doing, students realized that many of their classmates had possessed differing brands of cell phones.

This discovery lead to further questioning regarding the factors that contributed to choosing a particular cell phone (cost, coverage area, provider, color, size, special features, etc.). Some of the students shared information on the various features, showing me how they used their phones to send text messages. This in turn revealed that some phones came equipped with a shortcut to texting. Students expanded on the pros and cons of using this option. One student mentioned reading about an increase in the number of school-age children and adolescents diagnosed with cumulative trauma disorder; the article suggested the increase may be due to frequent text messaging.

Throughout the entire activity the students were educating me as well as each other about their personal experiences with cell phones. They talked about how they had engaged in research (via the internet, Consumer Report magazine, Technology Today newsletter) in order to make the most informed purchasing decision. They advised me not to purchase a 'razor' phone as many students found the sound quality to be inferior! Students admitted that despite having a perfectly good cell phone, they fully intended to stay current with the latest advances in cell phones as technology is constantly improving.

Clearly the students found this topic relevant to their lives; many indicated they would be 'lost' without this piece of equipment. Their motivation to solve my dilemma was evidenced by the eagerness with which they shared their experiences and identified resources that could assist me in making an informed decision. Feeling satisfied that I had achieved my goal; I revealed to the students that I had an ulterior motive for seeking their assistance. I explained that my objective was to show them that they could successfully work through the PBL steps. Realizing that they had indeed proceeded quite naturally through the steps, students laughed and expressed appreciation for the time I took to help them gain confidence with the process.

One student's blackboard posting served to reinforce my belief that this impromptu activity had achieved my objective:

Karen's cell phone dilemma was a great example of how we should be asking questions about EVERYTHING, and helped me to realize that common knowledge to me may not be the same for others. I think PBL will help us all to be able to look at situations from all points of view since we are doing everything first hand and be better prepared to answer questions that may pop up along the way.

Once the students realized they were capable of applying those same principles to the original scenario, they appeared more comfortable and ready to proceed. I then guided the students to engage in PBL in order to answer this original query (*During the next 8 weeks you will be following the principles of PBL. You all indicated that you are unfamiliar with PBL. Why might an OT educator use PBL?)* and, in effect, begin to learn about PBL. Within their groups, I observed students begin to discuss what they knew about PBL. They discovered they knew very little about it, not even what the acronym 'PBL' represents. In my fieldnotes I recorded one student wondering aloud "…is PBL a theory used in occupational therapy like the biomechanical model"? As students 'brainstormed' together in groups, they began to generate questions about PBL. Initially their questions were broad. Who uses it? Why is it used? What are the expectations for students? Then students began to categorize and narrow their questions. How is PBL defined? What is its history and what are its characteristics?

I observed some students attempting to prioritize their questions in order to gain the most useful information. At the end of the first lab each PBL group provided me with a list of their identified learning objectives. Students indicated that they were aware of their responsibility to engage in self-directed research. They stated their intention to return to the next lab period prepared to integrate their newly acquired information with group members. I was able to observe some of the student's self-directed learning as I joined their groups throughout the lab sessions. I was also able to check student postings on blackboard and evaluate the resources they accessed; this enabled me to inform their learning issues. Students listed many resources, including data bases such as Pro-Quest, PBL publishing house websites, and text books. Ann shared her internet findings with group members with this blackboard posting:

I just wanted to let you know what websites I found my info for class:

> www.mcli.dist.maricopa.edu/ppl/info.html - this one I used for the roles of student and teacher. www.ppli.org/pbl/pbloutside.htm - this one had info about where else pbl is use www.designshare.com – this one had info on the physical and social environments of pbl

Another student in the group, Elena, decided to use resources other than the internet:

> I tried to stay away from the internet in my research this time. I found some neat articles from professional journals to share with you guys in class. This whole thing should be really interesting and I can't wait to solve the actual problem.

In addition to sharing resources, many postings indicated the students' willingness to assist their group members. Sofia posted:

> Hey ladies! I hope all of you are doing well! If any of you are having trouble finding information for lab here are some websites I got some information from. I typed the link as well as a very short description of what the general concept of each website is. See you all soon!!

Students returned to the next lab period with information to share. They then generated additional questions based on their information. Once students felt they had achieved their PBL learning objectives from the previous lab (PBL history, characteristics, principles, student and faculty roles, and the role of the environment) they agreed to move forward to a new set of questions. These questions surrounded the connection between PBL and occupational therapy.

Students continued to generate learning issues in this week's second lab session. They asked to use the next lecture as an opportunity for each group to share their PBL orientation experience. Since students in PBL are given a voice in determining their learning needs, I honored their request.

Lecture 2

The second lecture period was a 'debriefing' session. I suggested we use an 'open forum' to accomplish this goal. This afforded students the opportunity to engage in meaningful discussions about their PBL knowledge acquisition, to identify the challenges and rewards that accompanied this quest, and to share their current opinions and attitudes regarding PBL. My fieldnotes from this date note, "the classroom atmosphere was charged with energy and emotion as the students engaged in a lively debate about the merits and perils of this new learning approach." Students shared stories about their group's initial confusion and missteps as they stumbled their way across this new terrain. They relayed that hearing other group members' perspectives helped clear their confusion. Allison Marie reflected, "In the past week, I found it very useful to be working in a group and being able to discuss opinions and knowledge we had looked up. It helps to have others explain their understanding of the information, especially if I am not entirely certain myself." Angela followed up on Allison Marie's comment and stated:

> Knowing others in the group are counting on your input to seek solutions and gain knowledge adds to the pressure. It's not a bad thing, but I did find myself thinking, I can't slack off because it's not just my learning being impacted, but everyone's. So there is this external motivation element. On the other hand, getting praise and validation from my group members made me feel good about my ability to contribute. I find that to be intrinsically motivating as well.

Another topic discussed at length was the role of faculty as facilitator. Some students voiced their concern over the new role expectations and indicated that adjustment to this process

was proving difficult. As explained by Joan:

> The prevailing mindset of most students is that it is the teacher's responsibility to ensure the student's are given the correct answer. When this fails to happen students can become resentful, thinking 'this is what teachers get paid for.' I don't think PBL adequately addresses the difficulty some students will have in adjusting to these new role expectations. It is easier said then done.

Other students agreed that the role changes might take some getting use to; however, they felt these new expectations more accurately reflected the responsibilities they would face in the real world. Marie elaborated to her classmates on this:

> We can't expect to run to someone for the answer every time we encounter something new, we have to learn how to seek out answers for ourselves and use our best judgment. The teacher is actually doing her/his job more effectively if they can help us learn how to learn. So far PBL seems like a good way to develop this ability.

Mary joined in the exchange by offering information she had found to support Marie's viewpoint:

> The traditional educational paradigm prepared clinicians for the old health care environment. PBL is an educational strategy that could prepare occupational therapist for success in a new practice environment that values cost, quality, and customer satisfaction.

As students left class, they indicated that the debriefing session was beneficial to their learning and it furthered their understanding of PBL; it also validated their feelings and experiences, and provided an opportunity for reflection. Two postings reflected students' satisfaction with the class content. The first student wrote, "I liked today's class and it was very helpful in furthering my understanding of PBL. I liked how we worked in our smaller PBL

groups and then came together as a big group to share." The second student agreed, "I think our group is doing great together so far and I also like how the separate groups came together to answer questions. That way we are not only seeing what our group has found but what the other groups came up with as well."

The conclusion of the second lecture marked the end of the orientation to PBL phase. In the following section the major findings that emerged during this timeframe will be discussed.

Key Findings Phase One: Orientation to PBL

As acknowledged, none of the students in the Activity Analysis II course had prior experience with PBL. Three main themes surfaced from this first phase of the study (orientation to PBL). The themes are organized as follows: contrasting perspectives, PBL as a relevant approach for occupational therapy students, and positive attitude towards group learning. These findings will be elaborated in the following sections. The data presented in each of the findings emerged from the 'debriefing' session, student blackboard postings, participant observation, and student reflection papers.

Contrasting Perspectives

Students' initial reactions to PBL were diverse and sharply contrasting. They ranged from ecstatic to indignant. There were also some students who avoided the extremes; offering instead a more tempered response to their first encounter with PBL.

The students who wholeheartedly and unreservedly embraced PBL did so for varying reasons. Marcy clearly appreciated that in PBL, the locus of control shifts from the teacher to the student. In her reflection paper she states:

> In a PBL environment you and your group are your own teachers. You have to decide what to do with your class time, when to do your work and assign homework to yourselves. When I initially learned this I thought wow that sounds great; you get to do what you want, when you want!

Jackie, another member of this group was equally elated following her first encounter with PBL.

Jackie's blackboard posting suggest her encounter with PBL may have resulted in a personal transformation:

> HEY guys!! PBL is awesome!! It's really been getting me thinking, how different our lives would be if all of our learning was PBL. Like, compare a boring lecture history class to what we did in class yesterday. It's a totally different world. I am horrible at memorizing and regurgitating that's why I think this PBL is going to work for me, I don't know if you guys agree with me or not. I'm really looking forward to our next few weeks together; I think we really have a great group. Have a great weekend guys!!!

In sharp contrast to the sanguine feelings espoused above, some students had distinctively negative reactions to their PBL orientation. These students expressed feelings of resentment at being 'forced' into this new way of learning. Lola expressed preference for a system where students are given information and expected to memorize facts. She was unhappy with PBL's requirement to explore and analyze information and to identify her own learning needs. In her reflection paper, Lola expressed her initial displeasure:

> PBL is very different from the conventional methods of teaching that I am used to, so at first I found it to be very frustrating. I did not want to go and do research on my own outside of class to learn the material, I just wanted to be lectured to. I felt lost because I was not sure if what I was researching was the correct material to be studying. Also, I did not want to work in a group, I just wanted to work alone. I felt like working in groups was a slow and inefficient method, and it was frustrating because there were six different points of view that we had to work with.

Joan, (a member of the same PBL group) concurred with Lola's feelings and indicated a

desire to stay with a familiar and preferred method of teaching:

> Compared to the traditional style of teaching, PBL is quite different. When I researched PBL, I read that this style of learning is ill-structured and learner centered. That made me nervous because I was not sure what to expect since the teacher was always giving me information and I was never in charge of the course content in any of my classes. I felt very unsure of myself. Because I am very goal oriented, this process made me feel helpless at times. The initiative was up to my group, but none of us knew where we were supposed to be heading. When I found out that we would be working in groups, I was nervous to find out who I was with because I did not want to get stuck with people who did not want to do the work necessary.

As previously stated, several students avoided the emotional extremes discussed above. These student responses showed that, despite some hesitation and uncertainty with PBL, they were open to its possibilities and excited to begin the process. A number of these students credited the PBL orientation exercise to alleviating their anxiety. They indicated that the exercise gave them a chance to get familiar with the process so they would be better prepared for the actual case study. Tiffany articulated mixed emotions in her blackboard posting. She expressed initial frustration with the second step of the PBL process (brainstorming), but also reported increased comfort with the process following the PBL exercise:

> When we first started talking about PBL I was completely confused. Never hearing of it before now, I had no idea where to begin. As we went through the outline in class it started to make a little more sense but I started to become frustrated when we were told to brainstorm about the problem just because I didn't know what I was suppose to be aiming for or working towards. Once we started to research it and I found out how it actually

> works the process was clearer. I also think that when we do start the real problem, it will be so much easier to find the problem and start going through the PBL process just from doing this little exercise of finding out what PBL is. I do think PBL is a really interesting way to learn. In most schools it is always the teacher dictating facts and other information to the students. Half of the time you're memorizing and not actually learning. But with this learning strategy, you're really working hands on, finding information you need yourself through research and actually leaning through the process. It will be interesting to see how this turns out with our group and the case study we work on this semester.

Rae shared her initial confusion about the PBL process. At the same time, she identified some of the characteristics of PBL that made her learning more meaningful:

> At first I was so confused about the PBL process and what it was all about. After doing the exercise in class for 2 days it became a lot more clear as to what PBL is. I like the fact that it is student centered learning. Personally I like the more hands on type learning because for me it helps me to learn more instead of just listening to a lecture. I am excited and interested to actually start our real PBL case study because it is a new and different way of learning for me and I am anxious to see how the whole process turns out.

Allie, like both Rae and Tiffany, acknowledged her confusion when beginning the PBL exercise, however as she worked through the problem, she gained an appreciation for this method of learning:

> After years of traditional learning, PBL seemed confusing and I felt that a more typical method of learning would have been more effective. However, after we started to use the PBL method to figure out what it is all about I found that I actually understood what was going on a lot better. I found working in a group to be very helpful. For example, while I

> had an idea about what the characteristics of PBL were, I was not confident in my answer. When the issue came up, one group member found a source which actually said "Characteristics of PBL" and listed several. In our group, we were than able to add to the characteristics and compile a list which we thought worked well. This example not only helped me understand what PBL is and clarified how the process works, but I was actually able to understand why the active learning process of PBL can be more beneficial than traditional learning. I'm excited to begin working on a real case study. I think it should be interesting to see how PBL works out in our group this semester.

Ann also appreciated the opportunity to experience the PBL process in advance of the actual PBL case study. She posted the following message, indicating that immersing herself in the PBL process made the learning about various PBL phases and expected student activities easier:

> So far I have been enjoying the fact that we are actually implementing what we are learning about while we are learning it (we are learning what PBL is, while we are part of our own PBL process). I feel like every time I go to class and learn something about PBL it clicks because it relates to what we experienced in a previous class.

Obviously, and to summarize, a wide range of emotions was experienced and expressed by the students: On one end of the continuum, students seemed almost euphoric at being introduced to this new type of learning. At the other end of the continuum, students' took umbrage at the departing from 'traditional' learning methods. Still others found their experience to be more centrally located on the continuum. Their reactions could be described as cautiously optimistic. A second theme emerged from this phase. This theme describes the participant's views on the significance of a PBL approach for occupational therapy students.

Relevance of a PBL Approach for Occupational Therapy Students

While students' reactions to PBL varied, most students identified PBL as a relevant and effective learning approach because the process mirrored skills needed in the real world of practice. Eileen's blackboard posting demonstrates the way she quickly connected with PBL's use of 'real world' problems:

> I really like the idea of the PBL process. I think it is a great way for us to work together and have experiences that are similar to things we will be doing in the clinic. I think after this semester I will feel much more confident about my ability to be an OT because I will understand what I'll be doing better.

Similarly, Elizabeth identified another important aspect of PBL. In her posting she specifically addressed how PBL's 'hands on' approach to learning will transfer to her work as an OT practitioner:

> I think that our last two labs went really well. First I was so confused and I couldn't make sense of what PBL was or why we were doing it. After doing some research and all of us sharing what we found, I get it now. I think it will be an exciting way of learning that will help us as OT's because it's so hands on and we are a 'hands on' field.

Rae observed that PBL emphasizes the 'construction of knowledge' over the 'transmission of knowledge' and also stresses the application of knowledge to resolve issues. She, too, makes a connection between PBL and the skills needed by OT practitioners, who must think critically and be solution-oriented:

> It is difficult to imagine a situation in which the students are really the ones doing the teaching, and the teachers are merely facilitators and at times students themselves. Although traditional methods of teaching may be less time consuming, PBL guides

> students in constructing their own knowledge through problem solving and experience. It is more appropriate for us as OT students to learn to apply the knowledge we obtain rather than being able to recite it. Although I initially had no idea what PBL was all about, I believe that by doing the research myself I now have a better understanding of what PBL is. I feel that PBL as a whole will prove to be very beneficial when it comes to the learning process. It allows students to find their own solution to a problem rather than having it handed to them.

Annie also agreed that occupational therapists must be able to think critically and apply the information they have learned. Her blackboard posting read:

> I honestly never heard of PBL but the more I learn about it the more I like it. I think it is exactly what we need as future OT's. Spitting back information on exams won't help us think critically or retain information.

Bonnie acknowledged the benefits that learning through a PBL approach could have on her career goal, but went on to site other advantages, "I'm drawing a parallel between PBL and critical thinking, so I am thinking about how PBL can be useful not only in the classroom or therapy setting, but in other areas of our lives as well."

Scarlett did not offer her opinion on the relevance of a PBL approach for OT students. However, she posted research findings that made a connection between PBL and one's profession: "According to a research article I retrieved, traditional and PBL students achieve equal test grades but PBL students do better in their vocation."

The PBL attributes that students identified as most relevant to their learning needs as future OT practitioners were: hands on learning, collaborative learning, critical thinking, and construction and application of knowledge. Several students offer empirical research that

supported the use of PBL in the education of healthcare professionals. The topic of collaborative learning (which was identified above as a relevant aspect of PBL and OT) also emerged in the third and final category; positive attitude towards group learning.

Positive Attitude Towards the Group Learning

Group work is an integral part of the PBL process. However, for students accustomed to learning in a traditional lecture format, group work is atypical. At the end of the PBL orientation period, an overwhelming majority of students voiced a positive attitude towards group learning. Various reasons for this attitude were cited by the students: it more accurately represented the clinical setting, it provided opportunities for hearing different perspectives and it offered a social dimension to the learning experience.

Postings by both Allie and Mary Beth recognize group work as representative of the day to day encounters of occupational therapist. Allie notes:

> I think working in a group will provide an interesting learning opportunity. I think it will be very helpful for us, considering the various professionals that OT's have to interact with in order to provide optimal services for a client.

Mary Beth adds:

> I think working in groups will provide us with opportunities to learn how to modify our working styles to accommodate the styles of others. I think it will provide us with an idea of what it will be like to work with other therapists in an effective collaborative way.

The chance to hear and share perspectives with group members was also cited as a positive aspect of group learning. Elizabeth described how interaction with peers provided

insight when seeking out solutions to problems:

> One of the main aspects of PBL that was different than traditional learning was working in a group. While it did take our group a couple of days to get used to each other and figure out our differences in learning styles, I found that the differences between the members of our group proved to be a positive thing as we all brought in our own ideas and insights. We were able to talk out our confusion and brainstorm together until we were able to come up with what we were looking for.

Donna shares this opinion: "I think groups are really important for the brainstorming process. You need input from many people with a variety of ideas." Danielle concurs, "Working with fellow students makes the process more enjoyable and also allows you to consider other ideas you may not have thought of on your own. This aspect is definitely important in my learning." Danielle uses the term 'enjoyable' when talking about her interactions with the other members of her group. Several other students alluded to the social aspect of group learning. The following postings show that students are making connections and building friendships as a result of the group work experience. Rachel demonstrates a growing affection towards her group members; she bestows them with a nickname:

> I just wanted to say that I am honored to be part of the best group ever: The Loud Group! I am excited to work with all of you and listen to all the ideas you contribute. I have faith that we will work well as a group and pull all our information together.

Erica (a member of the same PBL group as Rachel) responded with the same friendliness:

> I just wanted to say how much I am loving my group! We all bounce ideas off of each other so wonderfully and I feel that we use our time productively and respect everyone equally. You guys are awesome! You guys are doing a great job, have a nice weekend☺

The students' exposure to PBL was, of course, very limited at this point. Most students expressed an eagerness to move past the practice exercise to the 'real' problem. While they verbalized increasing understanding and comfort (even a possible link between PBL and real life) I suspected their current 'happy state' might change or fluctuate in the coming weeks. The next section will examine how participants responded to the PBL experience and PBL's relationship to the development of clinical reasoning during the second phase of the study. This phase is referred to as case study introduction.

Case Study Introduction

PBL is particularly well suited for a course such as activity analysis wherein primary objective's include advancing the students capacity for critical thinking and analysis. The multi-layer PBL assignment was integrated into this course with an overarching outcome - to promote student understanding of the occupational therapists' primary role (which is to facilitate occupational performance by providing opportunities for engagement in occupations to promote participation in context). The quality of the interventions (designed to engage client's in meaningful occupations) is determined to a large extent on the therapist's (and student's) ability to use clinical reasoning.

The 8 week PBL assignment engaged the students in a complex case study with an actual client. Simulating the process used by occupational therapy practitioners, the Case Study Introduction phase involved the PBL student groups preparing for a client's initial evaluation. Written assignments for this phase included a group paper about the medical conditions contained in the client's medical history; students were required to address these conditions in light of occupational therapy. In addition, students were also required to design an occupational therapy evaluation form which was then used to evaluate the client. The following section describes the students' PBL lecture and lab experiences during the Case Study Introduction phase. This second phase encompassed lecture 3, 4, and Lab Week 2, 3, and Tuesday of Week 4).

Lab Week 2

At the start of lab 2, I administered the Self-Assessment of Clinical Reflection and Reasoning (SACRR) pretest. SACRR was developed by Royeen, Mu, Barrett, and Luebben (2001) as a means of evaluating the clinical reasoning skills of occupational therapy and physical

therapy students and practitioners. According to Royeen et al (2001), "the SACRR is not intended to be a stand-alone tool without additional data collection on clinical reasoning performance, preferably of a qualitative nature (p. 112). The SACRR consists of 26 items that are ranked on a five-point Likert scale where 5 = strongly agree, and 1= strongly disagree. Each item addresses a different aspect of clinical reflection and reasoning. For the purposes of this study, the SACRR items 1, 13, 14, 24 and 25 were modified. The modifications were needed to more accurately represent the student's current level of experience. For example, question 1 originally stated "I question how, what, and why I do things in practice." At this point in their education, (second year of undergraduate study) students in the activity analysis course had not yet completed any clinical fieldwork. Therefore, the students did not have actual clinical experience. In consideration of this, question 1 was modified as follows: "I *would* question how, what, and why I do things in practice." The same change (insertion of the word *would*) was also made to questions 13, 14, 24 and 25 (Appendix C).

Following completion of the SACRR, each student received the PBL case study (see appendix D). The problem scenario stated: *In a few weeks you will perform an occupational therapy evaluation. Currently, the client's medical record is not available. However, the following information is known: PMH of a cerebral aneurysm, CVA, and B phlebitis.* Under the scenario was the following question: *What are your thoughts and feelings at this point?* Students were instructed to read through the PBL case study problem and respond to the question. They were told their papers would be collected, however they were not required to put their names on them.

As the case study was distributed, I made the following notation in my fieldnotes "the excitement and anticipation etched on the students' faces altered dramatically as they began to

read the problem scenario. The room, filled with chatter and laughter just a few minutes prior was now blanketed in heavy silence." The students written responses (collected later) offered a number of explanations for the noticeable change; some students expressed strong elements of self doubt. One student indicated, on her cases study form, that she felt paralyzed after reading the problem:

> I have no idea what these words mean. That makes me feel unqualified and inadequate. I feel insecure about my ability to help the client because I have no idea where to begin. It makes me want to seek the help of someone better qualified or educated in the field. Overall, I'm embarrassed that I can't contribute.

Another student was equally dismayed after reading the scenario:

> I feel really confused and nervous. I don't know if I learned these terms and forgot them, or if I never learned them at all. I would be no help whatsoever at this point. I have not the slightest idea what is wrong with this person.

Sharing comparable feelings of confusion and uncertainty, the following responses also contained an element of hope. These students expressed eagerness to take on the challenge and a willingness that was markedly absent in the previous responses:

> I am confused and scared because I don't know what most of the information means. I am excited to learn new things, but hope I am up for the challenge. I feel that this will be a good experience and look forward to the next few weeks.

Joan too, shared feelings of nervousness coupled with excitement to tackle the problem:

> After reading this I felt curious to know what that information meant (PMH, CVA and B phlebitis). A little nervous and intimidated because I've never seen those health issues

> before, but also kind of excited because I am looking forward to trying out the PBL process with this problem.

The following students expressed an equal amount of confusion and anxiety. However, they indicated they were motivated to learn the information and seek solutions to the scenario because they saw it as an authentic problem of practice. Kendall begins:

> I feel like I need to learn abbreviations and the types of cases OT's deal with so I can understand right away what I am dealing with. I am hoping that in a few weeks I will be able to perform the evaluation properly. I am excited to know that soon the cases won't look like they are in a foreign language to me anymore.

Likewise, this student wrote:

> I am a little confused on some of the terms in the information that is available to me. But I think when I figure out what they mean I will not be as confused. I am also very excited to be able to try to solve a case study because a case study is a step closer to solving real life problems in the practice setting

Applying PBL to the Case Study

After collecting the student's papers, I encouraged them to apply the PBL process to the case study. As I made my way to each group, I listened intently to their dialogue.

