PROBLEM-BASED LEARNING TUTORS' BELIEFS AND CHALLENGES

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ABSTRACT

This study investigated the relationship between tutors' pedagogical beliefs and their comfort and challenges with the facilitation of Problem-based Learning (PBL) tutorials. Fifty-one tutors from two medical education programs that use a PBL approach participated in this study. The mixed methods study consisted of a researcher created online survey followed by interviews with some of the individuals who completed the survey. Recommended procedures were followed to establish reliability and validity of the survey consisting of descriptions of protypical PBL tutor pedagogical beliefs (Part A), and nondirective facilitation techniques (Part B).

Survey results showed a statistically significant relationship between pedagogical beliefs and facilitation comfort with PBL facilitation techniques. Interview data corroborated these findings. Subdivision of pedagogical beliefs into subtypes showed that participants believed more highly in student role and PBL approach beliefs than tutor role beliefs. Although participants were comfortable with both verbal and nonverbal nondirective facilitation techniques, they reported most comfort with verbal nondirective facilitation techniques. While interviewees indicated that they considered professional background influential on their comfort and success with PBL facilitation, survey results did not show a statistically significant correlation between professional background and facilitation comfort.

This study provides a theoretical framework that links PBL to Dewey's theory of inquiry and theory of experience, and Rogers's client-centred theory. In this study, participants' pedagogical beliefs were consistent with those embodied in Barrows's (1980, 1988, 2007) recommendations and principles for PBL tutors, with Dewey's (1910, 1938) theory of inquiry and of experience, and with Rogers's (1942, 1951) client-centered theory. The nondirective facilitation techniques with which participants were comfortable parallel techniques of client-centred theory and therapeutic communication. Participants considered the nondirective techniques of the tutor similar to the patient-centred techniques used in clinical roles.

Seven characteristics of PBL tutors emerged representing an interlocking set that tutors draw upon in their interaction with learners. Further research should be conducted

to refine the survey, and investigate factors influencing differences in tutor pedagogical beliefs and the types of nondirective techniques with which they are less comfortable.

Keywords: **PBL tutor, PBL tutor beliefs; PBL tutor comfort; PBL tutor challenges; PBL tutor characteristics; nondirective facilitation**

Subject Terms: **Tutors and tutoring; Problem-based learning; Medical Education; Professional Education**

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CHAPTER 1: INTRODUCTION

This study investigated the relationship between tutors' pedagogical beliefs and their facilitation comfort and challenges when working in a medical education program that uses a Problem-Based Learning (PBL) approach. PBL has been viewed as the most outstanding curriculum innovation in medical education (Holmes and Kaufman, 1994). In PBL the teacher who usually works with a small group of students is referred to as tutor to reflect the facilitation behaviours of this role. This form of facilitation, as defined by Barrows (1988), requires the tutor's awareness of the inquiry/reasoning process coupled with the tutor's willingness to allow the student to self-direct their learning through experimentation, inquiry, and study. The facilitation process uses a mix of direct and nondirective guidance enabled through verbal and nonverbal manner. Although the PBL approach has increased in popularity, tutors' beliefs in the pedagogical principles associated with the PBL tutor role, their comfort, and challenges with the facilitation process have not been investigated to the same extent as these topics have with students. This study specifically looked at the segment of the tutors' pedagogical beliefs in PBL tutor principles that surrounds enabling problem inquiry and tutors' comfort and challenges implementing these beliefs. In this study, tutors who work in a program that applies PBL are referred to as PBL tutors. The terms inquiry, reasoning, and problem solving are used interchangeably.

Background

This investigation stems from the researcher's experience as a PBL tutor, as a tutor trainer, conversations with PBL tutors about their role and learning, PBL scholars, and a concern for the lack of research on the tutor's view of their role. Since the core works on PBL were published by Howard Barrows (1980) it has been argued that assuming a PBL facilitator role often requires an adjustment in the teacher role that is difficult for many faculty to learn (Baptiste, 2003; Neufeld & Barrows, 1984; Neville, 1999; Wilkie, 2004). Although the facilitative role has been "open to interpretation" (Neville, p. 400), many scholars have speculated that PBL tutors struggle to incorporate nondirective facilitation techniques into their role because this type of facilitation requires