Needing definitions. Most students did not feel they could offer anything to the discussion at this point because they first needed to define the words/abbreviations in the problem. Some students made an attempt: "I am assuming CVA is something to do with a cerebral aneurysm." This same student went on to say "I wouldn't want to go into an evaluation with just this information, though, because I am pretty lost. Do therapists normally have more information when they go into an evaluation or is that what the evaluation is for"? Another student proposed

the following: “Perhaps PMH has to do with a type of brain aneurysm, but I could be wrong, I suppose that this unknown evaluation is the unsolved or ill-structured problem.” Students quickly recognized they could not engage in a meaningful conversation until they first identified the unknown abbreviations/words in the problem scenario. Expecting the students to have limited knowledge of abbreviations, I was prepared with resources to help them. I did not, however, immediately make these resources available; I was interested in first observing how the students would independently resolve their dilemma. I was pleased to see students actively sharing their ideas for clarifying unfamiliar terms in the problem scenario. Some students suggested doing a computer search to find information; others indicated their text book might provide some information. Another group decided they should look for resources in the OT library. Once I was satisfied that students demonstrated initiative in identifying ways to find resources, I provided each student with a booklet on medical abbreviations. Equipped with this new resource, students promptly found information.

Connecting to personal experience and pop culture examples. After the students learned what the abbreviations stood for, they were able to proceed. Several students shared knowledge gained through their personal experiences with relatives (usually grandparents) who had sustained a stroke. They spoke of how their loved one was affected and how the stroke impacted other family members. Engaging in this type of story-telling helped the students identify several learning issues. For example, two students shared stories about a relative who had a stroke; one talked about her grandfather, the other about her grandmother. This led the students to wonder if age or gender might contribute to a CVA. Almost immediately, students began generating other questions (i.e. what causes a CVA? What are common deficits resulting from a stroke? What

causes some people to be relatively unaffected while others are severely impaired? Can a CVA be prevented?).

Other PBL groups did not have any personal experience with CVA. However, they creatively used popular media as a stimulus to produce learning issues. One student rather meekly offered, "I know this is not necessarily a credible source, but I saw an ER show that showed a woman having a stroke." Many students recalled this episode and began a conversation around 'could that really happen.' Another student mentioned that she had recently seen a Larry King show that featured celebrities who had sustained a stroke (i.e. Dick Clark, Kirk Douglas). Several group members suggested that the television show *House* exemplified the PBL process because the premise of the show revolves around a medical team engaged in an iterative, continuous process of generating hypotheses and revising them as a natural consequence of their experiences and interactions with the medical problem.

The use of popular media referred to above, provided the students with an effective albeit rudimentary way to generate group learning issues, (many of which were similar to the ones previously mentioned). Student blackboard postings showed one PBL group decided to watch the television show House as one of their weekly team activities. Erica begins the conversation, "Hey everyone, attached is our PBL framework and brainstorming notes and a reminder to watch HOUSE. Great work today ladies, see ya soon." Rachel continues:

> This PBL work is teaching me how to research and that I can learn a lot when I actually read what I research. I am glad that we are all coming up with our own trains of thought as Steph said and finding ways to connect them. If we keep this up we can all get jobs working for Dr. House ☺

Stella agrees with Rachel:

> I love that we're all on the same page☺. Never have I had so much fun working with a group, while still accomplishing so much. I love how we bounce ideas off each other and are really running with PBL…I agree with Rachel that by the end of the PBL journey, we will all be prepared to work with House! Can't wait until we all get together again…have a nice weekend everyone.

Identifying Learning Objectives Process

At the conclusion of Tuesday's lab session, each PBL group provided me with a list of their identified learning objectives. Students indicated that they were aware of their responsibility to engage in self-directed research. They stated their intention to return to the next lab period prepared to integrate their newly acquired information with group members.

Students returned to lab on Thursday prepared to share their individual research efforts. One of my first entries in my fieldnotes that day stated:

> It is great to see the students taking charge of their learning environment. It is becoming a familiar routine to see the 8am PBL group put on a pot of coffee prior to beginning their discussions. One of the PBL groups in the 1:00 pm lab routinely goes to the adjoining lab where they sprawl out on the mats. Most of the PBL groups are bringing in their own lap tops to keep track of their group's key points of discussion. At the end of class they upload the information to blackboard so group members have immediate access to the information. Food continues to be a welcome element to the PBL environment. Students freely avail themselves to the treats provided and express their appreciation for the food.

Growing comfort level, and developing sense of knowledge. As students began sharing their understanding of the concepts, I listened to their conversations in order to follow their

particular problem solving process. It was encouraging to hear that many students were not merely offering definitions and facts about the various medical conditions; they were also generating hypotheses about the relationship between each diagnosis. For example, one group was using the data they identified to suggest that the client's stroke could have been a result of the aneurysm since a potential cause of hemorrhagic stokes is an aneurysm. They went on to propose that since both a CVA and an aneurysm can be extremely debilitating, (often resulting in prolong bed stay), the client is placed at an increased risk for phlebitis.

While there was a growing comfort level, there was still of course some frustration. Some of the frustrations voiced during these group sessions related to the abundance of information found as a result of the self-directed learning, and an uncertainty as to how to decipher what was most relevant. One student asked me, "Is this the point where we start hating PBL"? The majority of the groups felt that by having more specific information on the client, they could eliminate this concern. Rather than convince the students this was not the case, I gave them additional information from the client's medical chart. This information contained a series of test (MRI, PET scan, X-ray, blood work) the client had undergone during her hospitalization. As I moved around to the various groups, I heard some students engaged in negotiations. Points of contention centered around two primary issues; how to best accommodate individual learning styles, and how assigned duties were impacting discussion contributions. Student blackboard postings showed the students continued this dialogue following lab. Shelly expressed her concerns:

> My problem is I tend to get stressed out when everyone is blurting out things that they found and you're trying to write them down as well as trying to think about what you're going to say or contribute. So this is still so new to me. I am hoping to participate more in

a group but I don't feel as comfortable as I should. The problem about this way of learning is that there is no organization. Everything is just out there and you make your own plan. I guess that's another thing that bothers me. Organization is so important to me and when it is not there I get stressed or nervous. I like structure and since we are working with ill-structured scenario's you get my point. I don't really have time in the class to absorb what everyone is saying. I like to sit on it and take it in what people are saying and then come up with stuff. This group is somewhat a good thing. But I would have probably liked less of this group thing and more of the teacher's input because I learn by listening to the teacher more. …I mean I have nothing strongly against this, this is just my opinion. I still want to work with all of you and contribute in the group because it is somewhat interesting but new. I look forward to working with you guys more.

The value of group support. There was a strong sense of group support that was developing. For example, several group members responded to Shelly's concerns with empathy and encouragement as seen in the following comments. Danielle begins:

Hey Shelly,

I understand, but just remember this is new to all of us...your not alone. I'm also really organized and like structure so this type of learning takes some getting used to, but just because it's different doesn't mean it's bad. It's still just the beginning. I think once we start to find out more about the patient it will get easier to understand. As far as contributing to the group, I think you are doing a great job. Everyone learns different and although it seems like we all have to be doing the same thing I don't think we do. I mean do what works for you..there's 8 of us and if we all were doing things the same way we wouldn't be learning as much. Hang in there!

Devon offers her reaction, which demonstrates not only a concern for a fellow group member, but also a sense of group responsibility. "I can understand what you're saying maybe as a group we can somehow eliminate some of your worries. Maybe we can figure out a way that will better organize it." Ann replies, "I understand what Shelly is saying about the organization of the process, but contrary to her I feel like I excel when I don't have as much guidance. Hopefully soon we will be able to find a happy medium."

Mary affirms the feelings of her group members and provides encouragement: "…learning something new can be very stressful but I think we all have good heads on our shoulders and that we can continue to work together and make it through!" She then goes on to express her difficulty:

> My only problem is the recording, I know I volunteered for the job, but these past 2 weeks, especially last week, I feel like I cannot relax in class and just discuss because I'm trying to write everything down and I want to make sure I get everything. I would like to make the suggestion that maybe we can alternate weeks or classes unless someone is strongly opposed to recording…I'm just throwing it out there, maybe some of you have a couple of ideas to make me feel less stressed, I know it will all work out though."

Again, members of the group engaged in a discussion to help resolve Mary's predicament by validating feelings and offering encouragement. Danielle's posting encompassed many of thoughts shared by fellow group members:

> I understand what Mary is saying…she has a lot to offer our group and I can't imagine how hard it is to juggle participating and recording. I think we should definitely talk about this more on Tuesday and figure out what we should do. The job shouldn't

compromise anyone's learning experience so we will think of something. See you all soon!

This sense of group support was also apparent in an informal focus group. Before students left lab on Thursday, Lisa (the clinical fieldwork coordinator) came in and held an informal focus group. She began by asking the students, "what's happening to you as an individual, let's get your pulse." Students indicated they really appreciated the independence and the ability to pace their own learning. Several students used the word 'freedom' when describing the PBL process. Elaine elaborated, "we're not all doing the same thing, taking the same route, getting the same viewpoint, there is a freedom in learning this way." When Lisa asked the students, "How do you know you will end up in the right place?" many students responded by saying they were not really afraid. Mary stated, "PBL alleviated the fear of an absolute right answer." Bonnie added "This process is making me use critical thinking skills; I'm not just looking for the 'right' answer." However, not all students were focused on the journey; some indicated their anxiety about the destination. Donna's comment demonstrates this concern, "I'm waiting for the shoe to drop. I keep wondering, are we learning the right thing?" Another student explained she too was concerned about the eventual outcome; however her response showed confidence because of the facilitator's presence, "Karen's guiding us – she makes sure we have learning issues, she questions us to understand our logic and rational for doing what we are doing." A final question presented to the students was, "Do you feel it is a real group process; are you concerned that your final grade will reflect your collaborative efforts"? Marie commented, "I like working in groups, you get to share your frustrations, you are more accountable and you get the benefit of learning by hearing varying perspectives. Ann indicated she was "not really focused on the grade, I'm thinking of it as a learning process". Another student interjected, "I

actually forgot about the grade, I got caught up in the problem and stopped thinking about the grade." Students responded positively to this opportunity to process their thoughts and feelings on this new learning method. In her blackboard posting, Rae writes:

> After Lisa came in I thought more about how we are learning necessary skills that we will be using in a clinic one day, like researching the disease thoroughly, hypothesizing, and collaborating with others to come up with the best solution.

As the lab came to an end, students once again had identified learning issues that would require additional study (What information is relevant when designing an OT evaluation; How is it different than physical therapy or speech; are there different evaluations for different medical conditions?). Students indicated they would like lecture 3 to address the research they did on the medical conditions and various occupational therapy evaluation methods.

Lecture 3: Developing Skills of PBL

The lecture activity was designed to give the students an opportunity to apply the skills and knowledge they had acquired about medical conditions and their relationship to occupational therapy through their research. Students watched 'Train to End Stroke Informational Video' by the American Stroke association http://www.youtube.com/watch?v=ED7lOQ8EMAM. The video showcased several people who had sustained a CVA. The goal of these survivors was to participate in a 26.2 mile marathon. Brief narratives of the people were provided; in some instances, family members were also interviewed. It was a very powerful and moving video that challenged students to reflect on their underlying assumptions and beliefs about disability. As the video played, students were asked to consider the following:

1. What are the manifestations of the clinical condition through the signs and symptoms?
2. How did the individuals make meaning of the condition?

3. Speaking from a therapist perspective how did this activity meet the needs of the person?

Following the video, we processed these questions. Students were able to identify whether the CVA had occurred in the left or right hemisphere depending on the side of the body affected. Language difficulties displayed by some of the participants were discussed in terms of lobes of the brain affected, muscles and nerves affected. Students also noticed the affect of the individuals and how it changed when discussing different topics. They discussed the client's intrinsic motivation to obtain the goal of competing in the marathon. They connected this to the importance of considering the clients goals when designing occupational therapy interventions. Students articulated this was a great learning experience. I helped them to realize the importance of accurate observations of cues, to be cognizant that as therapist we need to have a holistic perspective of the client (not just the disease) and create opportunities for engagement in meaningful and relevant occupations that have therapeutic value. This activity helped the students more accurately assess their current level of understanding.

While students were able to apply their newly acquired knowledge, they also realized they needed to engage in more research. Following this class, they indicated they were better able to determine their learning needs and create action plans to complete their inquiry. Mary Beth speaks about this in her blackboard posting:

> I feel like things are progressing in a way that they should be. I think our group is realizing to not stress over facts that are not that vital right now in the process. I also feel like we are beginning to realize that we have to keep searching even in the information we find for answers about different possibilities. As time goes by, it is getting a little bit more frustrating because we want to just keep moving, but sometimes you have to really sit and talk about everything you know and have found out.

Lab Week 3 Becoming More Self Directed Learners

Students continued to address their outstanding learning issues during Tuesday's lab and they seemed to be becoming more self directed learners. They also generated new learning issues about the occupational therapy evaluation process.

Seeking out information. As I moved between the groups, I heard students explaining how they had enlisted the expertise of other professionals (a method encouraged in PBL). For example, Annie and Joan sought out friends and family members who are nurses. Sofia spoke to her father (a pharmacist) about medications, "My dad was able to talk to me about the medications we had researched and better explain how they address symptoms of the disease. The great news is that most of the information we found is very accurate!" Bridget informed her peers that the University's librarian (who is also an OT) recommended a book called, *The Shattered Mind.* Additionally, the librarian helped her locate interactive videos that explored different regions of the brain and showed how brain trauma can significantly impact a person's physical and cognitive abilities. My fieldnotes from this particular lab also reflect my excitement at hearing students integrate information from other courses. "I was thrilled to hear Jackie comment, 'I can't believe we are using Structure and Anatomy in Activity Analysis, it's shocking to see how all of this information is interrelated'."

Different interactions with the instructor. As I moved from group to group, I observed that students were actively participating and becoming increasingly familiar with the PBL process; they were gaining skills in working collaboratively, posing questions, developing and using effective inquiry strategies. Nevertheless, I noticed that my presence in the group often altered the dynamics. When I walked around without formally joining in on the discussions, students interacted with one another in an informal manner, often interrupting each other

unceremoniously to clarify a particular point. However, when I purposed to join in the group's conversations, the student's behavior changed. For example, after offering information or an opinion, they would immediately and consistently turn to me - not their fellow group members - as if seeking my approval. They also tended to raise their hands when I was a part of the discussion instead of responding spontaneously as they did prior to my joining the group.

Interestingly, this behavior did not occur when the students *requested* my presence. Whether they were seeking my input on a particular issue or just excited to share a hypothesis with me, their interactions with me in these instances was much more relaxed. In their reflection papers and blackboard postings, students provided some insight into these variances. Elaine's reflection paper identified the 'teacher as facilitator' role as a possible weakness with PBL:

> Although my experience with problem based learning has been a very positive one, I feel there is still a possibility for weaknesses in the process. One of these included the teacher's role as a facilitator rather than an authority figure in the classroom. I found it slightly difficult to change my view of Karen during the second semester. Even through she was changing her role in the classroom I had difficulty forgetting the fact that ultimately she would be grading me.

Donna shared this concern:

> Traditionally the teacher provides guidance and is the expert, but in PBL they act as an advisor on a more equal level. There were many times when our group could have used more guidance, and some times when we had our own plans and needed to follow them on our own. Suggestions from the teacher, though they should be considered just as another member's would, often seem to be a better answer and we would discard our original ideas. I think it would take more time and confidence in our ideas to make this

> power differential less of a problem, or this style needs to be the relationship from the beginning of the year.

Ann also commented on the difficulties of adjusting to a new learning environment. Like Elaine and Donna, she specifically mentioned the teacher/student relationship espoused in PBL. She stated:

> In a traditional class the teacher takes an authoritative role. A defining aspect of the PBL process is that the teacher takes on the role of a facilitator and is seen more as a helper rather than an instructor. One of the biggest challenges of PBL was to view the teacher as part of our group. Even at the end of the process my group could not function properly with the facilitator in the room because we were still nervous about her opinions and suggestions. I see the teacher taking the role of a facilitator as a weakness to the PBL process as well. During fieldwork and after graduation when we become professionals we need to treat our superiors with respect and recognize their authority. With PBL we do not learn that respect and we are encouraged to view the facilitator like another member of the group.

Thursday's lab of week 3 was cancelled due to inclement weather. Student blackboard postings showed that most of the PBL groups did not make special arrangements to meet outside of class or via blackboard to discuss their progress or action plan for developing the occupational therapy evaluation form. The loss of classroom time to work on designing an evaluation (which would be used to gather data when they met with their client on Thursday) may have contributed to the increased anxiety expressed by the students during lecture 4 and Tuesday's lab of week 4.

Lecture 4: Anxiety About Clinical Evaluation

I chose to use Monday's lecture time to review the Occupational Therapy Practice Framework (OTPF). As mentioned earlier, the role of the occupational therapy practitioner is well articulated in this official document; facilitation of occupational performance through client-centered, occupation based, collaborative, therapeutic interventions. Classroom discussion focused on the evaluation process. This process involves information gathering through the use of interviews, observation, and standardized and nonstandardized instruments so that areas impeding occupational functioning are identified and a treatment plan is established. As part of the Case Study Introduction phase, students were expected to design their own evaluation form, which they would then use to evaluate the client. My decision to concentrate on the evaluation process was, in part, based on blackboard postings like Claire's. She wrote:

> I didn't realize the amount of thought and research that goes into an evaluation, or that we would be compiling our own. So that makes me a little stressed out and nervous. But so far we've been very productive, and really work well together as a team. And the book is also very helpful with providing a lot of structured information.

The occupational therapy evaluation process consists of two parts; an Occupational Profile and an Assessment of Performance. To answer some of the questions on the occupational profile, occupational therapist frequently begin by conducting a medical chart review. However, not all occupational therapy clients have a medical chart. This is generally true for clients seen in non-medical settings (community, school, work). The PBL case study given to the students indicated that the client's medical chart was not available, although the students were provided with some of the client's past medical history. Students were genuinely astonished at the limited

information provided them. Some were skeptical and questioned how they could commence problem solving without knowing more about the client. Allie shared in her blackboard posting:

> What I found frustrating about lab last week was that we still don't know what is really wrong with our client. I think it would have saved us a lot of research time and would allow us to just focus on how the client's condition will affect him/her functionally if we could just get a definite answer about what is wrong with the person. However, I guess that we do have enough general information to accept the fact and work with what we have.

Bonnie shared similar feelings, "I have mixed emotions about the amount of information we've received. I think having such limited information has forced us to really dive deep into every tiny detail, but it's also frustrating to be limited to only those facts." Based on these postings, it was obvious that students did not immediately comprehend the function of an evaluation. Since they had never completed an evaluation, they needed to first engage in research to understand the purpose of an evaluation and learn what information is relevant to an evaluation. Successful completion of this task was not dependent on the students receiving more client information. The students did need to have an understanding of the client's past medical conditions in order to appreciate how the diagnoses could impact the client's current function. Some students grasped the importance of this task; nevertheless they expressed uncertainty. Crystal posts:

> I think I really like being able to learn about these medical conditions by ourselves, because we are not simply just being given a bunch of facts that we HAVE to know for a test. I like being able to research the topic and find out things about it that I find interesting. On the other hand, I did feel that it was also pretty frustrating and stressful. I

definitely don't like not knowing where all of this research is going and what exactly we are supposed to be doing.

My main objective in introducing the occupational therapy evaluation process was to ensure that students understood the importance of designing evaluations that illuminate the client's occupational history, interests, values, needs, and experiences. I hoped students would understand that while it is necessary to have a working knowledge of the client's medical conditions, it is just as important to maintain an open mind when meeting the client; an open mind enables objective assessment of the client's problems. Although I felt this objective was at least partially met, I suspected that some students had a false sense of security: they believed they were adequately prepared to meet the client. I jotted the following words in my field notes, "As I think about the students and the approaching occupational therapy evaluation, the saying 'you don't know what you don't know' nags at me." Although the students demonstrated the ability to gather relevant information for the evaluation, they still appeared to lack insight about the process. To help them recognize the gaps in their knowledge I designed a lab activity that would require them to apply what they learned. I believed this would help the students (and me) to more accurately access their knowledge acquisition (relevant to the occupational therapy evaluation process). I hoped that when students were 'in the moment' they would gain greater insight and appreciation into the skill and knowledge required to perform an occupational therapy evaluation. With a heightened awareness, they could then clarify their learning needs prior to meeting with the client on Thursday.

Lab Week 4 (Tuesday): Processing Clinical Evaluation

As students entered the lab on Tuesday, a gentleman was seated in the center of the room. The man, Brian, is an occupational therapy practitioner, with whom I previously worked. He is a

seasoned therapist with exceptional clinical skills. He also firmly believes that occupational therapists should continually question what they are doing and why they are doing it. On numerous occasions in the clinic, I observed Brian ask his fieldwork students to provide a rationale for their proposed treatment interventions. In doing so, he learned what factors the student had considered prior to deciding on a particular treatment activity. Often this exercise would enlighten the students and help them to identify possible flaws in their intended course of action. I believed my students would benefit from an exercise that not only provided them a context to apply their knowledge, but also challenged them to support their reasoning. I was curious (and slightly apprehensive) to see how the students would react to Brian. In our years working together, I had become well acquainted with Brian's deliberate approach. His very direct style of interacting could sometimes seem intimidating. While I had the advantage of knowing that Brian's hard-hitting questions stemmed from passion for the profession and unwavering commitment to providing the best client care, my students did not! I knew this would be an exceptional learning opportunity, but I still experienced conflicting emotions. On one hand, I wanted to protect the students from what I knew would be a challenging experience; on the other hand, I wanted to prepare them for the 'real world' that required quick thinking, acting, and reasoning. In this state of uncertainty, I greeted the students and explained that we had an unexpected guest joining us. We would use this opportunity to 'get to know' him by conducting an interview. I told them to think of it as a 'trial run' for their initial evaluation on Thursday. Students were given ten minutes to engage in conversation with Brian. The students immediately reacted by firing a series of questions at me: "Are we supposed to be therapist when we ask questions" "Is there a medical diagnosis we need to have before we can begin?" "Are we trying to find out if there is something wrong with him?" The students appeared panic-stricken

by this assignment. Their anxiety was not lessened when Brian interjected, “why are you ignoring me and seeking information from Karen?” He continued, “Two of the ten minutes provided to talk with me have already past!” The startled students slowly regained their composure and, without further protest, began their interaction with Brian. At the end of the ten minutes, the interview stopped and the students were asked to reflect on the experience. I encouraged them to think about why they asked the questions they did. I also asked them to consider how effective they felt their questions were at garnering information. We discussed the importance of open ended and follow up questions. The opportunity for reflection on the occupational profile seemed to aid the students understanding of the art and science of interviewing. Mary Beth remarked on her experience:

> Our ten minutes with Brian has helped us to see how we should interview a client. When Karen brought up all the missed topics, I was dumbfounded. Knowing what we did not ask will remind us what to ask on Thursday. Today’s lab was very beneficial.

Examining assumptions and reactions. One unexpected learning moment came when I asked the students to examine how they felt about Brian’s conversation style. Several students stated they found him to be intimidating, and frightening. “He expects us to give him answers when he asks questions, I just didn’t know how to think so fast, and I was afraid of being wrong.” Another student stated that she, too, felt Brian had an abrupt manner. However, when she learned that he had a military background she accepted his behavior, “that’s just the way people in the military talk.” This comment sparked a lively exchange about underlying assumptions and one’s tendency to generalize or stereotype people. Brian was present during this discussion and interjected his opinions as well. When I asked students to compare Brian’s style of interacting with that of Lisa, the fieldwork coordinator, students responded “night and day.”

"Lisa is much 'softer' in her approach. When I told the students that Lisa had also served in the military they were surprised. I urged the students to consider how their own assumptions and personal biases could unknowingly impact the way they interact with their clients.