different behaviours from the traditional directive teaching and general facilitation skills to which they are accustomed (Boud & Feletti, 1999; Jung, Tryssenaar & Wilkins, 2005; Olmesdahl & Manning, 1999; Rogers & Freiberg, 1994; Schmidt, 1994; Wilkie, 2004). Numerous studies report tutor difficulties in transitioning to the PBL tutor role, which has been attributed to the tutors' professional background (Camp 1996; Dahlgren, Castensson, and Dahlgren, 1998; Gijselaers, 1997; Jung et al. 2005; King, 1999; Martin, 2004; Neild, 2004; Rideout, 2001; Maxwell & Wilkerson, 1990; Windschitl, 2002). Professional background refers to the intellectual and lived experiences of teachers and tutors. Windschitl (2002) speculated that pre-existing states of mind about teacher behaviours could interfere with the tutor's ability to acquire new teaching behaviours. Gijselaers found that the stability and generalizability of tutor behaviour was related to departmental affiliation. Hoogveld, Paas, Jochems, & van Merrienboer, (2002), in a study of teachers in teacher-training colleges in the Netherlands, found experienced teachers were slow to change from a transmission style to a coaching style because they had been strongly conditioned by prior teaching and learning experiences. Neville (1999) recommended that future studies of PBL tutoring should consider context-specific characteristics and departmental and/or organizational background of tutors.

Barrows (1988) called attention to the teaching challenges of the new PBL tutor in the method's early days. Since then, research on tutors has broadened to the areas of tutor training, tutor characteristics, tutor behaviours, and tutor evaluation instruments (Dolmans, 2005; Koschmann, Glenn & Conlee, 1999; Schmidt & Moust, 1995; Wilkie, 2004). Tutor behaviours have been described with synonymous terms, such as facilitation, process, questions, facilitation strategies (Hmelo-Silver & Barrows, 2006) and tutor moves (Koshmann et al., 1999). In the tutor behaviour research as reviewed in this thesis, it appears studies have taken an indirect and nonspecific approach in looking at the tutors' challenges with nondirective facilitation. Most of this research has examined the tutor's use of subject matter knowledge by classifying tutors as either content experts or noncontent experts (Davis, Nairn, Paine, Anderson, & Oh, 1992; Gilkison, 2004; Silver & Wilkerson, 1991). Within these classifications research targeted the amount and kinds of direction tutors give to students.

Tutor behaviour has also been examined through tutor effectiveness studies. Tutor effectiveness data are commonly obtained from course evaluations where students, at the end of the unit or course, rate tutors. Many of these studies also suggest

that tutors find it difficult to leave behind the directive and control behaviours with which both tutors and students are familiar (Miflin, 2004; Wilkie, 2004).

While the literature acknowledges challenges in transitioning from directive to nondirective tutoring, research on this topic is sparse and softly focused, often surfacing as an aside to problems such as tutor retention or the student-tutor relationship (Maxwell & Wilkerson, 1990). A few studies in this area investigated PBL faculty attitudes and opinions about PBL in comparison to their perspectives on traditional curriculum (Vernon, 1995; Vernon & Hosokawa, 1996; Wilkie, 2004).

PBL practitioners and researchers agree that the tutor's ability to facilitate the PBL model, which is described later in this chapter, is critical to the successful implementation of PBL (Barrows, 1980; Berkel & Schmidt, 2000; Jung et al., 2005; Mayo, Donnelly, & Schwartz, 1995). Yet, the fidelity of the PBL model is often compromised when the facilitation role varies or is not appropriately carried out (Barrows, 1988; Rideout, 2001). Neild (2004) proposed that PBL is continually at risk of degrading because PBL tutors do not always follow the PBL model in practice. Due to the tutor's importance in the PBL process, PBL tutor preparation programs aim to promote a change in teaching and learning methods and behaviours. Some researchers view this change as similar to acquiring constructivist principles of teaching and learning (Dolmans & Ginns, 2005; Dolmans et al. 2005; Kaufman & Holmes, 1998).

Levin (2003) considered it unlikely that teacher development involving adaptation to a significantly different teaching style is possible without dilemmas and challenges to pedagogical thinking and teaching beliefs. Pedagogical thinking and beliefs commonly refers to thoughts about teaching and learning. Mezirow (1991) labelled this teaching situation as a "disorienting dilemma" that precipitates transformative learning in adults (p. 168). Although there have been reports that some PBL tutors adopt the new role with ease (Rideout, 2001), the reasons for this are unclear. It has been argued that instructors in higher education who are used to traditional transmission teaching methods face considerable challenges in moving to teaching methods that require new teaching behaviours (Hoogveld et al., 2002; Neufeld & Barrows, 1984; Tillema, 1994).