The next learning activity required the students to analyze Brian's occupational performance. He informed the students he had difficulty putting on his belt and tucking in his shirt. He asked them what might be contributing to this problem. Some students offered it might be due to limited range of motion, others suggested muscle weakness. He countered by asking them what muscles and joints would be involved? How would they test to see if there were limitations? How would they determine the level of pain with the movement? Students took time to consider these questions, looking to resources such as the internet, books, and each other. Eventually, the students were able to identify that his limitations may be the result of a rotator cuff injury. Satisfied by the student's problem solving, Brain told them he had a partial tear in his supraspinatus. He then asked them to explain the function of this muscle and explain how it directly impacts his performance with the dressing tasks mentioned earlier. By fostering an environment of inquiry, Brian helped the students understand that information sought from the initial evaluation serves as crucial data to design meaningful treatment activities. Since many students had included a section on their evaluations that addressed muscle strength and range of motion, he suggested they demonstrate their skill at performing these tests. He also questioned them about safety precautions, and if there was any contra indications for performing these test. He challenged them to consider how cognitive deficits may impact the client's ability to participate in these test.

Seeking more information, and processing learning. Students spent the next hour seeking information to the many learning issues raised in the course of their interaction with Brian. They

also experimented with the goniometer (a tool to measure range of motion) and practiced manual muscle testing on Brian. From my perspective, I observed students engaged in solution seeking strategies, identifying learning issues, seeking out reliable resources to answer their questions, and integrating and analyzing the information in light of it relevance to designing an occupational therapy evaluation. Later, blackboard postings following lab revealed my initial fears surrounding the intensity of this learning experience had not been unfounded. Several students were obviously taken aback. This is evident in the conversation between Lola, Joan, and Allie. It is noteworthy to point out that this conversation took place less than a half hour after the student's lab session had ended. Lola expresses her fear at the challenges raised by this lab experience. In her posting, she questions her ability to think and act with competence:

> Okay, so I just feel really stressed by today's class, not only for the case study but for becoming an OT in general. I felt like I was expected to know things that I don't know or that I just can't make the connections. It makes me wonder if I am going to be a good OT or if I am going to be prepared at all when the time comes to go out into the clinic. Does anyone else feel that way or am I the only one who feels lost and like they are going to be an awful OT?:\ In regards to the evaluation on Thursday, we are evaluating our supposed client from the case study and not just some random person, right? (Karen, which is it?) Because I thought it was the case study client but then I talked to Joan after class and I was confused as to which it is, being that the last medical report we saw said the client is in the ICU so how can they even respond to an interview? Doing the question and answer thing with Brian definitely did help and makes me feel a little more prepared, but I just feel so crunched for time and a little lost because we are meeting with our client in 2 days….comments please?!

Joan was the first to respond to Lola's posting. She replies:

> Lola, I agree with a lot of what you said. I got the impression as most of us left today that we were all feeling overwhelmed. I am extremely worried about this and feel very rushed. I do feel more comfortable with the occupational profile after today's class. I feel like that part won't be that bad. But the part with analyzing occupational performance…I'm worried. I know we read chapters in our book about the different tests; however we haven't spent a lot of time on any of that, except maybe for today, so I feel totally unprepared. I just feel rushed and unprepared, I feel like I should know a lot more than I do right now. Who is this client we are evaluating? I know this is PBL, I just wish we had more insight on what exactly we're doing in class. It's frustrating. I'm sure we'll all be able to come together and get it done! It's just that this process is starting to get extremely annoying. I know we are supposed to conduct our learning on our own, but I feel like I'm losing so much time, and I could be learning other things that I definitely will have to know as an OT. I don't know…we'll see what happens. Hope you guys are hanging in ☺

Allie echoed the apprehension of Joan and Lola. Her posting expresses concern over her perceived lack of professional identity and competence:

> Add me to the list of people who felt stressed out and overwhelmed by today's class. Looking back on my time so far at Scranton and considering how much I still have to learn in the few years I have left I question whether I will be able to pull everything together before I graduate. Right now I feel that my understanding of everything an OT has to do and know in order to safely and effectively treat a patient is very vague. It seems weird that after almost 2 years of not knowing more than a few definitions of what

> an evaluation is and what its parts are that we are expected to make our own complete one in 2 days. I'm also confused as to who we are actually going to be evaluating on Thursday. The last information we got from the medical chart on him/her says he/she is comatose. While a comatose person could be evaluated, making up an occupational profile to use on the patient would not be useful for us. Therefore, it seems that this information must either be old and the patient has progressed since then or we will be evaluating another pt entirely. That said, I do agree that today's class was very helpful and I learned a lot about how to do the occupational profile and what kinds of questions need to be asked. I looked up some more info about evaluations used on stroke patients. This website has some good sources which may be helpful for the analysis of occupational performance: http:www.strokecenter.org/trials/scales/. I looked at the NIH stroke scale which was helpful because it explained some of the common symptoms that stroke patients have and how to test for them. For example, it gives a brief description of how to test for and rate conditions such as dysarthria or aphasia.

Providing instructor support. I was not entirely surprised to hear the students expressing feelings of stress, frustration, and insecurity. I had hoped that this lab experience would make them re-examine their readiness to undertake their first evaluation. I felt it was important to acknowledge and validate the students' feelings while at the same time offer encouragement given their progress thus far. My posting read as follows:

> I hear your stress coming through loud and clear. Try to remember that stress is not always a bad thing. Stress (not distress) can be a great forward motivator, one that causes us to learn and grow. Step outside the tension of this moment and realize many, many students have gone through this program ahead of you and have successfully passed their

boards and are now enjoying rewarding careers. Now look backwards for a moment; did you ever imagine two years ago that you would make it through a lab like todays? You did a fantastic job today! True, you realized how far you have to go, but you also have to have seen that you know A LOT! What Allie is doing is a great example of deductive reasoning – she is taking information and drawing reasonable conclusions about the client, who by the way is not a random person! I agree 2 days is not a lot of time to create an evaluation from scratch. But are you really starting from scratch? Take what you have learned already about the Dx's, about the Practice Framework and conclusions such as Allie's. You're right that you are already off to a strong start in regard to the occupational profile. This is really key! Talking to the person and getting to know who they are is half of the battle. The goal is not to go in with all the answers but to go in with reasonable questions. The answers to these good questions will guide you to an appropriate intervention. One more thing, with the exception of a recent slight dip in your productivity levels between Thursday and Tuesday you are exactly where you should be in this PBL process. BRAVO!!!

I also included an attachment to the above posting, an e-Hallmark card that was humorous and encouraging. I hoped it would provide momentary relief to the students' tension. Several students expressed (through their blackboard posting) appreciation for my effort to empathize with their situation. They indicated it made them laugh and underscored my belief in them. While nearly the entire class agreed that 'intimidating' was an accurate adjective to describe their encounter with Brian, several students also included additional descriptors such as thought provoking, stimulating, inspiring and invaluable. A few examples serve to illustrate this.

Devon writes:

> I thought it was a great class. I'll admit I was definitely overwhelmed by him, and he scared me almost to the point that I was afraid to say an answer. However, I honestly feel that it was one of the best classes we ever had. Yes, he put us on the spot but now that I look back on it, I'm glad he did that and I wish more teachers would do that. In our field we are going to be put on the spot and we need to learn how to handle it in an appropriate manner. I felt like we learned more in that one class than what we would normally learn in an entire year in any other class. I really hope to see him again. As for our impending evaluation with Evelyn, I am freaking out about it, as is half the class. Again, I think it is just because we are going to be put on the spot again and in those situations we have to learn to take the knowledge we know and get through it.

Rachel indicated that the experience with Brian helped her to identify some of her own learning needs, "Tuesday's lab was nerve-racking. I realized that I personally really need to work on my anatomy and remembering all that we learned in that course; this lab really highlighted the need to know and apply concepts. It helped me to realize knowledge is not disposable."

One student talked about Brian's dedication to the profession and shared how inspired she was to become an OT after hearing stories about Brian's interactions with his clients. She writes:

> I think Brian helped a lot. He taught me some things I should be aware of when I go into the clinic, which was very helpful. I think when he said he talked to a person in the bathroom, (while the two collaborated on finding a way to help her perform her own peri-care) that showed how caring he actually is. I mean who would want to sit in the bathroom? If someone has that kind of heart to help someone I don't think it would matter the condition your in. As long as at the end of the day that person had more

> meaning in themselves as a human being than that would be enough reward for me. Helping someone shouldn't be what you get out of it; it should be the smile that comes back from that individual that you helped that makes you feel good. I like how personal Brian got, because I feel like I know him or can relate better with him. Tuesday's lab was really good. And hey come on, I hope that Brian's winging of the scapula: didn't get you too grossed out…

Students easing the stress of evaluation. I closely monitored the PBL groups (via blackboard) between Tuesday and Thursday. I required all groups to electronically submit their evaluation forms to me for feedback prior to Thursday's lab session. Student blackboard postings showed group members were collaborating, giving feedback and articulating and synthesizing the evaluation information during this period. The following discussion between Bonnie and Claire conducted via blackboard provides some insight into the thoughts and feelings they experienced in completing the evaluation form:

> We just finished working on our evaluation and I feel a little overwhelmed. I think the object of this is to test our clinical reasoning, and because I have no significant experience in the clinic I feel really insecure about my competence. When we were working on it, all of our minds were racing with different things we might potentially be responsible for knowing, and I think we were all a little overwhelmed at the prospect of talking to an actual patient. I think this will be an amazing learning opportunity, but I'm still very intimidated by it. I'm really impressed with all of the ideas everyone is coming up with. I think everyone in the group brings a lot to the table. I'm sure we'll be fine and I'm really curious to see how it goes on Thursday. What does everyone else think?

Claire responded:

> I definitely agree Bonnie. After class today I was so overwhelmed. But it was a true learning experience. Our meeting tonight calmed some of my nerves by helping me realize that we're capable of more than we think. After the process we went through in class, I found myself utilizing more clinical reasoning, and questions flowed more naturally to me. It also showed how well we work together as a team. Even though we were all so apprehensive, we took it one step at a time. We were able to kind of branch off of each others' ideas and questions to come up with some very relevant questions. Keep up the good work!

Donna shares her misgivings about the evaluation form, indicating her group neglected to include some potentially important information. She writes:

> I am reviewing the performance analysis section of evaluation and I have a few questions. I think we should included a lower extremity (LE) dressing section (just in case there is some impairment in that area), I am thinking we can just ask the patient to put on their shoes or show how they would do that. I just don't want us to be unprepared if impairment arise here. I also was wondering how you wanted to do the writing analysis. Do you want to have it tie in some other skills? Reading and coping a sentence. Grabbing the pen from my hand (to show dysmetria). I will put these sections in for now, but if you think it is too much to look at let me know.

In responding to Donna's posting, Claire adds a new thread of thought into the conversation; she raises the issue of professional attire. She states, "That sounds like a good plan Donna. I'm reading over that section now…but just one thing; what do you guys think about dressing up a little for tomorrow? Just like khakis and a sweater or something?" Elaine responds "I agree with

you Claire, I like the idea of dressing up a little. I don't have khakis; I only have black pants so that's what I'm going to wear." Lauren also weighs in on the debate:

> About what we are wearing…I agree we should wear something whether khakis/black pants…as long as we don't look like we rolled out of bed in our sweats. There are so many details to think about!"

The Case Study Introduction phase ended just prior to the students meeting with the client on Thursday. The following section of this paper will present the key findings that emerged during this timeframe. The findings from the Case Study Introduction phase came from the student's blackboard postings, classroom participation and observations, the student designed evaluation forms and my field notes.

Key Findings Phase Two: Case Study Introduction

The case study introduction phase was initiated when the occupational therapy students received information about the client's past medical history; CVA, aneurysm, and B phlebitis. At this time they were informed that they would be carrying out an evaluation on the client in the upcoming weeks. Three main themes surfaced from this second phase of the study (case study introduction). The themes are organized as follows: swimming upstream but with the shore in sight, emerging interdependence with group learning, and emerging connections to clinical reasoning. These findings will be elaborated on in the following sections.

Swimming Upstream But With The Shore In Sight

Students are recognizing and respecting the complex thinking process required in a PBL environment, but quick to point out it isn't necessarily an easy or comfortable process. Their comments and blackboard postings reflect an implicit understanding that the student-driven learning (so highly valued in PBL) goes against the *current* of the traditional teacher-centered learning (privileged in many educational settings). Students concede that *going with the flow* (traditional learning) is less frustrating, time consuming and less arduous that PBL which one student characterized as "*swimming upstream."* Nevertheless, they are voicing that the rigor involved with PBL is resulting in an infinitely more rewarding learning experience. Students see where they want to be, and even though they are caught up in the struggle of swimming upstream, they don't feel as if they are drowning. For example, Ann provides a salient example of this when she shares "It's a little frustrating researching topics and trying to find answers to questions I don't even know, yet when I feel like I'm on the right track I get so much more excited because I feel like I got to that point on my own." Similarly; BB echoes this sentiment

and believes the increased responsibility for her learning is contributing to skill development that will serve her well in her chosen vocation:

> I think the point Shelly made about balancing this learning opportunity and the 18 credits is a very good one. We have so much to focus upon and then we also have the pressure to be responsible for our learning, In this way this learning method can be a difficult one. Still, looking at this difficulty, it just points more to the benefits of learning this way since it is such a real approach. I'm glad that we are having this experience and increasing our real life skills.

Likewise, Marcy conveys a similar perspective but using a different analogy – that of "No pain, No gain" – when talking in class about the PBL process:

> Having to discover information for ourselves is like an athlete building muscle – there has to be some resistance. If someone else is doing the lifting, the athlete is not reaping the rewards. Seeking our own solutions to the problem, by gathering the facts, critiquing the sources and making sense of the information, is contributing to making us think on a higher level. It's hard work that pays high dividends!

Scarlett succinctly expresses the feelings of many of the students when she states in her blackboard posting:

> So far the process of PBL has been successful in making me think and hypothesize to problem solve. Every time I think I find an answer I realize there is more to complete the answer. Researching makes me aware of new things to research and new questions to think about. It's not as easy as just getting the 'right' answer from the teacher – but it's infinitely more rewarding.

Overall, the students are voicing that learning under PBL can be a rigors process because it puts the onus for learning on the students. Although this evoked both positive and negative reactions, students ultimately believed their efforts would result in them becoming more effective thinkers. A second theme emerged from this phase. This theme describes the participant's views on the collaborative learning associated with a PBL approach.

Emerging Interdependence within Learning Groups

There is a growing sense of interdependence of learning within groups. Students continue to demonstrate a positive attitude towards the group process. Students are (with increased frequency) referring to themselves as a team. This is seen in their excitement about their fellow group members and in the development of friendships, sharing different perspectives, having fun with each other and thinking of PBL as a game. Postings pertaining to group work are less superficial and a deeper level of awareness and understanding of the interdependence of learning is emerging. For example, one group nicknamed themselves Team Casey (a fictitious name they gave to their [as yet] unknown client). Tiffany shares:

> Hi girls! I just wanted to say great job today. I think we are really working well together and coming up with some very interesting ideas about Casey. I am enjoying brainstorming with all of you. I think some of our ideas were a little out there, but overall we made good progress. From today's class we have already seen other trains of thoughts and our research helped us understand possible connections between the 3 diagnosis. I think learning more about the lobes of the brain and hypertension will really help us. Go Team Casey!

Lauren and Angela (both from different PBL groups) also use the term 'team' when posting to their respective group members. Lauren writes, "I felt like I was on a team more than in a group project today." Angela shares:

> I think we have been doing an awesome job as a team. This past week has been just as interesting, if not more, than last week. I am really starting to warm up to this process. I think the scenario we are working with is really thought provoking. We have been really working well together, and we have all found a lot of information. It is nice to be able to talk as a group about what we have found because that leads to more answers and sometimes more questions not previously thought of. I am intrigued and curious to see what additional information, if any; we will be receiving and how that will affect our research and our hypothesis. Good job team!

Students indicate that group discussion stimulates their thinking process and creates a fun, learning atmosphere. In one of the groups, I noticed the students often turned their learning into a game, especially when they felt stressed. We came to term their proclivity for turning work into play, the "Mary Poppins' Phenomenon." It started with one student asking me if I had noticed her recent blackboard posting regarding unfamiliar medical terminology. It read, "this week was really stressful, maybe that will mean extra desserts for us." I jokingly remarked to her, "So a spoonful of sugar helps the *medical terms* go down?" (relating her comment to the lyrics from Mary Poppins). This encouraged us to look a little closer at the lyrics. The first verse reads "In every job that must be done there is an element of fun, you find the fun and snap, the jobs a game!" Many of the PBL groups' posting showed that as the students were thinking their way through the issues, they often described it in terms associated with games and engaging in fun. A few examples from student blackboard postings serve to illustrate this

point: “piecing a puzzle together”, “playing detective”, “searching for clues”, and “solving a mystery.” Lauren spoke to this point and states:

> If we just discussed the symptoms of a stroke in class, I would not retain it as much as researching it. As a group, I think we are all contributing and working well together. Knowing I have to discuss my research with the group definitely makes me not put it off. Even though it is only the first week, I honestly feel more confident about my critical thinking skills! Like Claire, I like the limited information! It kind of reminds me of playing detective. We work together to make sense of the information we have and then go out an search for more clues that will help us solve the case.

Erica and Jackie specifically use the word fun to describe their group accomplishments:

> Never have I had so much fun working with a group while still accomplishing so much. I love how we bounce ideas off each other and are really running with PBL. Everyone is contributing so much, and I have really learned so much about hypothesizing.

Similarly, Jackie (a member of the PBL group that gave a factitious name to their patient) writes:

> The researching could get a bit frustrating at times but I love just discussing and making hypotheses about the patient, that is what I find the most fun. I also like sharing real life stories; I think it helps sometimes to put a face or a story to a patient not just researching facts.

These postings resulted in our “Mary Poppins phenomenon.” Reinsmith (1997), stated: “For authentic learning to happen time should occasionally be wasted, tangents pursued, side-shoots followed up…Teachers who structure too tightly where they think the learner's mind should go may be involved in conditioning, rather than learning”

(http://www.ntlf.com/html/pi/9708/reinsmith2.htm). The students, assuring me they take their learning seriously, urged me to hear their thoughts on the second verse:

A robin feathering his nest
Has very little time to rest
While gathering his
Bits of twine and twig

Though quite intent in his pursuit
He has a merry tune to toot
He knows a song
Will move the job along

They used this stanza to support their feelings that PBL is a time intensive endeavor (as it requires researching, analyzing and integrating information); This intentional undertaking of building and constructing knowledge (while fun) requires not only dedication to their own learning but responsibility to the whole group. Student postings showed they recognized and accepted this responsibility and showed a commitment to helping one another. Sofia's posting explains her understanding that in a PBL environment she is responsible for her group members learning, as well as her own. She writes:

> Hey ladies! I hope you all made some progress familiarizing yourselves with the foreign terms found in the case study. I actually went home this weekend and I had an Advance for OT's magazine waiting for me because I get it delivered to my house and guess what?! There is an interesting article on rehab after a stroke as well as working with aphasic patients. I plan on reading these articles tonight, highlighting key information and sharing them with you tomorrow in lab. See you all then!

Ann, and Annie (both from different PBL groups) post comments indicating that collaborative work encourages new ways of thinking and constructing knowledge. For example, Ann makes a brief comment about the value of pooling knowledge and experience. She states,

"There's no way I would have thought of a lot of the ideas you guys did." Similarly, Annie writes:

> I think running into the problems we did while making the evaluation actually helped us to see that we can do this and we can overcome our problems when we work together. This evaluation is really something that belongs to all of us because we all put our own thoughts and ideas into it. I'm so glad we work well together.

Summarily, the students integrated an element of fun into the PBL process to make their learning more enjoyable. Overall, the students are voicing that the active exchange of ideas occurring within their groups is motivating them to learn, promoting critical thinking skills, and contributing to group cohesiveness. Several students indicated that this type of learning helps them to retain the information better. The next and final finding to be discussed in this phase is emerging connections to clinical reasoning.

Emerging Connections to Clinical Reasoning

Students are beginning to think in ways that make for a more effective clinical practice. Some students explicitly stated how they used clinical reasoning to design and evaluate their evaluations. For example, students were discussing the information they planned to include on their evaluation. I asked them why they had chosen to incorporate a section on UE range of motion (ROM), muscle tone and muscle testing. Although not verbatim, my field notes show Kendall responded to my inquiry by offering the following:

> People who sustain a CVA often have physical deficits such as increased or decreased muscle tone, decreased muscle strength due to altered innervations and muscle atrophy, and limited range of motion possibly due to a shoulder subluxation. If this is true for our client, we need to have an initial baseline of function so if we end up addressing the

> deficit we can measure whether our treatment intervention is effective. After providing this rationale, she smiled broadly and said, Can you tell we have been engaging in procedural reasoning?

Marcy's posting does not identify a specific type of clinical reasoning like Kendall; however, she talks about how she and her group members will need to use their clinical reasoning skills when evaluating the client. She writes:

> Last night we worked on our evaluation, and ohhhh man was it interesting! I think we all got really stressed in the beginning, because we're not used to being thrown into situations not knowing what to expect. I think it will be good for us though, and it will really help with our clinical reasoning. Once we realized a lot of it would be to test our clinical reasoning, we calmed down a little, because you cannot really prepare fully for that. We compiled a great list of questions, and made sure not to make the same mistakes with them that we made in lab yesterday.

Donna agrees that the evaluation experience will test their clinical reasoning and writes, "I think we will be ok if we are good at thinking on our feet."

Students are getting a better sense of what is involved with the evaluation process. Although not entirely confident in their practice skills and techniques (including clinical reasoning) students understand the importance of the evaluation process. As one student stated, "without accurate information about the client's functional status, values, interests, and goals we won't know how to provide appropriate treatment."

The next section will look at how students responded to the PBL experience and PBL's relationship to the development of clinical reasoning during the third phase of the study. This phase is referred to as Meeting the Client.

Phase Three: Meeting the Client

Meeting the client phase required the PBL student groups to conduct an evaluation, design and implement meaningful treatment interventions, document services provided, and identify and evaluate outcomes. Each of the 5 PBL groups met individually with the same client during their scheduled time periods. The following section describes the student's PBL lecture and lab experiences during the Meeting the Client phase. This third phase encompassed lecture 5, 6, and 7 and Lab Week 4 (Thursday), 5, 6 and 7.

Lab Week 4 (Thursday) Mixed Emotions

On the morning the students were scheduled to meet the client for the first time and to complete the evaluation, I stopped by their lab (downstairs from the waiting client) to briefly check in with them. The first PBL group scheduled to meet the client was already in the lab. Their reactions, demeanor, and verbalizations on that morning were particularly noteworthy. While I fully expected they might be somewhat apprehensive about their first encounter with a 'real' client, I was surprised by the intensity, frankness and raw emotion displayed in their words and body language. Instead of the cordial welcome to which I was accustomed, I was met with a stony (and for me, disconcerting) silence. One student shot a menacing glance my way, before stating, "Karen, I am so mad at you right now I can't even look at you." Taken aback by her remark, I asked what she meant. Her response indicated that she did not realize she would be meeting with a client. Furthermore, she stated that she felt flustered and unqualified to conduct the evaluation. Another student added, "I don't think we realized we were actually meeting the 'real' client, we're not prepared." Still another student interjected, "I just don't know if we're ready, maybe if we had more time. Could we do it next week instead?" Perplexed by their reaction, I tried to surmise whether the students were experiencing a case of last minute nerves,

or if they truly had misunderstood the expectations of today's lab. My field notes reflect this incident and my subsequent reaction:

> I was perplexed by the students' vitriolic emotions. On the one hand, I was glad they felt they could openly express their feelings to me (although they bordered on doing so in a disrespectful manner). On the other hand I was dismayed: perhaps I hadn't really communicated the day's expectations clearly. Or maybe the students didn't quite grasp what they should have done in order to be prepared for the evaluation. I realized it was critically important in that moment that I validate the students' feelings. I did so by acknowledging their apprehension and reiterating that meeting a client and completing an evaluation for the first time is a tremendous undertaking. Since I also recognized a need to move the students forward past this emotional crisis, I next brought them back to the concrete reality of our situation: the client was upstairs waiting for us to conduct an evaluation. We needed to regain our composure, go and meet with our client, and complete our evaluation. I reminded them that I would be with them the entire time. I also reminded them that I am a licensed occupational therapist and I would not let them do anything to jeopardize the client's safety or well-being. I assured the students that I had complete confidence in their ability to engage the client in productive dialogue and collect data that would guide them in designing a meaningful intervention. On this concluding note, the students and I preceded upstairs to meet with our client.

The students in that first lab went on to complete the client evaluation without further crisis (see details below). Thankfully, none of the subsequent PBL groups presented with the extreme emotion, confusion, and insecurity (or perhaps fear) demonstrated by that first lab. On the contrary, the other four groups came in at their scheduled time slot eager and excited to

finally meet their ‘mysterious’ client. While the crisis was short lived and positively resolved, it reveals important information about the student’s progress through the PBL process. The students lashing out at me with powerful emotions, while disturbing, demonstrated that they considered me as something other than the expert, authority figure. In that moment, we were on equal footing. The students were fearful and angry and had no qualms about showing it. Moments later, however, they were able to rally and regain composure *only* when I reassured them of continued guidance and supervision. In a sense, they required me to step once again into the role with which they were most familiar, that of their leader, teacher and expert.

Carrying Out The Evaluation. As mentioned earlier the occupational therapy evaluation process consists of two parts; the Occupational Profile and The Analysis of Performance. Each PBL group was given 30 minutes to meet with the client to complete the occupational profile and 30 minutes to complete the analysis of performance. In the labs with two PBL groups, each group met individually with the client for the occupational profile. However, during the analysis of performance both groups were present and shared the allocated 30 minutes. I deliberately set aside the last twenty minutes of lab time to allow the student to practice specific techniques with the client and to practice grading the client’s level of function using a specific measurement tool the students had inquired about. The occupational therapy evaluation took place in the Activity of Daily Living (ADL) lab. This lab room is actually a furnished apartment with a kitchen, dining room/living room combination, bedroom, bathroom, and laundry area. All of the appliances (stove, refrigerator, washer, dryer, etc.) are fully functional. The client (Evelyn) was seated at the head of the dining room table when the students entered the lab. They exchanged warm welcomes as they entered the room then joined the client at the table to begin the interview. Due to space limitations, I did not join the students around the table. For each of the 5

interviews, I sat off to the left of the table on a living room chair not far from the client. Some of the PBL groups had designated specific people to ask all of the interview questions to Evelyn, other groups gave every member an opportunity to pose questions. The groups showed varying degrees of interviewing skills. In my field notes I comment on one such skill:

> When the client was asked by each of the PBL groups how old she was, she responded "I'm not going to tell you my age. Do I look old? I can tell you I'm not a teenager." Some of the groups were shaken by her answer and quickly moved on to another question. These groups did not try to obtain this information again. Other groups were (or at least appeared) unshaken by the client's unexpected response and found a way to rephrase their question and pursue the same line of inquiry later in the interview. For example, one group attempted to get the information by asking Evelyn what year she was born. Without hesitation, Evelyn responded, 1965. In doing so, she provided them with the sought after information. Another PBL group attempted to do the same thing during their interview. However, they were not as fortunate. When they rephrased their original question and asked Evelyn for her date of birth, Evelyn only provided them with the month and date, not the year.
>
> Undaunted by their second futile attempt to garner the information, this group tried again. This time they asked Evelyn when she had sustained her stroke. Evelyn told them in 1993 at 29 years of age. A triumphant look of success came over the students' as they immediately realized they could determine Evelyn's current age with this newly acquired information!

Student blackboard postings showed the students had also identified perceived strengths and weaknesses with their interviewing skills. For example, Angela writes:

> There were some questions that we could have asked that we missed or that we didn't have time for. We had a good game plan but getting off track or just going with the flow of the conversation during the evaluation is natural and can work for or against you (in this case it worked against us at some points). I think this evaluation showed us our strengths and weaknesses individually and as a group.

Ann offers her critique:

> Although for our first time I feel we did an excellent job today, even considering we were so nervous, I still feel like we could have done better…To be specific, there were times when I would ask a question, and then while she was answering realize I didn't need to ask that question because I could have seen it with my own eyes (coordination). And there were other times I felt there were questions that although important weren't necessary at the initial eval.

Elena reflects on the experience as well. She posts:

> If we were to do this morning over, the only thing I would suggest is that we didn't break up the entire occupational profile like we did. I felt that I was kind of silent because I was just observing cognition levels and waiting for a free moment to ask a question. Also, I agree with Jen that I barely even used the eval sheet. I feel as though if you just have a conversation with your patient you can find out SO MUCH information. I guess this is what all the books mean with the importance of establishing a good rapport with your patients. I also think that without using such rudimentary questions like: what is your name? What is your age? We can find out and talk so much easier with our clients.

The information the therapist collects from the client interview helps determine what specific occupations or activities need to be further analyzed. The analysis of performance

section of the evaluation is where actual performance of an activity occurs. When a client's occupational performance is analyzed, the therapist considers a number of interrelated factors (performance skills, performance patterns, context, activity demands, and client factors). Some of the PBL groups had considered in advance activities to do for the analysis of performance. They did so based on their scientific knowledge and evidence about the various diagnostic conditions. However, due to discoveries made during the interview process, some of the groups changed from their original idea and had the client perform a different activity. For example, one group had planned on having Evelyn do a lower extremity dressing activity (i.e. putting on her shoes); however during the course of the interview, Evelyn pulled out her long handled shoe-horn and told the students that she occasionally uses this piece of equipment to help put on her sneakers. The students in this group came to me immediately following the occupational profile and said they would now prefer to assess Evelyn's cognitive status through the use of a kitchen task. They provided the following rationale for the assessment change "during the interview, there were a couple of times where Evelyn started to do something, or wanted to tell us something and would get sidetracked and forget about it." They explained that they wanted to see if this behavior was evident when the Evelyn was engaged in a functional task that required her to follow multiple step directions.

Once each group had completed their analysis of performance, we engaged in an exercise that gave students an opportunity to familiarize themselves with an assessment tool they had discovered through their research. The Functional Independence Measure (FIM) is a widely used assessment tool in stroke rehabilitation to evaluate disability and burden of care following rehabilitation The FIM is an 18-item measure which evaluates functional activities such as dressing, transferring and social interaction. Evelyn performed UE dressing, LE dressing, and

bed/bath/toilet transfers. Students had an opportunity to see how Evelyn performed each task, and determine a functional level. Once all the items were scored, the students checked their inter-rater reliability. Students found this additional opportunity to observe Evelyn engaged in functional tasks to be extremely educational. Ann states:

> I found myself really interested in learning how people with physical disabilities adapt to household and personal chores. I know we learned about it from books and lecture, but to see Evelyn get dressed and make cereal was different. I was particularly astonished at how easily she could do things."

Thursday's lab time ended with a reminder to the students that Evelyn would be back in one week. At this time each PBL group would be expected to implement a 45 minute treatment intervention based on the information they gathered and analyzed from their respective OT evaluations.

Relishing The Experience. The demands related to meeting the client created feelings of uncertainty, frustration, and nervous anticipation. However, once the students experienced this therapeutic interaction, their self confidence was restored. Blackboard postings were filled with accolades to one another on their group's performance. For example, Elena posts, "I know we all said this but we did do a really great job this morning. Yes, we were all a little stressed but we came through and we were awesome. It was a great learning experience." Bonnie writes, "Great job everyone! I was really happy with how our interview went, and I thought everyone took a genuine interest in Evelyn: the individual, not just the client/patient. Ann further adds:

> I'm really glad that our first evaluation related to our PBL study went so well. It actually surprised me at how much we have learned this semester. That sounded rude, but to

> explain myself, I knew that we learned a lot this semester but I was just surprised that we processed that information and used it so well today!

Of special interest, was the dramatic difference seen in the responses of the PBL group, who initially expressed serious misgivings about participating in the evaluation process. One member discusses her perceived and discovered capacities following her meeting with the client. She writes:

> I think our evaluation went surprisingly well. As you all know I had my doubts this morning, sorry. I know that we are a great group who work really well together but I just felt so caught off guard and definitely incompetent. We have been told so many times not to do something we don't know how to do and I was so nervous and uneasy about assessing Evelyn because I have never done it before. I didn't want to hurt or offend her. Once we met Evelyn I instantly felt much better. She was such an inviting person and I felt pretty comfortable asking her questions. She was a great first evaluation for us. She offered a lot of information without us even asking. I thought it was interesting that I barely looked at the evaluation we prepared. I noticed myself asking more follow up questions and things I was interested in knowing then trying to fill in the eval. I don't know if this was a good thing or not, but I think we learned enough to go further. I do however feel I have a weakness in note taking. I couldn't keep up and towards the end I gave up because I felt it was more important to observe everything than keep writing and miss something important. I think once I learn how to abbreviate and short had this will get easier. Overall I think we were very professional and friendly. I really enjoyed evaluating Evelyn. She's such a positive person. I loved her sense of humor and outlook on life. I can't wait to continue working with her!

BB adds:

> I'm so proud of our group for coming together and doing a great job on our first evaluation as scared and as unprepared that we *thought* we were. And Danielle, I want to say that I am glad that you were able to speak up and let our fears known to Karen, b/c we all know that we were all feeling the same way…Great work guys, and thank you Karen for your support. You have been a great encourager throughout all of this =) and your patience is also great too.

Students who had previously voiced doubts about their ability to become competent OT's, shared how the evaluation experience helped to restore their confidence and reaffirmed that they had made the right career choice. Danielle states, "The success of the evaluation restored my confidence in my abilities as a therapist." Claire states, "So I don't know about you guys, but I feel so relieved after getting that evaluation done. I really enjoyed talking with Evelyn and I almost felt like a real OT!" Similarly, Lauren posts:

> Wow, that was not as bad as I thought! It was so great to finally meet our patient; she was so nice! Although it was only our first evaluation, I kinda felt like more of an OT student, I am more passionate then ever about our chosen profession.

Students also discussed their unexpected and surprisingly emotional reaction to the client. Shelly posts:

> Evelyn was great! She made me see things in my life that I take advantage of and shouldn't. She made me open my eyes more to the bigger picture of life. Just seeing her made me think about all the other people out there with this exact problem and how they are coping with the situation. Evelyn on the outside seemed so vibrant and loving, but we do not really know what is going on inside. Other people may not be as positive as her.

Allie shares similar sentiments. She writes, "I also agree that Evelyn is a very courageous woman who has come far to overcome many things to live with the level of independence that she does today."

Jackie aptly sums up the feelings of many of the students when she states in her blackboard posting:

> Meeting Evelyn made all of the frustrations of research, understanding terms, unanswered questions, well worth it. Putting a face on these confusing medical terms makes it almost a different world. Now I realized hey, we are helping this person, making her life better. Meeting the actual patient gave me so much motivation to do better and really find ways to help her…I wish we could have had two hours with Evelyn rather then just thirty minutes. I felt I learned so much in those thirty minutes. I am so grateful that we had this opportunity, thank you Karen!

Students engaged in continuous dialogue throughout the weekend (via blackboard, scheduled group meetings outside of class and chat rooms). They shared their observations and made inquires about Evelyn's actions so that her performance problems became more intelligible to them. The following discussion between Claire and Donna provides an example of this sense-making dialogue. Their conversation focuses on Evelyn's physical and cognitive impairments. Claire begins by stating:

> The first thing I noticed was that only Evelyn's left arm was on the table, so I thought maybe she had right side neglect. However, when she showed us the exercises with the ball, it was clear that she still isn't fully functioning in her right UE. This surprised me considering how long ago her stroke was. Because her fist was clenched, it seemed like her muscles might be spastic. But watching her dress, her right arm was much more

flaccid, and I noticed that she dragged her right foot a bit when she walked. However, because she could actively move her right leg, it clearly isn't flaccid. So I wonder if she was initially flaccid as a result of her stroke, but is slowly compensating for that? Also like we talked about today, it seemed like she suffered a stroke on the left side of her brain. Because her speech was somewhat slurred and she had some difficulty with word retrieval it was probably her frontal lobe that was more affected. I also noticed that when we were in the bathroom and Evelyn said something about washing her hands, she couldn't really answer when Karen asked her what she had said. This showed possible trouble with memory, maybe from the temporal lobe being affected? What do you guys think?

Donna responds and offers her interpretation:

I also noticed how she dealt with her right arm. It wasn't neglect because she continued to touch it and reposition it with her left arm. I saw her reach down and lift her right leg up to cross it while we were sitting at the table and then when she was putting on the pants. She has function in it but I think there is some weakness. The way she moved to do this though shows that her balance is pretty good. She doesn't need to have both feet on the ground to feel stable. Along with not being able to tell Karen what she had said about washing her hands. She was having difficulty explaining how she gets in the shower. She has a walk in shower at home and does not have to step over the side of the tub. But she continued to say that she could and that she needed a shower chair. Either she didn't understand the instructions or did not recognize that she couldn't lift her leg over the edge (that it was different from her home setting). In the kitchen activity she didn't complete the activity. She was asked to set 2 places for dinner, but she set one place

(without silverware) and talked about breakfast. Once again this could be an oversight, or she may have some memory problems.

Many other postings attest to the students' eagerness in generating treatment interventions for Evelyn. I was impressed with some of the groups' originality and creativity. However, I was concerned that students were not questioning the soundness or necessity of their treatment ideas in light of the Evelyn's needs. In my field notes I wrote "Coming up with an activity that incorporates Evelyn's interest seems to be of primary concern to the students. While this is an important element of any intervention design, it should never be the sole reason." My interaction with the PBL groups (via blackboard) became more frequent during this period. As I 'observed' the students thinking process I posed key questions to challenge their clinical reasoning and deepen their inquiry. For example, students were hypothesizing about why Evelyn was unable to complete a task (difficulties with attention, organization, and sequencing, hemiplegia). I asked them to consider how their understanding of the neurological basis of impairment supports their hypotheses. When students started to brainstorm treatment interventions designed to improve cognition or regain movement in the right upper extremity, I asked them what factors contribute to recovery of clients with neurological dysfunction. I also suggested the students use the OTPF to guide their thinking processes.

Lecture 5: Documentation

The topic of lecture 5 was documentation. Documentation is an essential part of the occupational therapy process. While researching information on occupational therapy evaluations, students discovered the need to document the initiation of services. The initial evaluation is often the starting point of occupational therapy intervention. The need for occupational therapy services must be documented on this form before interventions can be

implemented. Through their research, students were surprised to learn that occupational therapy documentation is considered a legal document; as such it can be called into court as evidence in any type of litigation involving malpractice, fraud, negligence or incompetence. Upon learning this, many of the students requested that some of the lecture time be devoted to learning more about the documentation process. For example, Scarlett wrote, "In lab today we discovered that our evaluation and treatment session notes could be used in court. We all became aware that this is a skill we need to develop more." I decided to address the topic of documentation in lecture 5 as the students had just completed their initial evaluation of Evelyn. Additionally, they were in the process of developing treatment interventions that would require documentation. I used a mini-lecture format to cover the essential features of all clinical documentation and an interactive activity that had the students pull information from their initial evaluation on Evelyn to gain skills in writing a specific type of treatment note referred to as a SOAP note (Subjective, Objective, Assessment, and Plan). During class students indicated the most difficult part of writing a SOAP note is separating the objective information (O) from the interpretation of it, or assessment (A). For example, BB aptly summed up the feelings of many of her classmates when she wrote in her reflection paper "the note writing for a therapist is daunting work."

Lab Week 5: Examining Clinical Reasoning

Reflecting on my field notes for this lab I indicated the following "Undoubtedly but not unexpectedly, today's lab was the most labor and time intensive to date. I now understand why the literature indicates that PBL can be time consuming and why faculty sometimes find it challenging to discern how much guidance to provide during the solution seeking process." Recall that I had spent the weekend observing the students (via their postings) as they worked through the data they collected. The purposeful questions and resources that I interjected at

certain points proved critical. Student posting showed that they were considering and subsequently rejecting various treatment options, most of which reflected their concern to engage Evelyn in an activity she considered meaningful. While students were obviously excited about their first time encounter with their client, they also seemed to have a vague awareness that they were not considering all the relevant aspects of therapeutic interventions. For example, Bonnie writes:

> I'm excited about some of the ideas we came up with, but I still feel so unprepared to actually treat a patient. I think we have the right mindset, like trying to incorporate meal prep and exercise and expand her support base, but I still feel like we don't know how to put them into action. I like that everyone kept her goals in mind and wanted to get a better idea of what's realistic.

Marie picks up on Bonnie's comment about addressing the client's goals in her return posting. She writes "It was easy to take note of her goals (driving, using a computer, exercising), but a lot of those were beyond our control to help treat for reasons such as money, time and equipment."

Despite the weekend's postings, students arrived at Tuesday's lab fairly confident that they had indeed landed upon ideal treatment activities. Once again, I felt the need to facilitate a more thorough, questioning approach that would cause the students to reflect on their choices thus far. Gradually students began to acknowledge the need for a stronger rationale for their treatment ideas, but they reacted differently (at times with uncertainty) to this realization: For example, Stella stated:

> At the following meeting, Karen questioned our reasoning behind our chosen treatment plan…At this point, our team hit a major bump in the road and our morale had declined

> significantly. We felt that every idea that our group came up with after this point did not relate to social participation and we found it very difficult to get back on track. At this point, our team was grasping at straws, trying to stumble upon anything that could potentially benefit our client.

Generally, students were able to identify that social participation was problematic for their client; this was ultimately the area they wanted to address in their treatment plan. Students also demonstrated that they had no difficulty coming up with creative, original ideas that would be interesting and meaningful for the client. Unfortunately, they seemed to have difficulty leaving the areas of Evelyn's physical and cognitive deficits, even though these deficits had existed for many years (in fact, students initially overlooked the client's report that she had been living on her own for quite some time despite these longstanding deficits).

By posing questions to my students and listening with them to their own reflections, I was able to facilitate their reasoning process. For example, I asked the students what areas of performance (identified by the OTPF) does your evaluation data reveal may be problematic for Evelyn. Annie responded in this way, "I think that the way Karen posed questions about the framework made it a lot easier to focus in on specific areas that Evelyn may have had problem with. Looking at the practice framework was a huge help for us." For many students, increased clarity was achieved when they used the OTPF to guide their treatment planning process. It was then that several students realized that social participation was, in fact, a 'legitimate' consideration for occupational therapy, indeed, the one most appropriate given Evelyn's performance issues. For instance, Lauren expressed this in her blackboard posting following this

lab. She writes:

> So today's class was a little frustrating but it did end well! I remember Karen saying the OTPF was essential for this class and in the field. We all know it and have a copy...I can't believe we did not start our ideas from there. We were aware of her social participation, but we were more focused on 'fixing' her – like Claire said. We were so stuck on our meal preparation idea…but thanks to Karen she pulled the answers out of us that we were aware of!

Similarly Elaine states:

> Today's lab definitely started out as one of the most stressful! After Sunday I though we were in good shape but after talking to Karen I realized I was totally lost! After last semester ended the OTPF kind of left my mind! As bad as it sounds it never dawned on me that it could guide this process as much as it did today in lab! Now I am sure it will be the first thing we all think of. I never realized that there was such a huge flaw in our meal prep activity; I would have never realized we were working on something that didn't need work!

With this realization, students could, with effort, adjust their treatment ideas to design an intervention that not only addressed Evelyn's interests, but also supported her goals with a strong rationale. One PBL group provides an example of this:

> Some of the ideas we had targeted cognitive disabilities…looking back on the ideas we had, we realized that these ideas were not age appropriate for Evelyn. Furthermore, we realized that the return of function from her CVA would have already occurred and Evelyn's cognitive abilities were not likely to improve…we realized that the level Evelyn was currently at was sufficient as she was living independently without safety problems.

> At this point we decided that it would not be beneficial to Evelyn to focus our treatment on improving physical or cognitive abilities. Reflecting back on the exercise program Evelyn talked about enjoying, we realized that the reason she liked going was not for the exercise itself but for the ability to socialize with others. Going back to our evaluation to look for more information, we identified that another important part of Evelyn's life was volunteering at a hospital. Evelyn had told us that she volunteers once a week in the mail center and delivered flowers to patient's rooms. She told us that she loved working in the hospital, but she was not able to work there over the summer because college students came home and filled these positions. Evelyn told us during the evaluation that volunteering was something she enjoyed because it gave her life meaning. She often felt 'down' during the summer because of the loss of this role and opportunity to socialize with others. Based on this information, we decided that working on social participation with Evelyn would be the most beneficial thing for her. Excited with this new idea, we began to explore how we could create more opportunities for social participation in Evelyn's life.

Students left this lab with a much more developed treatment plan. They continued, however, to voice a bit of uncertainty as to how Thursday's session with Evelyn would go. My field notes indicated that students may have been beginning to realize that, even though they had come up with an acceptable 'solution', there could be something they missed or overlooked. Lauren seemed to support this observation. In her blackboard posting to her group members she wrote:

> In chapter 27, it states "new practitioners often struggle with how to select interventions, perhaps because they are overwhelmed with all the factors that must be considered.'

> Although we are not practitioners we are still new at this! So I guess it's normal not to know exactly what to do at first. We have very good ideas though for starters!

Lab Week 5, (Thursday): Implementing the Treatment

Students came to this lab session eager to implement their activity ideas with their client; at the same time, they were anxiously aware that the client might not be receptive to their ideas. In general, the sessions went very well. Students had prepared treatment ideas that were enthusiastically received by Evelyn. Their activities were meaningful and relevant, and generally well analyzed. Students had considered their client's cognitive and physical deficits and had adapted their activities where necessary. For example, one group suspected Evelyn might need increased structure during the activity; they had provided both oral and written step by step instructions for her to follow. Students were even able to use the session as an opportunity to gain additional information about the impact of the client's deficits on her functional status. Furthermore, students showed ability to upgrade or downgrade their activity on the spot when indicated. For example, Shelly's posting incorporates many of the points discussed above. She stated on blackboard:

> Today Evelyn seemed so excited when we told her what the activity was going to be. She could not wait to get started. Her face brightened up so much and I could tell it was something that caught her interest right away! This project was worthwhile for her. Just seeing her face light up made me feel so excited to be involved in the project with her. She has such a warm and uplifting personality. She knows how to make a project fun and also unique. She made it her own and that is something special. I felt so happy for her because she could not wait to show off the finished project…She even was thinking about where she was going to hang it in her environment at home…I noticed Evelyn got

> frustrated tying the knot, but she handled it well, and asked for assistance. I think one of the reasons she concentrated so well on the task was because she really liked it and was intent on finishing the project so she could bring it home. Everything went smoothly. It helped me to realize that there were things we needed to adapt in order to match her abilities with the task. Elena, you did a great analyzes of this activity in advanced!

From this posting, students recognized the importance of activity analysis. In light of Evelyn's deficits (non-functional use of her right UE, and some memory deficits) they had analyzed the activity using one-handed techniques. The knowledge gained from this analysis allowed the students to adapt the activity so that the demands of the activity better matched Evelyn's capabilities. "We realized it would be difficult for Evelyn to paint the shamrock using a paint brush because of the fine motor control it would require. We adapted the activity by using scrunched up paper towels. This produced an appealing sponge painted look." Students also compensated for short term memory loss by providing Evelyn with written directions. "We thought that it would be a good visual reminder and reinforce the oral directions we were providing."

This group recognized in advanced the importance of performing an activity analysis. One group had changed their activity idea only one day prior to the session with Evelyn; hence, they were not as well prepared as the other groups. The group had not analyzed their activity as well as they needed to, and this resulted in their overestimating Evelyn's capabilities. During this group's activity session, I made some suggestions for increased structure and facilitated the group's immediate problem solving. Later student postings from this group showed their ability to reflect on their session and offer their own critiques. For example, Claire offers her

thoughts:

> I was probably the most overwhelmed today that I've been all semester. I think we have a great idea, and Evelyn seems to definitely like it too. We did a good job of making our treatment client-centered, by formulating a list with Evelyn's help. But I think we'd all agree that there are a lot of things we need to work on. I think our major problem was that we expected too much from Evelyn. While we had a plan, we were kind of depending on the fact that she would run through her routines just like she will during the actual video. We didn't really have an alternative plan if we ran out of time. However, I do think we did a good job of coming up with some follow-up questions on the spot. Our goals are also not exactly measurable…There are a lot of things we need to prepare for next week Like Bonnie and Lauren said, we definitely need to have a more structured plan, and decide exactly what we need to say to prompt Evelyn to carry out her objectives. But we also need to be careful that what we ask is direct enough so that she stays on track. I also think we can't depend on Evelyn to bring in all of her adaptive equipment. In the possibility that she may forget some things, we need to be prepared with some alternative.