Changing beliefs and behaviours is, according to Carl Rogers (1951), frightening to many individuals. It has been reported that some faculty are resistant, sceptical, and hostile to PBL as a curricular innovation (Maxwell & Wilkerson, 1990), and some speculate that this is caused by requirements for individual change. Walton and Matthews (1989) postulate that this may be due to a lack of understanding or knowledge

of the philosophy of PBL. Entwistle, Skinner, Entwistle, and Orr (2000), in their research on teachers' ways of thinking in higher education, suggest that the challenge of a change of teaching role stems from other factors, such as the influence of prior knowledge, beliefs, experiences as a teacher and as a student, and expectations of teaching status. Earlier, Rogers (1942) considered a teacher's philosophical orientation a significant factor that influences their practice.

It could be argued that PBL exposes tutors to alternative educational approaches, stimulates critical reflection about beliefs about teaching and learning, and challenges tutors to develop new facilitation skills. Mezirow (1991) defined critical reflection as "the assessment of the validity of the presuppositions of one's meaning perspectives, and examination of their sources and consequences" (p. xvi). When Major and Palmer (2006) investigated tutors' self-reports of the impact of PBL following a campus-wide training initiative, they found that the PBL tutoring experience had a positive carryover effect in that PBL tutors were also more facilitative in other teaching contexts. Similar shifts to a more facilitative, nondirective style of teaching in nonPBL related teaching are reported from PBL faculty after working as PBL tutors (Rideout, 2001). Why some instructors are drawn to PBL, carry out the tutor role effectively, and adapt PBL methods to non-PBL contexts and others do not is not well understood. No research could be found that explained this phenomenon.

Teaching methods that involve a pedagogical shift from traditional teaching often characterized as teacher-centered to a student-centered approach like PBL bring changes in expectations for teacher and student roles (Barrows, 1988; Maudsley, 1999). In the teacher-centered approach, the teacher develops and directs the curriculum and provides information, learning activities, resources, and assessment measures (Holmes & Kaufman, 1994). In a student-centered approach like PBL, the teacher requires a different skill set and orientation to stimulate student learning through inquiry, to enable self-reflection, self-direction, self-regulation, to promote collaborative small-group learning, and to orchestrate these skills using techniques in an indirect manner. Inquiry is regarded as a specialized type of participative and experiential learning (Rogers & Freiberg, 1995). Taken together self-direction, self-reflection and self-regulation are dimensions of learner autonomy (Benson & Voller, 1997; Little, 1991). In this context learner autonomy does not refer to learning without a teacher at home or with a computer. Zimmerman (2001) defined academic self-regulation as the extent learners

are metacognitively, motivationally, and behaviourally active in achieving their learning goals. Enabling learner autonomy is central to the PBL tutor role.

Adopting new teaching methods may require adjustments in assumptions and beliefs about teaching and learning. Some scholars maintain that adoption of the role of a PBL tutor requires a profound reframing of teaching beliefs (Rideout, 2001; Trembly, Tryssenaar & Jung, 2001). Teaching beliefs are considered the basis for an individual's philosophy of education (Zinn, 1998/2004). Some propose that teacher beliefs and practice are a dynamic two-way relationship, since beliefs are also influenced by practice (Ross, Cousins, & Gadalla, 1996). The relationship between tutors' comfort with the techniques they use in a PBL setting and their pedagogical beliefs have not been documented to the knowledge of this author.

Kagan (1990), focusing on the public school context, proposed changes cannot occur in teaching practices without changes in teachers' beliefs and the study of beliefs is an important aspect to understanding educational practice. Pintrich (1990) argued that beliefs are the most valuable psychological construct for teacher education. Although scholars indicate that beliefs are difficult to change, they are predicted to do so under specific conditions. Dewey (1938/63) theorized that genuine educational experiences lead to changes in beliefs. Similarly, Prawat (1992) argued that individuals must recognize dissatisfaction with their existing beliefs, must find useful alternatives, and must be able to connect old beliefs to new conceptions in order to fully commit the energy to change their beliefs. In the context of PBL tutoring, Barrows (1988) recommends that PBL tutors engage in active reflection on their tutorial practice to gain insight into their behaviours.