Summarily Marie concludes:

> I guess we can never plan for things to go exactly how we planned. Part of being an OT is rolling with what is given to you, we cannot be prepared for client reactions, and we cannot be prepared for everything. I think that today was a wake up call that next week we need to be ON THE BALL…I hope nobody gets too discouraged over this. We're all here to learn how to be better at practicing OT.

All the activities designed by the groups addressed the client's need for increased social participation opportunities; all activities were meaningful and relevant to the client. Interestingly, two group activities addressed games, and three activities were related to vocational and community participation. This underscored for students the PBL concept that there is not always one 'right answer.'

Lecture 6: More Ownership of Learning

Students were surprised at how the OTPF had guided them the previous week in their efforts to devise treatment activities for their second session with Evelyn. During Monday's lecture, students once again used the OTPF to review their recent intervention implementation. This time, students looked more closely at the framework. In particular, they talked with me about the importance of therapeutic use of self. This was a concept that they perceived to be critically important during their time with Evelyn. My field notes from this session reflected my surprise and satisfaction that, by this point in the PBL process, my students were essentially guiding their lecture time and identifying relevant learning issues.

Week 6, Tuesday Lab: Reflecting and Revising

During this lab, students reviewed their treatment activity session with Evelyn from the previous week. They did not request any input from me during this lab; they appeared confident that they were accurately assessing the strengths and weaknesses of their treatment plans and they felt able to identify their own learning needs. They discussed with their group members how adequately their activity had helped Evelyn to meet her goals. Students also began to become aware of steps in the planning process they had inadvertently omitted. For example, they now attempted to label their particular treatment approach in light of the OTPF; they discussed whether their approach had been compensatory, restorative or one of the many other approaches

cited. Students began to gather information for their SOAP note (documentation assignment). With this endeavor, they realized that they needed to be able to succinctly, professionally and objectively articulate what they did, what the client did, and how this related to the client's goals. During this lab students also made plans for their final treatment session with Evelyn. Four of the five groups continued to develop their treatment activities from their first session with Evelyn. The remaining group devised a different activity based on the information gained from their first treatment activity.

Week 6 Thursday Lab: Growing Confidence

As the students entered lab on Thursday, it was clear (from the familiar greetings and exchange of pleasantries) that the students and Evelyn had developed a strong rapport. Evelyn surprised the students with pictures of her apartment (living room, bathroom, bedroom and kitchen). She stated, "You were all wondering about my apartment so I had Karen take these pictures so you could see where I live." Without being asked, Evelyn proudly presented the groups with her completed 'take home' assignments and stated she had remembered to bring the requested items for today's activity. My field notes indicate that students appeared much more confident in carrying out their second treatment session. They were more attentive to cues and adjusted their approaches without difficulty. For example, in their first treatment session, one group's activity required Evelyn to design a "Grey's Anatomy" game. While making decisions about how to create the board, the students rushed Evelyn with her choices, and often, in their excitement, ended up making them for her. This lack of awareness on the student's part is reflected (rather emotionally in my field notes). In a heavy handed entry I note "**Stop, Stop, Stop**…you're not giving her a chance to think and offer her suggestions! Look at her face, she is getting frustrated, she is starting to show signs of disengaging"

Although it was encouraging to see the students actively involved in the activity with Evelyn, it also showed a lack of awareness (at least momentary) of what constitutes a therapeutic relationship. The second treatment session, however, showed the students were cognizant of the time Evelyn required to process the questions in order to formulate her own answers. This time students watched her facial expression for cues (frustrated, confused, contemplative). This helped to ensure they were providing adequate time for Evelyn to think about her ideas and offer her input. The students' ability to modify their behavior demonstrated they better understood their role as the therapist and the therapeutic relationship. The end result was that Evelyn became more invested in the activity because she was able to contribute many more of her own ideas. For example, this awareness is reflected in Erica's posting:

> I feel, as a group, that we did much better today than last week. We gave Evelyn clearer directions and TIME to process and think of her own questions and rules to add. She said frequently that she liked how the game turned out.

The PBL group who had not adequately prepared for their first treatment session also demonstrated the ability to reflect on their treatment session and make needed changes for future interventions. The postings from these students showed they found the process of reevaluating and reviewing their treatment session lead to a more satisfying experience in the second session. They voiced their contentment in the following ways, "I think the second session went WONDERFUL." "I agree, Thursday went great." Perhaps Lauren's posting best captures the group's feelings:

> Hey girls! What a difference it is when the treatment session goes well…it's like night and day. I really think we did a great job with the 2nd treatment session. I think the important thing is we learned from our mistakes from the 1st treatment session. We made

modifications. We were very prepared and utilized our group time efficiently. Yaa! I was really impressed with Evelyn's performance. I really do think she will appreciate the video and find meaning in it.

Following week 6 of lab, students went on Spring Break. During that time Evelyn called to tell me about some of the exciting things that had happened to her largely because of the treatment interventions the students had designed. This information was timely as lecture 7 and week 7 of labs would focus predominantly on the outcomes process. Specific details of Evelyn's call are provided in the discussion of Week 7 lab.

Lecture 7: Continued Ownership of Learning

Lecture 7 focused on client outcomes. Outcomes according to the OTPF (2002) are defined as important dimensions of health that are attributed to interventions, including ability to function, health perceptions, and satisfaction with care. During this time period students re-evaluated their treatment sessions in light of their stated outcomes for Evelyn. They also worked on incorporating this information into their discharge note (Thursday was their last treatment session with Evelyn). As in lecture 6, students were essentially guiding their lecture time and discussed their understanding of the outcomes process in light of what they had experienced with Evelyn.

Week 7 Lab: Documentation and Evaluating Outcomes

During Tuesday and Thursday of week 7 labs, students continued to work on their discharge note and evaluate outcomes resulting from their treatment sessions with Evelyn. I listened as students' integrated information, and debated about what was most relevant in support of their stated outcomes. Some groups chose to use Evelyn's responses to support outcomes such as client satisfaction, role performance and quality of life. For example one group reasoned:

> Evelyn showed us that she is willing to engage in social participation activities with us, and indicated to us that she would be willing to show and possibly play the game with her manager and other people. In this way, we reached our treatment goal and achieved our outcome.

Another group reflected on their treatment sessions and subsequent outcomes:

> After seeing Evelyn for two treatment sessions we felt that we achieved our goal of helping Evelyn increase opportunities for social participation. With our assistance Evelyn was able to make an outline of her story, write a letter about her experiences, and find three places where she could send her story in hopes that this would generate opportunities to share her story with others. Because of this we felt that there was no need for continuation of OT services. She demonstrated the ability to contact people on her own, showing that she could act independently if other opportunities came to pass.

After listening to several discussions, I shared with them the information I had received from Evelyn about her experiences following treatment. As indicated earlier, all of the PBL groups had determined (based on evaluation data) that Evelyn was at an increased risk for depression secondary to social isolation. They had determined she would benefit from OT services to increase opportunities for social participation. They all came up with treatment activities that promoted interaction with others. The group mentioned above (that had Evelyn write her story and mail it to three places) was ecstatic to learn that Evelyn had received a positive response from one of the area colleges. Evelyn told me she planned to use the video (produced with another PBL group) during her presentation at the college. She said it would be a good learning tool for the students as it featured her completing her daily activities with the use of adaptive equipment. In addition to the positive response received from the college, Evelyn

also received an invitation from her church pastor to speak to parishioners who are dealing with illness in their families. He thought her story would be an inspiration to them. He also asked her to consider volunteering her time this summer for several of their special events.

Evelyn also benefited from the treatment activities designed by the other three PBL groups. One of the groups had Evelyn make a craft activity. After showing the craft project to the activity director at her apartment complex, the activity director decided to run a similar group for the residents and asked Evelyn to help her facilitate it; using Evelyn's completed decoration as a sample model. Finally, Evelyn shared with me that she had spent a great night renewing old friendships. Evelyn sent out invitations (made in her treatment session) to friends she had lost contact with over the years and invited them to 'game night.' She asked each person to bring their favorite dessert and she would supply the game. She excitedly told me how her friends were impressed with the "Grey's Anatomy" game she had designed during her treatment sessions. This get-together resulted in everyone agreeing to 'once a month' game night. This information provided additional information to the groups that Evelyn had achieved their intended outcomes.

Not surprisingly, the students were overjoyed to learn that Evelyn had benefited from their intervention plan. They felt "immensely satisfied", "proud", and "appreciated" when they learned how effective their treatment activities had been for Evelyn. Elizabeth posted:

> Seeing and hearing how satisfied Evelyn was with our treatment plan was definitely the best reward possible. It was great to know that she really enjoyed it, actually went through with it, and then she even got a response back. I was so happy that all our hard work paid off and that we did assist in improving her quality of life by helping her get involved in the community.

The Meeting the Client phase ended at the conclusion of week 7 labs. The following section of this paper will present the key findings that emerged during this timeframe. These findings came from the student's blackboard postings, classroom participation and observations, students papers on the intervention (plan, implementation, review and outcomes).

Key Findings Phase Three: Meeting the Client

The findings related to this section, Meeting the Client, may be thematically categorized in the following ways: Authentic Involvement in the OT Process, Practicing Technical Skills, and Engaging in Multiple Aspects of Clinical Reasoning.

Authentic Involvement in the OT Process

The ill-structured problem used in this study necessitated full student involvement in variety of real-world tasks. In the Meeting the Client phase, these tasks included conducting an evaluation, implementing interventions, and achieving desired client outcomes. This phase provided an authentic experience for the students to be actively engaged in constructing their own understanding of the OT process. Upon meeting Evelyn, the students realized that the OT process consisted of more than a surface understanding of its components. For example Ann stated, "it was good to deal with an actual patient and apply what I learned so far instead of constantly reading about it." Allie concurred, "By being hands-on with our case study and forgetting about a text book for a minute helped gear my mind towards seeing what it really means to be an OT and what it is that OT's actually do." Joan indicated that this authentic experience (real client contact, conducting an evaluation and carrying out treatment interventions) helped her to better discern relevant information for planning, implementing and reviewing treatment activities that reflect Evelyn's unique situation. She wrote:

> It also helped us professionally because until this semester all of our OT classes have just been reading different materials, but in this class we applied what we learned. This gave me a better insight of what it feels like to actually do an evaluation, come up with an intervention plan and to have the opportunity to interact with a real client. Because of this opportunity to interact with a real client, I have learned better skills for analyzing

> situations and I have developed better clinical reasoning skills which make me feel more comfortable about our clinicals.

Joan specifically mentioned how being immersed in this experience fostered clinical reasoning skills. Several other students also indicated that the real-life client experience brought the concept of clinical reasoning from "text to life." Rae writes, "Reading about clinical reasoning I learned how to define the types: basic memorization. It did not enlighten me as to how the types of reasoning are actually applied and come to life." Marcy concurred:

> I never questioned my actions or the reasons behind them prior to this case study. I was in the dark when it came to clinical reasoning and I didn't really understand it being anything more than what I considered 'normal reasoning'. This case study opened my eyes to a whole new world…I began to ask Who is this person? What makes them who they are? Where and when an activity would be appropriate? Lastly, I was asking why I was doing something, why it would benefit the client. I had never thought of things that way. I felt each day of this project I was utilizing clinical reasoning more and more which ultimately made me more confident in my decisions.

Similarly, Eileen stated:

> Before this project I had no real concept of clinical reasoning. It was just a term that had been used in class and something I had known at some point I would use to guide my work as a therapist. After completing the case study, I feel like I have a real understanding of what clinical reasoning is and how it would be used in a real world clinical setting. I can now identify all the types of reasoning and how they are used in treatment. I have worked with occupational therapists in the past and been mystified by how they understand the client's problems and instinctively know what they need to

> adjust or do to help them achieve their therapeutic goal. They had great difficulty explaining their thought process to me because it was natural to them. This made me very nervous because clinical reasoning did not seem to come naturally to me at all. In reality, it is a skill which needs to be acquired through practiced; it can not be adequately taught in a traditional classroom. Now I can make decisions in the clinic and feel confident they were logically thought out and appropriate for the client. I made need more practice to perfect the skill, but the process is now understood.

Finally, this comment from Annie aptly summarizes how students felt this authentic experience fostered clinical reasoning skills. She wrote: "clinical reasoning is like a jewel, it needs a setting. Allowing us to actually meet a real client and carry out the OT process gave us an opportunity to understand that the ultimate reward was seeing the positive response our treatment activity generated in Evelyn."

The authentic involvement in the OT process presented students with the uncertainly, ambiguity and conflicting perspectives that comprise client treatment. Student postings indicated the authentic involvement allowed them to make connections with prior learning, deepen their knowledge base, and provided a context for them to practice their skills. The next section will focus on another finding that emerged in this phase; Practicing Technical Skills.

Practicing Technical Skills

Occupational Therapist must be able to think critically, analyze and synthesize information, and design creative and meaningful treatment activities for their client. However, it is also critical that they are technically competent when carrying out specific assessments and treatment interventions. Another benefit of meeting a real client cited by the students was that it provided them with opportunities to practice interviewing skills, such as how to phrase questions

so they are understood by clients, and how to ask questions that garner relevant information. Additionally, the authentic experience required students to respond in situ to Evelyn's body language, tone, facial gestures and other dimensions present only in real life encounters. In regards to gaining interviewing skills Devon posted the following:

> I realized I was asking questions that the client only had to answer yes or no to; that didn't give me much to go on. As I became more aware of what I was doing, I started to formulate more open-ended questions. This adjustment on my part yielded far more valuable data.

Jackie reflected on the opportunity this way:

> Interviewing takes real skill! When I asked Evelyn a question, and she outright told me she wasn't going to give me an answer, I felt like a deer caught in headlights – I froze and didn't know how to respond. I was confused and scared to ask any other questions in case she responded the same way. Thankfully, someone else in my group interjected and gave me a minute to regain my composure. In hindsight, I'm glad I had this experience, it taught me how important it is to be comfortable with the uncomfortable. Watching how my peers responded gave me new insight into handling similar situations.

Several other students indicated the feedback from their peers on their interviewing style helped them identify their strengths and weaknesses. For example, Marcy shared, "my peers (in a very nice way) let me know I dominated the interview, I didn't give Evelyn enough time to respond." Another student, Catherine, stated she was grateful for the valuable feedback her peers gave such as, "your pacing was very good, you gave her ample time to think and respond to your questions", "you did a good job with follow-up questions", "make more eye contact", and "speak up."

Documentation writing is another skill required by therapist. Students learned first hand how complicated it can be to simultaneously document what Evelyn was saying during the evaluation and treatment sessions and to actively listen and respond to her queries. Danielle talked about this difficulty in her blackboard posting:

> I wanted to get the information that Evelyn was providing to us recorded on the evaluation form, but I couldn't write fast enough, also, in doing so I realized I was not actively listening, and quite probably missing out on important cues. I also felt like I was being rude, I don't know how I would like it if someone was frantically writing down what I was saying instead of listening. This experience showed me the skill it takes conduct an interview, I think with more practice I can strike a better balance of attending and writing.

Catherine also found the experience gave her practice at writing treatment and discharge notes. She stated:

> Knowing that my documentation could be used in court made me nervous, this PBL experience gave me a chance to practice…I enjoyed learning about writing SOAP notes and discharge notes, and actually trying to complete them. While writing the SOAP and discharge notes I had to be able to defend what we were doing logically. At some points this was hard for me, but through some guidance from Karen and many group discussions we were able to come up with a good finished product. I think that if I had to do another SOAP or discharge note I would be better prepared as a critical thinker due to this experience.

During the initial evaluation, Evelyn demonstrated the use of one-handed dressing techniques (which she had learned many years ago from her occupational therapist). Students

found the opportunity to observe and participate in adaptive dressing techniques very insightful. Allie talked about this experience in her blackboard posting. She wrote:

> I was impressed with how she is able to live her daily life using only her left arm. I tried putting on a shirt using only my non-dominant arm and it was a lot harder than it looked. I found just putting on one shirt using that method to be tiring and frustrating. For Evelyn to accomplish everything that she is able to do on her own in a day is remarkable. I'm glad we had the opportunity to practice applying the techniques we will have to teach to our clients – it gave me a greater understanding of what is involved.

Mary Beth also talked about the one-handed dressing techniques. She stated:

> When trying to "teach" one of my group members how to donn a shirt using only one hand, I realized how difficult it was to simplify my instructions and make them clear. Evelyn made it look so easy! I realize it probably took her time to be so fluid. I know this helped me to recognize the importance of analyzing an activity, making sure I (as the therapist) know how to grade or adapt the activity by taking into considerations the client's abilities and disabilities. This gave us great practice, I can't thank Evelyn enough for sharing her experience with us and actually teaching us how to perform these techniques.

Some of the students performed range of motion on Evelyn's affected UE extremity Elaine shared, "Using the goniometer to measure Evelyn's range of motion (ROM) and passive range of motion (PROM) was complicated. I felt clumsy trying to manipulate the goniometer and I worried about the correct placement of the goniometer on the various joints."

Kendall also mentioned her feeling about performing PROM on Evelyn. She stated:

> When I tried to passively range Evelyn's fingers, it became evident to me that there was soft tissue contracture. Because I had read about contractures in our book, I knew about the precautions therapist need to keep in mind when performing range of motion on a client. You could hurt a client if you tried to range a fixed contracture. Once I felt the contracture I did not continue to range Evelyn's fingers.

Opportunity to Engage in Clinical Reasoning at Multiple Levels

Students were engaged in the process of interpreting the data they had collected during their evaluation with Evelyn and attempting to use it to make decisions about treatment; in effect they were clinically reasoning. It was evident from their postings and intervention papers that as they moved through the OT process, they employed various types of clinical reasoning including procedural, interactive, pragmatic, narrative, and ethical (Fleming, 1991, 1994b, Mattingly, 1994b, Rogers, 1983, Schell & Cervero, 1993). It should be stated that these findings are not linear nor entirely distinct; the categories are interrelated and sometimes overlap. However, these headings will help conceptualize the students' learning process and identify types of reasoning they employed.

Building on Formal Knowledge

While the students did not have any actual experience with clients, they did accumulate some basic information and facts about the given medical conditions and their relationship to occupational therapy. They used this formal knowledge to prepare to meet with the client. For

example, Annie posted:

> Given what we know about the client's medical conditions, there is a high probability we will see impairment with his or her client factors. Therefore, we need to include a section on our evaluation that addresses neurological and neuromusculoskeletal functioning.

The students also attempted to put together a picture of what the client might "look like" given the stated medical conditions. For example one of the PBL groups, used their formal knowledge about a stroke, to hypothesize the following:

> We know strokes can occur at any age, however they are most likely to occur in an older male who has a history of high-blood pressure, is over-weight and smokes. Since the majority of people are left brain dominate there is a greater probability the stroke occurred there, which means the client's right side would be affected. As OT's we would help the client to relearn muscular control and coordination in order to carry out normal activities of daily living.

The above posting demonstrates the students budding use of procedural reasoning. This type of reasoning occurs when the practitioners are "thinking about the disease or disability and deciding which intervention activities they might employ to remediate the person's functional performance problems" (Fleming, 1991, p. 1008). Many of the students demonstrated this when hypothesizing what they could do for the client if he/she exhibited increased muscle tone. For example, BB suggested, "if the client does have increased or decreased tone we could use Bobath's neurodevelopmental approach to facilitated normal tone."

Once students met Evelyn, they compared their formal knowledge to how Evelyn

presented. For example, Kendall noted,

> Evelyn was only 29 years old when she sustained her aneurysm and stroke, this is atypical in someone her age. She was and is over-weight, and has a family history of diabetes (her father died from this). She was an occasional smoker but no longer smokes (some of this information is consistent with what we read). Evelyn's right UE is flaccid; sitting and standing posture demonstrate a right lateral lean (consistent with a L CVA); she exhibits dysarthria; her right fist is clenched; she is inconsistent with following multi-step directions.

Likewise, Angela stated, "I could immediately see right helmiplegia, spasticity and flaccidity, however, Evelyn was also engaging, vivacious, and inquisitive; not the mental picture I had formulated in my mind of someone who had suffered a stroke."

Similarly, Stella's comment demonstrates how she drew on her formal bank of knowledge:

> I noticed Evelyn kept getting her pronouns mixed up – using he when she meant she and vise versa. This would not be unusual for someone who had sustained a left CVA because quite often language is impaired. We know Evelyn had a left CVA since she presents with right-sided hemiplegia

Further examples of procedural reasoning occurred as the students discussed (in their blackboard postings and intervention papers) possible treatment interventions. For example, Sofia posted, "I noticed Evelyn's muscle tone and I thought we could consider using inhibiting and facilitating techniques, and weight-bearing activities to bring about change." Allie shows how she struggled with some of the cognitive issues Evelyn presented with. She stated:

> One thing that frustrated me about the evaluation was that I found it hard to tell what things had to do with an actual physical or cognitive deficit and which things were not.

> For example, most of us observed how Evelyn's eyes would roll from time to time. It's hard to know it that has to do with an actual problem or is she was just looking from person to person. Like Joan mentioned, she also didn't follow the directions for what Lola told her to do with setting the table. I don't know if she set the table for breakfast deliberately and talked about her breakfast routine because she forgot the scenario we thought up about dinner of if she chose to talk about breakfast because that is the meal she normally sets up at her place for herself. It's possible that her boyfriend sets the table for dinner and the only time she does it is for breakfast. Looking back I would have asked her if that was the case. I also don't know if she actually forgot about the silverware or if she chose not to put it out. Maybe we need to assess her cognition further and try to improve it if we find there is a problem.

Although strategies mentioned by both Kendall and Allie are often used successfully in OT therapy when addressing muscle tone and cognition, the students initially failed to incorporate other factual knowledge; likelihood of return of function with a client whose CVA was status post 13 years. Several times I would respond to their treatment ideas to get them to think about their rationale for their treatment plan. For example, I asked them what they need to know about return of function following a CVA? How would this information impact your treatment approach? When students were proposing to use weights to strengthen Evelyn's left upper extremity, I asked them for what purpose - did she demonstrated decreased strength in her left arm that was inhibiting her engagement in a meaningful occupation.? Once students considered this additional information they were able to reason that their treatment interventions would have to be designed to compensate for loss of function (whether physical or cognitive), rather than for restoring function. For example, Lola wrote:

> Once we took into consideration the time that had passed since Evelyn's stroke, we realized return of function in her UE was permanent, and we would need to take this into consideration and use a compensatory approach instead of restorative. She also did not appear to have any difficultly performing tasks using her left hand, which told us she had adequate strength. I think we realized we need to look over our data again and ask some different questions.

Additionally, the following students comment shows the fluidity and growth of the knowledge bank and with guidance students could refine the bank.

> I agree with Joan that one of the most difficult and stressful parts of this past week was on Tuesday when we had to actually pick what to do with Evelyn- we were all coming up with such good ideas but at first most of our ideas were looking at cognition and her physical disabilities, so we had to re-direct our thinking to social participation. It also helped to have Karen there to give us some guidance and to help us figure out what we were doing and why… Like most of you said, Tuesday was very stressful because it seemed like we were just going in circles and although we were coming up with many ideas, they just were not what we needed. Eventually when we focused on social participation, it was a lot easier to narrow things down.

The ability to discern relevant information and then make specific application of this information (beginning use of interactive reasoning) was mentioned by many of the students. This type of reasoning will be discussed next.

Connecting to the Client through Interactive Reasoning

Interactive reasoning according to Fleming and Mattingly (1994) is used to help the therapist to interact with and better understand the person. Upon meeting Evelyn, students

quickly realized that the real-life client differed significantly from the client that existed solely in their bank of formal knowledge. This eye opening event engendered a tremendously positive response from the students. Students felt an immediate connection to Evelyn. Student's postings reveal their desire to understand Evelyn as a person, not just a patient. For instance, Angela stated:

> I could immediately see right helmiplegia, spasticity and flaccidity, however, Evelyn was also engaging, vivacious, and inquisitive; not the mental picture I had formulated in my mind of someone who had suffered a stroke. As we talked I began to feel a genuine connection, I wasn't simply trying to assess the damage from a stroke.

A few examples show how the student's questions served to develop rapport, establish trust, and form a collaborative partnership, "What are your habits – do you like to sleep in or are you an early riser? "Your wearing a lot of purple, does that color hold a special significance for you?" "What is your favorite Holiday?" "How would you describe yourself to others?" They were also intent on finding ways to relate to Evelyn in a meaningful way. One example servers to illustrate this point: A student asked Evelyn what kind of things she did for fun. Evelyn responded that she loved to go to concerts "I love Bon-Jovi, I saw him in concert last year." Two of the girls in the group had also attended this concert and several others indicated although they did not go to the concert, they did have the group's CD. I wrote in my field notes that "after connecting with Evelyn in this way (through music) students relaxed and spent a few moments of the interview sharing favorite songs and even engaged in singing some of the lyrics." Another way students built trust and developed rapport was by the remarkable sensitivity they demonstrated upon learning about the loss of several of Evelyn's family members. Allie provides

an example of how getting to know the client as an individual not a diagnosis affected her personally. She states:

> On a personal note, once we received our case study and began to put the components of it together I went through a period of time where I found myself very withdrawn and unmotivated to do the project. A few weeks before we began PBL, my grandmother who I was close to suffered a massive CVA and passed away. It required a lot of work to mentally put myself in a place to want to study in detail the effects and recovery process of a CVA. I found however, that once I began to know more about our client as a person, I was able to focus my attention onto her and become fully invested in the process.

The personal nature of the questions posed during the interview process shows the students desire to see the *person* behind the *disability*. Students felt that they had established a rapport with Evelyn because they showed a sincere interest in her personal stories, inquired about her likes and dislikes (music, TV shows, etc) and demonstrated active listening. Bridget believes these strategies engender trust and created an atmosphere that allowed Evelyn's quick wit and off-beat humor to emerge naturally in their exchanges. She writes "Evelyn felt comfortable enough to kid with us. When the topic of finances came up, she jokingly reminded us that her last name was LaRock, not Rockefeller!"

A few of the student's posting spoke about their somatic experience during the therapeutic interaction with Evelyn. For example Jackie writes. "It wasn't what she said so much as the tone she used when she said it, I just felt like she didn't mean what she said. "Another student comments on how she 'sensed' Evelyn wanted to talk more about a particular subject, "I don't know how to define how I knew, I just knew it would be important for me to follow up on my previous question to Evelyn; it turned out to be a pivotal point in our

interview." Students were not only becoming aware of the client's not-so- obvious needs, but they were beginning to make clinical judgments based on the client's response. For example when students perceived Evelyn was becoming fatigued they also wondered if this might be an area requiring therapeutic intervention. "Something about the lack of energy she began to display in her remarks alerted me to the fact that she may be tiring from all the questioning (mental), or just sitting up in a chair (physical) or both. Students unanimously agreed that getting to meet Evelyn in person fostered their strong connection to her. For example, Annie states:

> It was really nice to actually meet the client, Evelyn, instead of just reading about her on pieces of paper. When you see all of her problems in person and see how affected she is, it really made me motivated to want to help her. It made me excited to see how far she has come by using OT and it also made me excited to think that I would be helping people like this every day.

Similarly Marcy writes:

> Meeting Evelyn was a full-body experience, hearing her laugh, watching her ever-changing expressions, feeling her hands when we greeted each other. These interactions all provided important clues and enhanced my clinical reasoning, but they also helped me come to know Evelyn in a more intimate way. I would not have experienced all these sensations or felt this connection to a piece of paper.

All of these comments demonstrate the significance of the students' connection with Evelyn. Because the students came to know Evelyn as a person, they were able to individualize their treatment activities to reflect her interests. For example in learning that Evelyn loved holidays and decorating her apartment (in her words) "to the hilt", the students designed an activity that involved Evelyn making a St. Patrick's Day Door decoration to address their goal of

increased social participation. “During the occupational profile Evelyn talked about decorating her house for the holidays, her face lit up and she exclaimed how she loved to decorate.” Engaging in a craft activity can be frustrating for Evelyn given the non-functional use of her right upper extremity. However, because the students had constructed a therapeutic activity that had special significance for her, Evelyn was highly motivated to perform the task. In their intervention paper the students wrote:

> Since it was not our intention to focus upon motor functioning but upon social interaction to increase quality of life, Elena made sure that the project could be done using one-handed techniques. During this analysis, she realized that Evelyn would have difficulty painting the shamrocks, and adapted the activity by using paper towels. This produced an appealing sponge painted look.

Devon posted:

> I know Evelyn loved doing this craft. Just by the look on her face and her determination to finish it. It was obvious that she struggled at some parts (we all struggled at some parts) but rather than giving up she pressed on.

Similarly, Elena stated:

> Not only were we super excited about our idea for Evelyn, we actually listened to what she said and used that to come up with her treatment plan. This made her excited which is very important. She was so enthused about the shamrocks, I think it made us all feel good.

The students cared deeply about what was personally meaningful to their client. In establishing a relationship with her, they viewed her as more than her medical condition: they connected with her as a person. In so doing, they began to demonstrate interactive reasoning. As

students integrated their formal knowledge with all of Evelyn's unique attributes, they began to dialogue in a story-telling manner indicative of narrative reasoning. This particular aspect of clinical reasoning will be discussed in the following section.

Constructing a Client Story through Narrative Reasoning

Narrative reasoning is when a therapist "makes sense of the illness experience through telling stories that evince a narrative reasoning process" (Flemming & Mattingly, 1994p.18). In learning more about Evelyn, the students began to 'hear' her story. They learned the subtle nuances of her condition and the impact and meaning these conditions held for her personally. For example one student posted:

> Evelyn seems to accept the good with the bad. Although she told us she lost a lot by having a stroke (her career in television, the ability to drive), she also said the stroke is just part and parcel of life. In her own words "Everyone faces adversity if they live long enough. Things happen, it doesn't help to keep thinking what if".

Similarly, Lauren stated:

> I admire the way Evelyn faced the adversity in her life; with acceptance, courage, and toughness. Before she was even thirty, she had endured overwhelming heartache (the loss of her father, mother, sister and brother) and life threatening diseases (aneurysm, CVA). Yet, here she is, living her life with acceptance while striving to make the most of each day.

Another example that demonstrates narrative reasoning came from the posting and intervention paper of one of the PBL groups. In planning their intervention the group members admitted to an initial mindset that viewed Evelyn as a person to be 'fixed.' As they deepened

their understanding of Evelyn's perspective on her illness experience, they saw the need to revise their depiction. In the following example, we can see how the students were able to reframe how they saw Evelyn and construct a treatment activity that empowered her:

> Evelyn is not a person who likes to look out passively at life through a window – to feel fully alive she needs to be in the thick of things, stirring up excitement, and connecting with people in meaningful ways. On more than one occasion Evelyn emphasized that she had overcome immense obstacles; life threatening illnesses and loss of family members. She describes herself as a survivor. Evelyn told us 'I didn't survive just to exist, I want to squeeze every moment out of life.' If one was fortunate enough to spend time in Evelyn's company (like we were) they would be inspired by her invincible spirit and distinctive determination… Hearing Evelyn's amazing story showed us that she has overcome many of the barriers (physical, social and cultural) brought about by her stroke and does not allow it to *solely* define who she is. This helped us to construct a treatment activity that involved collaborating with Evelyn to write her story and assisting her in seeking out venues to share. This would address our area of performance (social participation and volunteer work). Evelyn indicated she gets great satisfaction out of helping others. Therefore, this treatment activity (which allows Evelyn to help others) could positively impact the quality of her life, which is one of our treatment outcomes.

While the students were engaged in developing a treatment plan that considered the various aspects of clinical reasoning they realized they had to adapt to the concrete contextual situation. This involved another aspect of clinical reasoning and will be discussed in the following section.

Connecting Client to Context

Pragmatic reasoning involves consideration beyond the therapist client relationship and attends to the context in which the treatment is occurring. According to Schell (2008), there are two perspectives from which the context is considered. One perspective focuses on the practice context. Factors such as time, space, cost and resources are considered in light of the therapy process. This is reflected in student responses to Marie's blackboard posting. Marie posted, "I was thinking we could involve Evelyn in a swimming activity. She said she likes to swim, we can use the swimming pool on campus… we can use the research we found that suggests exercise can help a patient with phlebitis, as a rationale for our idea." Various responses show students using pragmatic reasoning, "I don't think we have enough time to carry out that activity in 50 minutes. Evelyn requires increased time with dressing tasks, if she gets her hair wet, she'll need time to restyle it before her next treatment session." "I don't think the school pool has open hours during our treatment session." "Our pool does not have a lift to help Evelyn get in safely." "Speaking of safety, we really don't know how well she can swim. We need to be aware of legal ramifications; would we need a certified life guard present?" The other perspective associated with pragmatic reasoning is the personal context; which considers the practitioner's personal situation. The above example on swimming can also be used to illustrate how this factored into the student's reasoning. One student responded "I'm not fond of water activities, and I'm not that great of a swimmer." Another student indicated, "I'm a good swimmer, however, I do not want to be seen in a bathing suit."

As stated earlier, the various aspects of clinical reasoning discussed in the categories above, rarely occur in a linear fashion. Rather, the students continuously interacted with and questioned their evaluation and treatment data and that which they had accumulated from prior

learning in their efforts to bring meaning to Evelyn's situation. This process that the students engaged in (considering all of the different modes of clinical reasoning) lead to an ethical reasoning process wherein the students were able to construct a best treatment plan given Evelyn's current occupational performance needs. The last phase: Final Reflections will be discussed in the following section. This phase includes week 8 lecture and labs.

Final Reflections

The fourth and last phase: Final Reflections discusses week 8 lecture and lab experiences of the students as they worked together complying information and completing their Evelyn case study.

Week 8 Lecture and Lab

During lecture 8 students completed the Self-Assessment of Clinical Reflection and Reasoning (SACRR) as a posttest to determine changes in clinical reasoning. Lab time was devoted to the students complying assignments they had worked on throughout the eight weeks relevant with the case study. They also used the time to write their individual reflection papers. During this period, students discussed their written assignments, shared new insights and discussed possible alternatives to writing up the information, and addressed any remaining questions. For example, in a PBL group discussion that I observed, Tiffany suggested that the group reconsider some of the information they had written in their first paper on the *Connection of the Medical Diagnosis to Occupational Therapy* She stated:

> In light of what we learned through our actual experience with Evelyn, we can go back and re-write that section. We can put it in our own words because we can pull from our direct experience, not rely completely on what the book and other resources told us about the relationship. We saw first hand how Evelyn's medical condition affected her and we now have a better idea of how important it is to consider the client's occupational performance deficits in light of how they impact her ability to engage in meaningful occupations. That is really the hallmark of our profession – getting our clients back into the roles and (performing the tasks that go with those roles) that are meaningful to them.

The pattern of being initially overwhelmed by resolving another part of the problem was no less apparent in week 8. For example students postings show their initial reactions to complying their information into a completed case study, “I feel besieged with work”, “ I feel inundated”, “Trying to get this all together can be aggravating,” “I feel so stressed…I’m worried their won’t be enough time to get this all accomplished.” True to form, however, once the students progressed through the PBL steps, and could ‘see’ their progress, they acknowledge that they had overreacted. Postings from Elizabeth and Allie serve to support this. Elizabeth writes:

> I noticed that I get stressed the most on Tuesdays. That is when we seem to be given new information or another aspect to the case study…Looking back on everything, I realize that I definitely was getting more stressed out than was necessary…If I could offer any advice to future groups, it would be to just relax and take everything day by day and realize that it’s not impossible. I probably should have gone about the whole process a little more calmly, but then again, I think it was the stress that made me work harder and faster.

Allie reflects on the last part of the PBL assignment this way:

> When the time came to assemble our final project, I was amazed at how smoothly everything came together. While the assignment given to us looked intimidating at first glance, we had few problems getting it done. At this point in the PBL process our group worked well together and we were ready to put everything together. By keeping good records of our treatment sessions and our group meetings we had everything we needed to put our paper together.

This lab time also provided the students with an opportunity to reflect on the process itself, discussing what they saw as the strengths and weaknesses of PBL, the impact (personal and professional) of PBL, and the connection between PBL and clinical reasoning, For example, Allie writes:

> Taking the time to reflect back on the process as a whole and put everything together at once helped me to realize that PBL was effective in helping me to learn, as I feel I have a much greater understanding of the treatment process that occupational therapist follow.

Bridget's postings echo many of the feelings expressed by the students during this reflection period. She writes:

> Overall I think that the PBL experience is a great one. There were definitely times when it was very challenging, however, it was also very rewarding. I feel as if I have learned so much by working in the PBL setting because it was so hands on. PBL also gave me confidence because I learned and experienced so much. After experiencing PBL I feel as if I can get through any situation no matter how challenging it may be. I am very glad that I got the opportunity to experience learning like this and I hope that in the future there will be more opportunities for me to work in a PBL setting.

The eighth week marked the end of the final reflection phase and concludes the students' PBL experience. In the following section, the findings associated with this last phase will be discussed. The data supporting these findings was taken from the case study, the student's reflection papers, and post-PBL student interviews.

Key Themes Phase Four: Final Reflection

The three main themes surfaced from this final phase of the study were as follows: Growing Pains, Self-Efficacy, and The Relationship of PBL to Clinical Reasoning. In addition to these themes, the findings from the SACRR pre-test and post-test will be presented.

Growing Pains

Growing Pains alludes to a natural and healthy process (albeit painful at times) wherein students were able to see that the stress, confusion, frustration, and increased responsibility associated with their PBL experience contributed positively to their maturing process. For example, Ann writes, "PBL forced us to raise our eyes above our limited horizon and stretch and grow by constructing new knowledge – it was both rigorous and rewarding. Allison Marie also provides an example of this 'growing' in her reflection paper:

> The PBL process has been a very beneficial learning experience. It was definitely one of the most stressful projects I've ever had to complete. However, PBL definitely served its purpose. From the moment we were given our initial case study scenario, we were driven by self-directed learning. The fact that we were responsible for the majority of the information we could use for our cased study motivated us to actually obtain and understand that information. While at the time this may have required more work and been more stressful, I think it enabled us to learn more than any traditional classroom does. …Each of the mistakes we made or temporary road-blocks we faced were opportunities to learn and grow.

Similarly Bonnie writes,

> At first, I probably could have thought of a thousand different things I wanted to change about PBL, but now I can't think of anything. I think the feelings of confusion in the

> beginning lead you to have an enhanced learning experience in the grand scheme of things. The painful experiences (stress, doubt, uncertainty, etc) were ultimately the ones that contributed most to my growth because they motivated me to seek out viable solutions.

Lauren also talks about the challenges her and her group members faced. She writes:

> These past 8 weeks of PBL have been quite a journey! My group and I have traveled down many roads together. We got lost several times on this journey. We went down wrong paths, but asked for directions at dead ends. Personally, there were times I had to pull over to the side from this stressful adventure. Although the journey was filled with lots of bumpy roads, my group and I have successfully accomplished our final destination together. Nobody said it would be a smooth ride.

Summarily Danielle's comments from her reflection paper represent many of the feelings of growth the students experienced as a result of their PBL encounter. She begins with a quote by Napoleon Hill:

> *Do not wait; the time will never be 'just right.' Start where you stand, and work with whatever tools you may have at your command, and better tools will be found as you go along.* This quote accurately describes the fear I had to overcome through out the PBL experience. I was not comfortable with my level of competence during so many steps of the process. The evaluation scared me, the implementation gave me butterflies, and completing the binder had me feeling inadequate about my capabilities as a therapist. However, as the quote mentions, no matter how unprepared I felt, I had to work with the tools (skills) I had acquired thus far and forge ahead. Along the way I learned a lot about myself, grew as a professional, developed essential skills for group work, and gained

> confidence through my success and failures…As group facilitator I felt that it was not only my responsibility to keep us focused and moving forward, but to also try my best so that things were carried out smoothly. I often felt like I was using counseling skills with my group to ease their stress, negotiate ideas, and help explain other's point of views. This helped me grow a lot. I developed an appreciation for other's hard work and to value other's opinions even when they are different from my own. I found ways to communicate with my group that I have not needed to practice often such as constructive criticism, giving praise, and how to oppose someone's ideas without being rude. I also gained time management skills from this project. Our group met very often and for hours at a time. I had to learn to organize my time spent on other subjects to assure I had enough time available for group meetings and group homework….my goodness how I grew!

This growing process also related to the finding of the next category: Self-Efficacy. Many of the instructional strategies used in PBL and previously discussed in this findings chapter (authentic experience, collaboration, and reflection) were identified as having contributed to the student's sense of self-efficacy.

Greater Self-Efficacy

Self-efficacy is an individual's level of confidence and self-judgment regarding ability to organize and implement actions needed to perform effectively (Kielhofner, 2005). Many of the students indicated their PBL experienced contributed to an increased level of professional competence and identity. The examples below are representative of the perceptions shared by

many of the students. Elena shares her thoughts in her reflection paper

> I feel more confident in picking out and planning an event that I had at the start of this year. During times when I usually doubt my ability to do things, I had the utmost confidence that I was a capable occupational therapist. I feel like we all already had many of these tools and skills but we just never knew how to use them. PBL provided us with a real world problem that motivated us to use our hands, minds and emotions to learn. I now have a much stronger identity as an OT.

Similarly, BB reflects:

> It is true we learn about the world and ourselves through every experience… Through this case study I gained confidence to share my thoughts; I learned how to self-direct my learning, I increased my knowledge on medical conditions and on the process of what an occupational therapist does to provide services for their client. In many ways PBL is responsible for the force of conviction I hold that OT is something I will be happy doing and something I believe I will do well .

Likewise, Joan shares:

> Before this PBL experience I would probably say I am studying to be an occupational therapist. After this experience I feel as though I have 'become' (to some degree) an occupational therapist. This experience gave me a lot of confidence in my ability to be a competent practitioner. Although I have much to learn, I feel a stronger connection (a sense of belonging) to my profession.

The third and last thematic finding in this final reflection phase considers the students perceptions of the relationship of PBL to clinical reasoning.

The Relationship of PBL to Clinical Reasoning

The overwhelming majority of students indicated they saw a relationship between PBL and clinical reasoning. The following examples serve to illustrate this relationship. For example, one student stated:

> PBL gave me new insight in how to, in simple words, think…Since we did not have the answers given to us directly, it was vital to learn how to carry out our activity and the process following the intervention on our own. This forced us to learn the material in a more effective way. Processes such as the evaluation, intervention, and discharge were unclear to us in the beginning because although we were lectured on them, experiencing them and being able to do our own research and development gave us a better opportunity to actually learn the material.

Similarly, Shelly states the connection between PBL and clinical reasoning this way:

> The self-directed learning in PBL brings you into contact with an enormous amount of information on any given subject. It forces you to think about what information is relevant to solving the problem at hand. You learn to filter information, separating the relevant from the irrelevant. Clinical reasoning requires the therapist to view the client holistically. In coming to understand Evelyn, we gathered a lot of information. We then had to think about the information and decipher what was most relevant given her current situation.

Erica provides her insights on this relationship. She states:

> "Practice makes Perfect." This PBL assignment provided us with an authentic practice problem that allowed us to learn to think like clinicians. Clinical reasoning is a process that takes practice. PBL provided us with an opportunity for hands on learning. This is an

> essential component to developing clinical reasoning skills – reasoning skills do not manifest simply from reading about them, they need to be experienced. It was only by being place in an actual context that I came to understand all the different aspects of thinking required in making treatment intervention decisions.

Summarily, Marcy reflects:

> The most important thing I learned was you don't learn reasoning skills from a book, but through experiences and you grow from each case. That is the relationship I see between PBL and clinical reasoning. Through all of this I also gained a greater appreciation of the relationship of PBL to OT. PBL begins with a problem to solve. Clients seek out OT services due to a real problem in their life. In PBL a student-centered approach is encouraged. In OT, the therapist uses a client-centered approach. PBL empowers the student; OT empowers the client. In OT we do *with* the client not *to* the client. In PBL the teacher abandons his/her role as expert and works *with* the students, allowing them to direct their learning, Karen empowered us to be active participants in class. Collaboration is another essential consideration in PBL. Working collaboratively allowed me to share my perspectives with others and to learn from them as they shared their (sometimes differing) perspectives. This collaborative approach is also embraced in OT; the client, other interdisciplinary team members and extended family are all given voice. It is through this integration of knowledge that new knowledge is constructed and brought to bear on the problem. I can now understand why an occupational therapy educator would use a PBL approach.

In the upcoming section of key findings of the forth phase: Final Reflections, the results of the pre-post Self Assessment of Clinical Reasoning and Reflection (SACRR) will be presented.

SACRR Results

Quantitative data from the pre-test and post-test of The Self-Assessment of Clinical Reflection and Reasoning Pre-and Post test were analyzed using an independent t-test. Of the 36 study participants, 33 (91.6%) responded to the pretest, and 31 (88.5%) responded to the posttest. The results showed a statistically significant improvement at the $p < .018$. In attempting to determine whether the p-value using the independent samples t-test is an under or over estimate compared to the paired samples t-test (which was not used) is as follows: the worst case scenario is that the paired t-test would have exactly the same p-value as the independent samples t-test (significance = .018, 2-tailed). This is when there is no correlation between the 2 sets of scores (something I can not tell now since I am not able to pair up the scores). However, $r = 0$ is very unlikely, so the true significance level or p-value or probability due to chance is almost certain to be less than .018. A graphic of the finding from the pre-post SACRR can be seen in table 1 on the following page.

The Cronbach's alpha is a measure of internal consistency. Numbers close to 1.00 indicate a good internal consistency, whereas numbers close to 0.00 represent poor internal consistency. Cronbach's alpha was .762 for the pretest and .846 for the posttest, which suggest that even with the slight modifications made to the instrument for this study; the SACRR has high internal consistency. This high internal consistency suggests that the items that comprise the SACRR are measuring the same concept. This is important to ensure that the instrument is an appropriate choice to measure clinical reflection and reasoning. The SACRR accomplishes this in a theoretically sound and reliable manner.

The preceding thematic descriptions of the study's findings and the SACRR pre-post test help explain how the students experienced a PBL approach and it's relationship to clinical reasoning. Chapter five will discuss these findings and present the implications of the research.

Table 1 Pre-Post Test Scores

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
average	1	33	3.9347	.27776	.04835
	2	31	4.1117	.30485	.05475

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
average	Equal variances assumed	.082	.776	-2.429	62	.018	-.17693	.07283	-.32252	-.03134
	Equal variances not assumed			-2.422	60.527	.018	-.17693	.07305	-.32302	-.03084

CHAPTER FIVE

DISCUSSION AND CONCLUSION

The intent of this action research study was to implement and explore problem based learning (PBL) and its relationship to occupational therapy student's clinical reasoning skills. The classroom action research yielded the findings presented in the previous chapter. The research was posited on the following research questions: (a) how do the occupational therapy students participating in this study view their PBL experience? (b) how can PBL pedagogy aid an occupational therapy educator in fostering student's clinical reasoning skills? (c) what aspects of PBL do the students perceive to have contributed most to his/her development of clinical reasoning skills? (d) what was the nature of the clinical reasoning skills demonstrated by the students during their PBL assignment?

The findings discussed in the preceding chapter were organized and presented in four distinct phases: Orientation to PBL; Case Study Introduction; Meeting the Client; and Final Reflections. Phase one and two presented findings that focused primarily on how the students initially experienced and adjusted to the implementation of PBL pedagogy. The third phase presented key findings on the nature of clinical reasoning used by the occupational therapy students as they met and collaborated with the client on treatment interventions to address presenting problems. The findings from the fourth phase provided insight to the student's feelings and reactions following the completion of the PBL experience, as well as their perception of the relationship between PBL and clinical reasoning. Three categories (PBL, clinical reasoning, and the relationship between PBL and clinical reasoning) will serve as the foundation for discussing the relevant findings of this study. The current chapter is organized into three sections. The first section discusses the relevant findings. The second section discusses

implications for the practices of occupational therapy and the field of adult education. Finally, the third section offers suggestions for conducting future research on this topic and provides a summary of the chapter.

Section I: Relevant Findings

The data collected from participant observation, student documents, pre-post test and post interviews during the eight week action research study provided a wealth of relevant findings about the students experience with PBL and its relationship to clinical reasoning. These findings are organized in three main categories. The first category focuses on problem based learning. The second category highlights the findings pertaining to clinical reasoning. The third and final category discusses the relationship between PBL and clinical reasoning.

Problem Based Learning

PBL begins with an ill structured problem and requires students to direct their own learning in order to devise viable solution to the problem. Within this category of findings, the discussion will center on student reactions, collaborative learning, facilitator reactions, and the student facilitator relationship.

Student Reaction

As discussed in the previous chapter, student reaction to PBL (which, for most, represented a new method of learning) was varied. The participants in this study responded positively to learning in an environment that allowed for collaboration, self-directed learning, and hands-on experience in order to solve an authentic problem of practice. The process of adjusting to this new PBL environment, however, was captured metaphorically by one student as "swimming upstream but with the shore in sight." As implied by this metaphor, students immediately recognized that learning in a PBL environment presented challenges they had not

previously experienced in more traditional classroom settings. Students expressed feeling uncertain, stressed, frustrated, and overwhelmed. Many of these emotions were attributed to new role expectations, absence of enforced structure, and ambiguity about what they should be learning. This emotional state is consistent with Fiddler and Knoll (1995) who confirmed that students tend to experience anxiety with the lack of structure associated with PBL. The researchers found students' feelings of initial discomfort were often attributed to the "absence of a predefined cognitive framework that students could follow and use throughout the learning process" (p.18). The participants in this study did experience the initial discomfort, described by Fiddler and Knoll. Over time, however, their initial discomfort was mitigated as they grew in confidence. It is interesting to note that in this study, students seemed to revisit this "initial discomfort" phase each time they were presented with a new challenge or unfamiliar element of the problem.

Students in this course had been taught in the past by teachers who used primarily traditional methods; this is, the teachers generally provided an outline with information on the salient concepts under study. The students' role was to memorize the information handed to them and present it back in its original form, on an exam. By adhering to this process students could expect successful completion of the course.

The difficulty of adjusting to the expectations presented by the implementation of PBL seemed connected to students "learned" definition of roles in traditional classrooms. This was evident in the remark made by one student, Amy, during the first phase of the study. She stated:

> The prevailing mindset of most students is that it is the teacher's responsibility to ensure the students are given the correct answer. When this fails to happen students can become resentful, thinking 'this is what teachers get paid for.' I don't think PBL adequately

addresses the difficulty some students will have in adjusting to these new role expectations. It is easier said than done.

Amy's statement speaks to the implied expectation of what constitutes knowledge and the method from which knowledge is derived. Amy's expectation is that learning occurs when the teacher *tells* her the facts. The teacher's role is to observe and assess the process whereby students have received the "truth." Many students hold these preconceived and rigid notions of how learning occurs, and it is exactly these paradigms that PBL seeks to disrupt. Distinct from the positivistic viewpoint, PBL aligns itself with the philosophical perspective of constructivism. Hence, the overall conceptual framework for this study is social constructivism. Constructivism is a set of assumptions about the nature of human learning that guide constructivist theories and teaching methods. The theory behind constructivist approach is that learning occurs through 'doing,' not simply by being told what to do. Social constructivists concur with the basic premise that human beings make meaning as they engage in the world; however, from a social constructivist perspective, knowledge is actively created by social relationships and interactions (Fosnot, 1996; Jadallah, 2000). This perspective contrasts sharply with the dominant view that knowledge is transmitted from expert to novice.

The introduction of PBL necessitated that students re-conceptualize their approach to learning. Doing so required them to not only adjust their own learning style, but also to redefine their roles in the learning process. Students needed to begin to see themselves as active participants in the learning process. This would include acknowledgement of the value of their own strengths and previous experiences. Students would come to self-identify their learning needs and to develop a plan to fill in gaps in their knowledge. This adjustment period is reflected, in part, by the metaphorical comment of 'swimming up stream.' Amy's use of the

phrase “easier said than done” is of particular note. In light of the second half of the metaphor “but with the shore in sight,” the phrase could be understood to mean “difficult, but not impossible.”

While students described the process of adjusting to PBL as challenging, students also voiced positive attitudes and feelings towards some characteristics of PBL; these characteristics reinforced that assumption that ,PBL, though challenging, *was* do-able! This motivated students to “test the waters.” The use of a real-world problem was perhaps the strongest motivator. The students in this study actually grew excited when they were presented with the PBL problem because the problem -in their words - “mirrored the types of situations they would face as occupational therapy practitioners.” The notion that increased interest in the problem leads to stronger engagement in learning is well supported in existing literature. For example, MacKinnon (1999) observed that students in PBL courses may be more motivated to engage in the problem solving process because of its perceived relevancy to their learning needs. The particular PBL problem in this action research study further motivated the students because it challenged them in a productive way. The problem used in the present study was ill-structured and complex; few of the elements of the problem were known. The use of a real client added to the ‘messiness’ of the problem as students not only had to come to understand new concepts, but also had to integrate and apply their newly constructed knowledge as it related to an actual client. As stated above the use of this authentic problem resonated with the students because it was similar to the way they would need to function in their expected careers. The problem also offered them a “just right challenge” or as Vygotsky (1978) would say, the problem targeted the “zone of proximal development.” From a constructivist standpoint, the ill-structure problem presented to the students in this study provided favorable conditions for learning since, according

to Roth (1994), "the problem solver is facing conditions for which no known procedures are available" (p.216). In other words, the answer to the problem is unknown to the solver. One of the study participants commented on this condition; she stated, "There is no chapter in a text-book that we can turn to that was written exclusively for Evelyn."

The metaphor of swimming upstream but with the shore in sight aptly describes the students' experience throughout the duration of the study. Although faced with upstream *resistance* (for example, ambiguity, the need for higher order thinking, etc.) the students persevered (continually reached beyond their current ability level) because they saw the goal as meaningful and obtainable (they were solution seeking for a real life problem). In this sense, the PBL problem provided just the right amount of challenge for the students. Encouraged by their progress (their 'zone of proximal development' having been triggered) students were thus motivated to 'reach the shore.' Other aspects of PBL also contributed to their motivation.

In order to gain knowledge to solve the problem, students had to direct their own learning. There was no teacher to 'give' them the information or to determine for them what constituted important information. The students in this study experienced a sense of satisfaction from their self directed, individual and collective efforts to seek out information from a variety of sources. This process generated feelings of pride and ownership within the students.

Collaborative Learning

Students recognized that the collaborative learning aspect of PBL was important to their future careers. In most practice settings, occupational therapists are considered part of an interdisciplinary team. They make treatment decisions based not simply on their own thoughts and ideas, but those ideas filter through and integrated with the input of other team members, including the client. Although a few students raised concerns about the collaborative learning ("I

don't want to get stuck with someone who won't pull their weight"), the opportunity for collaboration was most frequently cited as one of the most positive aspects of PBL. As Stella's following statement suggests, students initially viewed the collaborative work as a safety net: "I liked that we are working in groups in PBL. Since none of us have any experience with this type of learning we will all sink or swim together." Students progressed from viewing their group work as a mere social support structure to the realization that it was a system that contributed to their own growth and knowledge. The students recognized that the group work provided them with opportunities to dialogue, receive and provide feedback, offer alternative perspectives on the issues at hand, negotiate conflicting viewpoints and individual interest, and compromise on differences in ideas, notably in the development of their evaluation form and treatment interventions. Through their collaborative work, students came to understand and appreciate the social construction of knowledge. Rachel indicated this understanding when she stated:

> I think running into the problems we did while making the evaluation actually helped us to see that we can do this and we can overcome our problems when we work together. This evaluation is really something that belongs to all of us because we all put our own thoughts and ideas into it.

A social constructivist would contend that the final product (the evaluation form) was very much shaped and influenced by the members of the group. Through interaction with and building on the insights of others, students co-constructed the evaluation. When students realized that, together, they were creating their knowledge, they were energized to continue their PBL journey.

Facilitator Reaction

The PBL literature identifies some of the challenges educators face when moving from a teacher-centered learning environment to a PBL student-centered environment. These challenges

included: relinquishing control, increased time and labor demands, and the need to re-examine long held beliefs about what constitutes knowledge (Maudsley, 1999; Kaufman and Holmes, 1998). I believe that these challenges are very real, but depend in part upon the background of the individual practitioner in the field. In the course of this study, for example, the transition from traditional teacher role to a facilitator role did not require a significant adjustment on my part. I have always preferred to have an active classroom, wherein students feel comfortable offering their opinions and questioning my views. My comfort is due in part to my previous career role as an occupational therapist. Working in the clinical environment necessitated that I considered the viewpoints of others. Listening to my co-workers' perspectives on a particular course of treatment often provided insights that furthered my understanding and at times convinced me to change my original course of action. There were also times when I had to defend my position for a specific treatment intervention as well as be an advocator for my client.

I did find, however, that at times, PBL was time and labor intensive. Some skeptics of PBL have alleged that this method of teaching amounts to little more than a mirage, wherein professors exalt the virtues of PBL (i.e. student led learning) not because they personally acknowledge or ascribe to them, but because in so doing, they can create an acceptable illusion that masks their real goal - relinquishing the responsibilities of teaching in lieu of other scholarly pursuits. To such critics, Knowlton (2003) offers the following response:

> Executing PBL *well* takes more time on the part of the professors, not less. Professor's responsibilities are not abdicated, only recast. Professors transition from playing solely an active role to playing both an active and reactive role in the teaching and learning process [*emphasis mine*] (p.11).

Knowlton's comment most accurately reflects my experience as a PBL facilitator during the eight week study. PBL required me to participate more actively in the students' learning process than did my prior roles in traditional classroom settings. As a PBL facilitator I was actively engaged in monitoring the students learning and interacting and coaching with them during this process. I did this by regularly (outside of scheduled class time) monitoring and conversing with the students on Blackboard. This allowed me to see how the students were progressing with their work and revealed key insights on their thinking process. After reading student postings, I would often seek additional information by asking them to expand on their thoughts and then return feedback on their responses. As facilitator, I frequently suggested informational resources for the students. I also accomplished this via Blackboard. I frequently checked the resources they had posted; this required me to access the web sites and read the material. I also posted information and resources (including several short videos and interactive activities) that I found while conducting my own internet searches. As facilitator I also encouraged the PBL process on a "human level". I used blackboard to offer notes of encouragement or send humorous jokes if I sensed (from the shifting tone of student postings) that their mood needed uplifting. This active participation in the learning process, outside of scheduled class time and occasionally on weekends, required a time commitment from me that was beyond what I had experienced when using traditional teaching methods.

Student-Facilitator Relationship

Because of my increased participation in the PBL process, I came to know the students personally. I knew their likes and dislikes, the sports in which they competed, important events (such as birthdays, getting a car), and unfortunate events as well, (such as losing a grandparent). I found this connection to be beneficial in many ways. For example, when trying to help students

understand a concept, I used examples that related to something meaningful in their life to help them make connections. An interesting finding from this study showed that although the students and I connected on an personal level (they shared their personal stories with me, had a surprise party and presented me with a gift at the end of the semester to thank me for their PBL experience) – they nevertheless, as the finding support, had difficulty seeing me as just another PBL member and facilitator. At some level, they were still aware of a power differential. This finding may bear more exploration in future studies as it is not a significant topic in current PBL literature. Comments on the end-of-course evaluations with respect to PBL indicated I empowered the students and gave them freedom to be their own educators: "She really embraced us and empowered us to learn and be passionate about learning." "Karen really empowered us to be active participants in her class." "Karen loves when we participate and ask questions." When placed in certain context, however, it was evident that they never completely lost their core belief that the 'teacher' had ultimate authority. An example occurred when the students in the first PBL lab were distraught about having to complete an evaluation with their client. While the crisis was short lived and resolved positively, it revealed important information about the student's progress through the PBL process. The students lashed out at me with powerful emotions, while disturbing, these emotions and verbalizations demonstrated that they considered me as something other than the expert, authority figure. In that moment, we were on equal footing. The students were fearful and angry and had no qualms about showing it. Moments later, however, they were able to rally and regain composure *only* when I reassured them of continued guidance and supervision. In a sense, they required me to step once again into the role with which they were most familiar, that of their leader, teacher and expert, for a brief period to help them through a difficult process. This experience seems to run contrary to Sadlo, Piper & Agnew's, (1994)

suggestion that "tutors create an atmosphere of shared learning and avoid negative judgment that can cause anxiety in the student and may interfere with the learning process" (p. 51). In the case of the OT students, the atmosphere of shared learning and the facilitator's attempt to avoid negative judgment did not completely remove the students' anxiety. The students still perceived they would be 'judged negatively if they did not perform well.

In summary, the student/facilitator relationship is among the most fulfilling aspects of introducing PBL to the curriculum. Students learn a new way of interacting with themselves and with their teacher as facilitator. The teacher, when putting in the extra effort, gets to know students personally and guides their learning – and helps to coach their insecurities to overcome obstacles to learning. Both students and teacher experience strong satisfaction and success with the learning outcomes. The next section explores the second category of findings that emerged from the study: clinical reasoning.

Clinical Reasoning

Unsworth (2004), defines clinical reasoning as "the thinking, decision-making and 'know-how' that therapists use in the conduct of their work, including the way they seek information, how they interpret the client's overall situation and how they derive a 'best' course of action with a particular client" (p.15). Imbedded in the PBL problem of this study was the task of researching information on the client's past medical history, researching and learning about the occupational therapy process, collecting client data through an initial evaluation, and designing and implementing a treatment plan. Accurately identifying client's problems and devising effective treatment interventions requires the occupational therapist to use clinical reasoning skills. According to Ikiugu (2007), "the extent to which a therapist is able to use clinical reasoning skills effectively determines the quality of care given to a client" (p. 106).

Overwhelmingly, participants in this study indicated that they gained a deeper understanding of clinical reasoning and its application to the OT process. They also engaged in the various types of clinical reasoning as identified by Mattingly & Fleming (1994a) and Schell and Cervero (1993). These findings on clinical reasoning will be discussed below. The discussion is organized under the following headings: outside of the text book, panning for gold: appreciating the process, thinking like a clinician, and authentic versus artificial.

Outside of the Text Book

"Having a definition does not necessarily simplify one's understanding of a phenomenon or the issues that it raises" (Hinojosa & Blount, 2004, p 161). The truth of this statement was born out in the student's situation regarding clinical reasoning. While they had read chapters that offered definitions on and descriptions of clinical reasoning, the students indicated they lacked a true understanding of the concept and continued to feel confusion and uncertainty. Eileen's comment, "Before this project I had no real concept of clinical reasoning. It was just a term used in class and something I had known at some point I would use to guide my work as a therapist." This statement by one student suggests that to understand and develop clinical reasoning one has to experience it and have opportunities to practice it.

The difficulty surrounding the 'teaching' of clinical reasoning is well documented in the literature; see, for example, Hammel et al, 1998, Stern, 1997, and Neidstadt, 1987. Questions have been raised regarding whether clinical reasoning can even be taught at all (Schuwirth, 2002). Some of the students' comments support the notion that clinical reasoning is not a teachable skill. Examples include, "it's something mysterious." and "it not something you can put into words." Donna's experiences with a therapist led her to conclude clinical reasoning is not something that can be explained or taught, "In reality, it is a skill which needs to be acquired

through practice it cannot be adequately taught in a traditional classroom." The attempt to operationalize the decision-making process is complex. Findings from this study, however, support that PBL as a teaching method *can* enhance students' clinical reasoning skills by facilitation the development of critical thinking skills, offering opportunities for collaboration and providing for periods of reflection. The following section discusses the students' processes in gaining a deeper understanding of clinical reasoning.

Panning for Gold: Appreciating the Process

The students' road to becoming more aware of the concept of clinical reasoning was marked with many missteps and mistakes; they tended to rush their way toward a solution instead of reason through the problem. Marie's suggestion that they take Evelyn swimming because "she told us she likes to swim; we can use swimming as an exercise to promote health" is one example of how students hurried to a solution. Students did not take time to consider all the pertinent issues. Evelyn already had a swimming program which she interrupted due to a phlebitis condition. Another example of students rushing versus reasoning their way to a solution is evidenced by Mary Beth's statement. Mary Beth was exasperated by the fact that Evelyn was already quite independent in performing her self-care activities of daily living. She stated "I didn't expect her to be able to do so much; it's hard to figure out how to help. Maybe we should incorporate meal prep because she seemed to be a little confused when asked to set the table." Another student's comment aptly depicted the students' pursuit of understanding clinical reasoning. She stated "so many times we thought we struck gold with our treatment ideas, only to realize (after processing them further with Karen) they were nothing but pyrite." This student's metaphor of panning for gold is useful. It helps illustrates the students' process of making sense of the great mass of information they obtained from the client evaluation. Some of

the findings from the study may be described though this metaphorical approach. The students spent many hours *sifting* through the data trying to determine its *value*. This process challenged the students to become more discriminating in attending to relevant clues when deciding upon a treatment plan. While students did increase their awareness of the nature and importance of clinical reasoning, they did not do so with complete independence. The findings showed that facilitator assistance was required with this process primarily by posing metacognitive questions. For example, when students were debating over a treatment idea, I asked "What factors are guiding your recommendations for treatment activities?" This prompted students to re-examine their reasoning behind their treatment choices. I encouraged further dialogue among the students to increase their reflection on their ideas and decisions.

Students gradually learned that while something might initially appear to be a good idea, when that idea was subjected to increased scrutiny, it would often prove to be an inadequate solution to address the client's needs. The student above alludes to this process with her 'panning for gold' quote. Students began to recognize that a 'get rich quick' plan does not apply to designing treatment interventions; the treatment planning process requires a substantial investment of time and energy. Only through hard work and perseverance, like the sifting and rejecting of worthless debris in the search for gold, were the students ultimately able to 'find gold' in developing a treatment plan that reflected the true nature of the clients concerns. As one student joked "we were like prospectors who final got a *mine* of their own"! Through ongoing development, experience and reflection, students became increasingly skilled in developing creative treatment activities that were meaningful to their client.

Thinking Like a Clinician

Thinking like a clinician involves the ability to simultaneously consider all types of clinical reasoning (procedural, interactive, conditional, pragmatic and ethical) identified in the literature by Mattingly and Fleming (1994) and Schell and Cervero (1993). The findings in this study showed the students used several of the aforementioned reasoning skills when integrating Evelyn's evaluation information and developing her intervention plan. For example, they used procedural reasoning when considering Evelyn's client factors (both her deficits and strengths), interactive reasoning when engaging Evelyn in conversation and collaborating on meaningful treatment goals, and narrative reasoning when developing and deepening their understanding of Evelyn's life story. Although this study did not specifically reveal students engaged in conditional reasoning (generally considered to be used primarily by expert clinicians) the students' thinking certainly demonstrated the development of conditional reasoning. This was especially evident in one treatment plan that envisioned a future in which Evelyn was an "inspirational speaker." This demonstrates what Fleming (1994) described as conditional reasoning: the ability for the practitioner to "form an image of future life possibilities for the person" (p. 234). Students also demonstrated pragmatic reasoning by considering how the context (i.e. Evelyn's physical and cognitive deficits, financial and time constraints, etc.) impacted treatment decisions. For example, students realized Evelyn needed structure and increased time for cognitive processing. Thus, they provided cue cards and allowed adequate time in their intervention plan with her. Ethical reasoning was shown by the students giving consideration to Evelyn's personal wishes and honoring them when developing a treatment plan that realistically addressed her limitations.

Simply demonstrating the various types of clinical reasoning does not make a therapist. Procedural reasoning, however, is often cited as the reasoning process most often used by novice occupational therapist. "Novice" indicates the clinician has less than one year of experience. A study by Alnervik and Sviden (1996) showed that OT's who practiced in physical rehabilitation used procedural reasoning most frequently; their use of interactive and conditional reasoning was extremely limited. Certainly, sophomore occupational therapy students would be considered novice in their thinking. Findings from this study, however, did not completely support the findings of Alnervik and Sviden. While the students' display of conditional reasoning was limited, their use of interactive, narrative and pragmatic reasoning was very evident throughout this study.

It is important to clarify, however, these three types of reasoning were seen in conjunction *with* - not absent from - procedural reasoning. This is exemplified by one of the PBL group's treatment approach that incorporated Evelyn's love of games into her treatment plan. Group members envisioned Evelyn hosting a once-a-month 'game night' as a means to increase her opportunities for social participation. Their treatment activity focused on having Evelyn design a game based on her favorite TV show "Grey's Anatomy (interactive reasoning)." She could use the game to kick off her first 'game night' get together. The students also designed a treatment session in which Evelyn created signature 'game night' invitations to send out each month (narrative and pragmatic reasoning). The students considered Evelyn's physical and cognitive limitations in planning the treatment sessions. They made adaptations to the activity so that it matched her capabilities; this allowed her to actively participate in constructing the game board (procedural reasoning). The students' consideration clearly demonstrated their use of procedural reasoning in combination with interactive, narrative, and pragmatic reasoning.

The difference in the findings from this study and that of Alnervik and Sviden's (1996) are quite thought provoking. It is possible that the students' clinical reasoning process was influenced by the profession's renewed focus on *occupation* and its change from emphasizing function to *fulfillment.* In other words, the profession of occupational therapy used to emphasize the client's occupation: What he or she did to perform his/her various life roles. Currently, however, the profession focuses more on fulfillment: What one does to find meaning in his/her participation in life. These latest changes within the profession may have surprisingly far-reaching effects. The profession recently adopted the slogan "*Occupational Therapy: "Living Life to Its Fullest,"* this replaced the previous decade-old slogan: *Occupational Therapy: Skills for the Job of Living."* According to Penny Moyers Cleveland, (current President of the American Occupational Therapy Association):

> This new branding is meant to associate OT in the public mindset with more than just function. Fulfillment is now the goal. The new brand is more in keeping with the context of occupational science, which sees "doing" as a first principle of human existence; that is, it is the nature of people to be active during their waking hours in activities and roles of their choosing that have meaning to them, personally. OT's job is to help them make healthy choices and undertake activities that lead to personal satisfaction in their lives. In this context, occupational therapy goes beyond the clinic and the classroom. It goes to a lifestyle that involves a healing connection with others through participation, in all aspects of one's life. (http://community.advanceweb.com p.1).

Preceding this slogan change, the Commission on Practice (COP; 2002) rescinded Uniform Terminology (which had been used since 1979 with three revisions) in favor of the Occupational Therapy Practice Framework: Domain and Process. This new document was developed in

response to the profession's need to "more clearly affirm and articulate occupational therapy's unique focus on occupation and daily life activities and the application of an intervention process that facilitates engagement in occupation to support participation in life" (AOTA, 2002, p. 609). The framework incorporated the language from the World Health Organization (WHO) which holds "the effects of disease and disability on health can be affected by an inability to carry out activities and participate in life situations as well as by problems that exist with body structures and functions" (OTPF, 2002, p.611). The direction of occupational therapy today is more accurately reflected by the language used by the WHO than the language of the rescinded Uniform Terminology (UT). UT was more closely aligned with the medical model.

Thus, current occupational therapy students are being socialized into a profession whose emphasis is on fulfillment. Additionally, they are learning the language of the Framework (based on WHO versus uniform terminology) in their academic preparation. It seems plausible, therefore, that these students could be less inclined to privilege the condition and more inclined to privilege the client than students/practitioners who were taught prior to these changes. It should be noted that the Alnervik and Sviden (1996) study was conducted more than twelve years ago, as was much of the OT research that discussed the types of reasoning used by novice versus expert practitioners. Since that time, as discussed above, significant changes have been made to emphasize the client-centeredness of practice and the use of meaningful occupations for interventions.

Authentic versus Artificial

Problem based learning allowed authentic engagement by the students because it was conceived around a complicated, real world practice problem. This contrasts with traditional learning methods in which students are often working with made-up cases or "artificially"

contrived circumstances. The use of a real client in the PBL scenario may have offered students a more holistic picture of the client; it is likely, that this added dimension influenced the students' simultaneous (albeit rudimentary) use of all the types of clinical reasoning. Jackie's statement, representative of many in the study, seems to support this possibility. She stated:

> Putting a face on these confusing medical terms (spasticity, aphasic, CVA) makes it almost a different world. Now I realize hey, we are helping this person, making her life better. Meeting the actual patient gave me so much motivation to do better and really find meaningful ways to help her.

Students recognized working with a real client has the potential to make more explicit for them the relationships between signs and symptoms, pathological and physiological processes, and diseases. This supports Rogers and Holm's (1991) statement that "explicit detail and many appropriate cues allow the clinical image of a client to become sharper and more realistic' (p. 1045). In this study, however, students also remarked on how interacting with a real client not only revealed the *clinical* image but also the "essence" or "spirit" that embodied the client, such as Evelyn. These findings lend support to existing research regarding the importance of the interaction between the therapist and the client in a range of areas such as the therapeutic relationship, collaboration, and ethical practice (Mattingly, 1991; Fleming; 1991; Mattingly, Hayes, & Fleming; 1994).

Furthermore, the findings from this PBL study (above) show that students believe their meeting and collaborating with Evelyn on a treatment plan provided an authentic learning situation. That situation stimulated their interest and motivation while fostering the clinical reasoning skills they needed to accurately frame the problem and seek real solutions. Evelyn was not a contrived or artificial case with a diagnosis written on a piece of paper. This echoes

VanLeit's (1995) findings that the closer a case approximates reality, the more it facilitates and enhances the students learning. Cases that move beyond paper seem to stimulate student interest. Students, in turn, seem to find real cases to be more meaningful and valuable; This study's findings clearly align with this notion. A final category of relevant findings, the relationship between PBL and clinical reasoning is discussed next.

The Relationship between PBL and Clinical Reasoning

As one study participant stated, "clinical reasoning is like a jewel, it needs a setting." This study showed that students found PBL to be an ideal setting to foster their clinical reasoning skills. For example, PBL facilitated their development of critical thinking skills, offered opportunities for collaboration, and allowed for periods of reflection. This section will discuss two specific findings from this study that support the positive relationship between PBL and clinical reasoning. One of these findings is that students in this study recognized that both PBL and clinical reasoning required them to use some of the same thinking processes. The other finding is that students readily identified that both PBL and clinical reasoning are collaborative processes.

Students acknowledge that PBL required them to demonstrate their ability to use concepts, frame suitable questions, and collect and analyze data. For example, when designing and implementing treatment interventions for Evelyn, the students employed concepts from their previous courses (anatomy, kinesiology, neuro-anatomy, psychology) as well as integrated their newly acquired information on CVA, phlebitis, and aneurysm. When designing questions for the occupational profile, students realized their questions needed to be uniquely framed from an occupational perspective in order get information relevant to the professions domain. They designed their questions to obtain information that would lead to a more individualized treatment

plan for Evelyn. In reviewing the collected data, the students developed and refined hypotheses about Evelyn's occupational performance strengths and weaknesses. In some instances students delineated potential intervention approaches based on best practice and evidence. For example, one PBL group in the study was surprised when, during the evaluation, Evelyn handed them a paper advertising a piece of assistive technology designed to stimulate nerves and induce movement. Evelyn questioned whether that device might be able to help her regain use of her right arm. This query required the students to research the information further, decipher the precise function of the equipment, determine whether there was any empirical evidence on its effectiveness, and consider cost and insurance coverage. They then had to apply that information to Evelyn's unique situation. This finding (the students recognition of a link between PBL and clinical reasoning) adds credence to Stern's (1997) study which showed support for the hypothesis that PBL strategies can serve as a framework for developing reasoning skills. Like the students in this PBL study, the students in Stern's study believed their PBL case course strengthened their ability to think through a situation and synthesize the issues involved.

The second link between PBL and clinical reasoning recognized by the students in this study was that both processes required collaboration on a variety of planes. Collaborative group work is an essential characteristic of the PBL process. Students confirmed the assumption of PBL that new knowledge is constructed through the exchange of ideas that occurs within the group setting. For students this exchange offered different perspectives which challenged some of their previously held assumptions and beliefs. It also provided an avenue for reflecting on these same assumptions and beliefs. Students also discovered that collaboration is an essential characteristic of the OT process because the OT process is a *client-centered* process. Within the general OT process, there is collaboration between the therapist (and the full scope of that

therapist's knowledge, background, experiences, etc.) and the client (and the entire breadth of that clients unique situation). The perspective of the client must be enjoined to the perspective brought by the practitioner (or, in this study, brought by the students). Students brought their knowledge about disease and disability and their beliefs that engagement in occupations affects health and performance. Evelyn brought her uniquely lived experiences and hopes for the future. The collaboration between Evelyn and the students allowed for the construction of new knowledge which was ultimately incorporated into the student's clinical reasoning process. Clinical reasoning process is part of the art of *practice* Rogers (1983) and "artful practice requires that the practitioner experience the treatment *with* the client." (Weinstein, 1998 p 154.). In carrying out the OT process with Evelyn (evaluation, intervention, and outcomes) the students in this study recognized and appreciated that clinical reasoning requires collaboration *with* the client. They needed to take into account the client's goals, values, and beliefs, and then pair this with their knowledge about human performance and the effect that disability and engagement in occupation have on function and fulfillment. In so doing, they experienced treatment with Evelyn, thus they found that collaboration was a clear link between PBL and clinical reasoning.

Implications for Practice

The finding of this study offer several implications for practice. First, the implications for occupational therapy will be discussed and then a discussion of implications for adult education practice will follow.

Occupational Therapy

One of the most significant implications from this study stems from the fact that it demonstrates both a quantitative and qualitative link between PBL and clinical reasoning. The occupational therapy profession encourages the use of evidence based research to provide best

practice. As Parker Palmer (1998) stated, “caring hearts unguided by critically thinking and informed minds are just as problematic as are critically thinking and informed minds unguided by caring hearts (p. 66).” This study contributes to the body of evidence upon which caring practitioners and educators (including fieldwork educators) may base their practice decisions.

Students demonstrated and reported that the opportunity to practice clinical reasoning in a PBL environment enhanced their understanding of the clinical reasoning process. As one student remarked, “Practice makes perfect.” This PBL assignment provided us with an authentic practice problem that allowed us to learn to think like clinicians.” This implies that it is reasonable to suggest that occupational therapy educators consider very early the incorporation of PBL into curricula in order to provide students opportunities for practice with PBL to facilitate clinical reasoning.

This study yields another implication for OT educators. Both facilitator and students in this study found that the professions’ occupational therapy practice framework (OTPF) provided excellent guidance for enhancing understanding of the OT process. When students were initially presented with a real client in an authentic context, they were overwhelmed by the myriad of information in front of them and even confused about how the mass of data related to occupational therapy. The OTPF guided the students to organize the information into a meaningful framework in which they could better understand the interrelatedness between such aspects as the client’s conditions, life situation, expressed needs, desires and the practice of occupational therapy. This implies that OT educators and clinicians might find benefit in using the OTPF to provide similar guidance.

It is interesting to note that these students had studied the OTPF (as well as several other subject areas including anatomy, theory, etc.) a semester previously and were surprised to

discover that PBL required them to draw on and integrate this knowledge. Before their encounter with PBL, the students considered the knowledge to be disposable since they had successfully completed these courses. This implies that PBL may be used to enhance the students' awareness that knowledge previously gained is not necessarily disposable. Through this PBL experience students grew to understand the importance of begin able to integrate and apply previously gained knowledge This implies that educators may wish to consider supplementing students learning methods with PBL in order to drive home the important message that knowledge is cumulative and builds upon prior experiences and learning. Students also indicated that their experience with a 'real' client in an authentic context significantly contributed to their learning. The benefits of this real life experience, as revealed by this study, were many. Benefits included, increased student interest and motivation. Students were increasingly invested in the learning process when they realized it directly related to their OT careers. As discussed previously, the students' interaction with a real client was crucial for development of the interactive, narrative and conditional reasoning. While students might have become quite familiar with Evelyn's conditions through the use of a paper case study, it was through the authentic experience that students came to know her as more than her medical conditions; she became a person about whom they cared very much. These benefits imply that OT educators should consider making increased use of real clients throughout the curriculum.

Further implications from this study relate to the fact that we are living in the 'Information Age." This era witnessed tremendous growth in almost every body of information. With this has come the need for professionals such as occupational therapists to have knowledge outside of their unique discipline. For example, therapists must not only understand OT, they must also be aware of and be able to discuss OT with many other interested parties. Students in

this study indicated that PBL provided them with a learning experience that made them feel "exponentially more competent in their ability to articulate their unique contributions as a member of an interdisciplinary team." It also heightened the students' awareness of the impact other professions have on occupational therapists' ability to efficiently and effectively meet the needs of their clients. The Accreditation Council for Occupational Therapy Education (ACOTE) 2006 Standards and Interpretative Guidelines, Standard B.9.3 states "The student will be able to promote occupational therapy by educating other professionals, service providers, consumers, their-party payers, regulatory bodies, and the public." PBL was effective in promoting this increased knowledge content in the students participating in this study. This implies that PBL is an effective method to achieve this important educational goal. OT educators should consider collaborating with other departments (i.e., marketing, research, science, and other allied health professions) to design interdisciplinary PBL courses that would serve to meet the demands of our information-dense society. According to Reinsmith, (1997)

> We should try to make our classrooms vibrate like a crossroads where powerful ideas intersect. Too often, especially in universities, classrooms are more like free standing islands --alone and aloof, reflecting the hyperspecialization of our various disciplines. But education, as Michael Oakescott has rightly observed, has more to do with conversation than with isolated bodies of information or fact. To converse is to connect and immerse oneself as part of an ongoing flow. Only appropriate contexts can allow such immersion to occur (http://www.ntlf.com/html/pi/9708/reinsmith2.htm).

One final implication for OT practice relates to this study's use and incorporation of the Online Information System: Blackboard. This system, referenced repeatedly throughout each phase of this study, enabled the PBL facilitator to closely monitor the students thinking process.

Through their continual postings, the students thinking and leaning became "visible" to the facilitator. Blackboard enabled the facilitator to provide on the spot interjection of metacognitive questions that guided the students learning. It served as the medium of exchange of student ideas, and the means by which they were able to communicate, collaborate, reflect and support one another throughout the PBL process. The usefulness and benefits of Blackboard in this PBL study imply that OT educators should give serious consideration to the increased use of electronic communication systems to augment student learning.

Adult Education

This study also has implications for the field of adult education. The use of PBL may, in fact, be highly suited to the diverse needs of an adult population. While some adult students may still bring to the classroom their view of the teacher as the authority figure (who will deliver facts and expect specific answers on an exam); it can be argued that most students will bring to bear their relevant experiences within a wide range of work environments. In workplaces today, whether in the broad health care industry or in manufacturing or service sectors, employees at all levels are increasingly expected to be problem solvers (despite sometimes imperfect information). In short, their work experiences often embody PBL at all levels. Thus, even if adult students are new to the field of OT (perhaps as mid-career transitions), the principle of learning-by-doing remains the same. Students still must address an ill-structured problem, seek information among fellow team members, and develop a process to achieve a successful outcome.

The facilitator role of a teacher may be enhanced in PBL for adult education as in the field of OT. In this research study, my facilitator role was more intensive as students sought guidance throughout the duration of the study and as they expressed strong emotions about their

ability to work effectively in a different learning environment. In contrast, many adult learners are already accustomed to the role of checking in with an authority figure (a boss, team leader, etc) when they need some help, but often they do so with a higher level of emotional maturity. General experience with life equips adult learners with greater self-efficacy; that is, they posses the internalized perception that enables them to figure out a problem – even if they have not stepped into a classroom in ten to twenty years.

In fact, the use of PBL may help relieve the stress that adult learners may harbor about their own ability to 'learn' after being away from school for years. Many adult learners recall unpleasant academic experiences because they did not fare well in traditional education settings. Because of the adult learner's anxiety, the facilitator may need to adapt his or her approach with students. For example, the facilitator might incorporate the work experiences of students in a particular class setting in order to show the group how they can learn from one another. Students will be more at ease once they understand that their personal experiences and attributes are valued and respected. This approach is similar to the case study approach used in major business schools that are on the forefront in developing successful, innovative educational methods. That approach seeks to develop business reasoning through a focus on a case with uncertain information. This resonates with the PBL approach.

Through PBL, adult learners are likely to grasp the OT curriculum in an efficient learning environment, even if they lack a background in the culture of health care. The biggest area of contribution of PBL to adult OT education will be to assist these adult learners in recognizing that they can develop clinical reasoning skills. They can adapt their existing reasoning skills and translate them to an OT setting to assist real clients with real needs. Through the process of PBL, adult learners can begin to recast their internal perceptions of themselves as emerging

practitioners with valid clinical reasoning skills. They can envision themselves as practitioners who can make a strong contribution to the practice of OT, even though they are joining the field at an older age. PBL facilitators can remind adult learners that their experiences are an asset to the field. As fellow adults, these students may already intuitively understand the unstated struggles and fears of their OT clients; a younger OT student who has not had to yet raise a family or to earn an income in an uncertain economy may not as readily relate to these struggles. Adult students can learn to leverage their maturity in developing solutions that meet practical needs of those clients.

Addressing Limitations

Limitations of this study were addressed in chapter one. Two of these limitations will be revisited here. One limitation was that I, as instructor, hold a position of power that may influence the degree of freedom that students feel to honestly express their feeling. I attempted to alleviate this limitation by promoting the attributes of PBL that seek to establish an environment of trust. My attempts included: (1) Exploring and adapting the learning environment to best meet the groups learning needs. Some of the things I did were rearranging furniture, bringing in food, using personal computers. (2) Modeling appropriate behavior. During my interactions with the PBL groups I demonstrated active listening, posed questions, and reflected the students' statements back to them and offered constructive feedback. I also encouraged them to challenge my viewpoints if they contrasted with their own. (3) Creating student ownership of the PBL assignment. This was achieved by allowing students to have control over their weekly lecture topics. Additionally, although they were provided with suggested due dates for their assignments, they were given the liberty of extending those deadlines as needed.

The students indicated that they appreciated these strategies as they empowered them in various ways. However, the students were never completely able to reconcile my new role as facilitator. They indicated that since I was the one determining their grade, I was ultimately the one with *power*. Since I was grading them, they at times felt afraid to freely express ideas or admit to confusion. This constraint became especially pronounced when I joined in the students' group discussions. Students also indicated (in their reflection papers) that they were concerned that I might view their missteps in their problem solving process with disapproval. Students feared that my viewpoint could negatively influence their overall grade.

Another limitation discussed in chapter one was my limited experience in carrying out action research. To address this limitation, I strived to establish trustworthiness of the study by collecting data (qualitative and quantitative in nature) from multiple sources (documents, focus groups, post interviews, field notes, etc.) The plethora of data provided triangulation. This served to enhance the trustworthiness of the study. Although I had never carried out a formal study on PBL and clinical reasoning, I had incorporated this teaching pedagogy into previous classes. My prior experience provided insight into how to design a classroom action research study; this contributed to the students' overwhelmingly positive response regarding their first PBL experience.

Suggestions for Future Research

This study adds to the body of knowledge for both occupational therapy and adult education; it answers specific questions surrounding problem based learning and clinical reasoning. As a research methodology, action research provided a forum wherein the experiences of the facilitator and students were a focal point of the research. The cyclical nature of action research is demonstrated and described throughout chapter four and highlights the phases

associated with action research (planning, action, observation, and reflections) as identified by (Denzin and Lincoln, 200; Kemmis and McTaggart, 1988; Patton, 2002). For example, students helped in deciding what topic would be covered each week in the lecture portion of class, utilized Blackboard as a means of communication and reflection, incorporated additional learning activities based on student concerns and progress. Throughout this study, students were given a voice in the decision making process.

Future studies could focus more intently on specific themes that emerged from this action research study. For example, one of the themes that emerged was "greater self-efficacy." The importance of self-efficacy cannot be understated. According to Bandura (1977); if the person's beliefs about his or her success are strong, then it is likely that the person will persist even through negative or unsuccessful experiences. Additional research studies may include a mixed method study on the relationship between perceived self-efficacy, PBL and clinical reasoning in occupational therapy students. Since this study was limited to occupational therapy students, other studies might include implementing a similar action research study in a Certified Occupational Therapy Assistant (COTA) program to determine PBL's relationship on COTA's clinical reasoning skills. Future studies might also examine the long-term effects of PBL on clinical reasoning.

Summary

This chapter provided a discussion of the study's relevant findings. The findings were organized in three categories; PBL, clinical reasoning, and the relationship between problem based learning and clinical reasoning. Relevant findings related to PBL included how students reacted to PBL, the importance of collaboration in PBL, how the facilitator reacted to the use of PBL within her classroom, and the significance of the relationship between the students and the

facilitator. Relevant findings related to clinical reasoning emphasized that the students thinking processes exceeded what typically is called ‘textbook’ learning. Using the metaphor ‘panning for gold, the chapter discussed how clinical reasoning was a process; it included trial and error, sifting though information and determining relevance and priority. The process was marked with steady progress but also had its ‘mistakes and missteps.’ In developing clinical reasoning, students began to actually think like a clinician; this process highlighted the importance of using authentic (versus artificial) problems for learning. This chapter also highlighter the findings on how PBL and clinical reasoning are related. Summarily, students found that both PBL and clinical reasoning required some of the same thinking processes. Furthermore, collaboration was a primary element of both PBL and clinical reasoning. This chapter discussed this study’s 10 implications for OT and Adult education. Suggestions for future research were related to connection between self-efficacy, PBL and clinical reasoning in occupational therapy students, PBL and clinical reasoning in the COTA, and examining the long-term effects of PBL on occupational therapy students’ clinical reasoning skills.

Reflection

Through the process of this study, I feel I have grown and developed in significant ways. I have of course, developed a greater appreciation for the research process. Additionally, this endeavor has expanded my knowledge on the use of qualitative and quantitative methods, and problem based learning. I did achieve my initial goal of learning how my occupational therapy students perceived a problem based learning environment and its relationship to clinical reasoning. Finally, and perhaps most importantly, I suspect that because this study was conducted in the context of my classroom, my students have also gained a greater understanding of the research process and an awareness of the role responsibility expected of occupational therapists in the 21st century. I am pleased to have encountered personal growth through completing this study, but I am most satisfied by the relationships that have grown and developed because of this work. It is through the continual building and strengthening of relationships such as these (with my students, colleagues, friends and family) that future enrichment is possible

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APPENDIX A

PBL Group Guidelines 10 A.M. Lab – Group 1
OT 241 Activity Analysis
Spring 2007

Collaborative groups are an effective aid to learning, but to work best they require that all group members clearly understand their responsibilities to one another. These collaborative group guidelines describe the general responsibilities of every member of your group. You can adopt additional guidelines if your group believer they are needed. Your signature on this sheet indicates your commitment to adhere to these expectations.

All group members agree to:

1. Come to each meeting on time.
2. Call group members if you will be late.
3. Hand in separate assignments on time. If you can't be there, email your information to the group.
4. Provide opportunity for everyone to contribute.

If a member of the group repeatedly fails to meet these guidelines, other members of the group are expected to take the following actions:

Step 1

- Ask for explanation and reminder of rules.
- Reflect behavior in weekly assessment

If not resolved:

Step 2

- Select one or two group members to bring the issue to the attention of Professor Brady

If not resolved:

Step 3

- Meet as a group with Professor Brady

Group Members Signatures: _____, _____,
_____, _____,
_____, _____,

(Developed by Dr. Allen, provided at the 2003 Summer Academy for Teaching Enhancement)

APPENDIX B

OT 241 Activity Analysis spring 2007
Assessment of Individual Performance in Groups (PBL)

Please write your name and that of each group member in a separate column across the top in the boxes to the right of the "ratings category" heading. For each of the assessment categories use the scale below to indicate the extent to which you agree it describes each person, and enter the appropriate number in the column under each person's name. Be sure to include a self-rating.

5= strongly agree **4= agree** **3=somewhat agree** **2=disagree** **1=strongly disagree**

Student Name:						
1. Does not miss out on group activities by being absent						
2. Comes to class on time						
3. Finishes all jobs assigned by the group by the specified deadline						
4. Comes to class prepared						
5. Listens well to others' presentations						
6. Contributes to the group's discussion without dominating it						

7. Brings new and relevant information to the group's discussion						
8. Communicates ideas and information clearly						
9. Presents logical ideas and arguments						
10. Asks questions that promote clearer and deeper understanding						

Please respond to the following two statements for each person in your group, including yourself. Be sure to link your responses to the ratings you provided on the assessment sheet.

1). Describe the ways in which this individual most helps your group's learning.

Student Name	Comment

2) Describe the ways in which a change in this person's behavior could improve your group's learning.

Student Name	Comment

(Developed by Dr. Allen, provided at the 2003 Summer Academy for Teaching Enhancement)

APPENDIX C

Example of PBL Model (as described in *Problem-Based Learning: A Self-Directed Journey;* Sue Baptiste MHSc)

1. Choose the learning scenario
2. Define any unfamiliar language or concepts within the written scenario and determine whether any of these are learning issues in themselves
3. Brainstorm around any issues that come to mind when reading the scenario
4. Extract from this open exploration key areas for potential learning
5. Organize these key areas within a logical, conceptual framework
6. Select priority issues for focused exploration
7. Develop a learning plan with specific questions
8. Define potential learning resources
9. Clarify that all group members understand and subscribe to the learning plan
10. Evaluate the learning experience of that particular session

Post PBL Interview Questions

What does PBL mean to you?

What was the problem-based learning experience like for you?

What is it like to be a student in a problem-based learning environment?

Based on your PBL experience, what would you see as the strengths of PBL, if any?

Based on your PBL experience, what would you say are the weaknesses, if any?

What would you change about the experience?

How can this PBL experience be improved/enhanced?

What does clinical reasoning mean to you?

Can you share an example of where you used clinical reasoning during treatment planning or intervention?

What is the relationship of PBL and clinical reasoning?

What are the main things you would identify as essential for developing appropriate treatment plans in order to achieve satisfactory outcomes? What is there relationship to PBL?

How effective do you think PBL is in fostering clinical reasoning skills?

What are some of the qualities you equate with occupational therapist who demonstrate strong clinical reasoning skills?

Reflect back on your experience over the past 8 weeks and identify what activities you found most effective?

Reflect back on your experience over the past 8 weeks and identify what activities you found least effective in promoting clinical reasoning skills?

Self-Assessment of Clinical Reflection and Reasoning (Adapted)

Response Key – DS = strongly disagree, D = disagree, U = undecided, A = agree, SA = strongly agree

	SD	D	U	A	SA
1. I would question how, what, and why I do things in practice.	☐	☐	☐	☐	☐
2. I ask myself and others 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 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 references	☐	☐	☐	☐	☐
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" for a variety of options.	☐	☐	☐	☐	☐
13. I would ask for colleagues' ideas and viewpoints	☐	☐	☐	☐	☐
14. I would ask for the viewpoints of client's family members.	☐	☐	☐	☐	☐
15. I cope well with change.	☐	☐	☐	☐	☐
16. I can function with uncertainty	☐	☐	☐	☐	☐
17. I regularly hypothesize about the reason for my clients' 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 events likely to result from a 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 would use clinical protocols for most of my treatment	☐	☐	☐	☐	☐
25. I would make decisions about practice based on my experience	☐	☐	☐	☐	☐
26. I use theory to understand intervention strategies.	☐	☐	☐	☐	☐

Vita

Karen L. Brady

Karen is a full-time faculty member in the Occupational Therapy Department at the University of Scranton. She holds a bachelor's degree in communications (B.A. 1983) from Mansfield University, an Associate Degree in Health Science (COTA) from Trident Technical College in Charleston, South Carolina (1995), and a Master of Science in Occupational Therapy from Misericordia University (MS, OTR. 1998).

Karen's clinical experience includes both direct client care and management positions. She has worked in a variety of practice settings including acute, rehabilitation, out patient, substance abuse, and long-term care. Her background also includes ten years of television and marketing experience.

Karen is a member of several professional organizations including the American Occupational Therapy Association and the Pennsylvania Occupational Therapy Association. She has presented at numerous conferences on a range of topics in the field of occupational therapy and adult education.