The implications of everything mentioned in this section are that difficulties individuals face in transitioning to the role of PBL tutor has been an ongoing topic of interest in the literature since PBL began. Researchers have approached the topic from various perspectives with most emphasis given to examining content experts, noncontent experts, and directive tutor behaviours. Explanations for difficulties in adopting the role have been attributed to a range of factors including conditioning to conventional teaching roles and beliefs, professional background. However, fewer studies have examined the facilitation process used by the PBL tutor, their use of nondirective techniques and their pedagogical beliefs.

Statement of the Problem

The problems addressed in this study stem from the lack of empirical research on the relationship between tutors' pedagogical beliefs and their tutoring experience (Vernon, 1995; Wilkerson & Maxwell, 1988; Wilkie, 2004). In particular, this study investigated the relationship between tutors' pedagogical beliefs surrounding the tutor role, student role, and PBL approach in a PBL context as identified by their pedagogical beliefs concerning PBL recommendations and tutor principles suggested by Barrows (1988, 2000, 2007) and facilitation comfort and facilitation challenges as identified by PBL nondirective facilitation techniques. Within this broad area, the tutors' pedagogical beliefs about cognitive and social dimensions of inquiry and problem-solving and comfort with nondirective facilitation as manifested in PBL and PBL tutor principles were of special interest. This included perspectives on learner autonomy or the rights of students to select and manage their learning goals and process. In addition, this study investigated the relationship between tutors' background and their facilitation comfort and challenges. In doing so, the present study extends the research about the relationship of tutor background factors and the tutorial process. Such knowledge would be directly helpful to PBL tutors, to university personnel developing in-service PBL programs, and to administrators and others considering implementing PBL programs. In the absence of such pertinent information about factors that may influence the PBL tutor role, other research that focuses on the PBL tutorial experience cannot be accurately assessed.

Rationale and Theoretical Basis

The rationale and theoretical basis for this study begins with an overview of PBL and the role of the tutor as the context in which the theoretical positions that follow are examined. The theories come from the fields of education and psychology supported by the expectation that new knowledge could be gained by this study, and justified the expectation of a possible relationship between the pedagogical beliefs of PBL tutors and their comfort and challenges with nondirective facilitation. In each section, the major constructs of the presented theories are described. A construct refers to a collection of elements that have something in common that differentiates them from other elements (Pope & Keen, 1981) and that exist within the mind.

The Context of PBL

The context of the problem addressed in this study is tutors working in medical education programs in Canadian universities that use a PBL approach. Barrows (1980) described PBL as "the learning that results from the process of working toward the understanding or resolution of a problem" (p.1). Maudsley (1999) considered PBL a combination of educational methods and a philosophy that is student-centered using problem-first learning. PBL experiences are designed to foster the integration of theoretical knowledge with practical knowledge so that students develop a personal construct of knowledge and master the inquiry process. The goals of PBL aim to develop skills in lifelong learning, self-directed learning, communication, teamwork, social skills process, and to inspire problem-solving.

PBL originated in the 1960s as a result of medical education program reforms aimed at improving the lifelong critical thinking, knowledge retention, and clinical reasoning of new graduate physicians. Three medical schools pioneered the process: McMaster University in Canada, The University of New Mexico in the United States, and Maastricht University in the Netherlands. The use of PBL in medical education has been continually researched more than any other approach in medical education (Norman & Schmidt, 1992). Although the effectiveness of PBL compared to other teaching strategies used in medical education has been mixed, Shin, Haynes, and Johnston's (1993) research on graduate outcomes found that postgraduates from a PBL medical school felt better prepared for practice in the areas of independent learning, self-evaluation, and problem-solving skills compared to fellow post graduates from a non-PBL medical school. Koshmann (1995) reported that the curricula of all North American medical schools had incorporated aspects of PBL. Camp (1996) considered PBL as an "explosion" in educational curriculum design that has spread from medical education into schools of health sciences, nursing, dentistry, pharmacology, veterinary medicine, architecture, business, law, engineering, police science, social work, education, and many other professional fields. That explosion has continued in the last 15 years into non-professional education such as law enforcement, K-12 schooling, and to online delivery formats for a wide range of post-secondary programs. By 1999 the now inactive database, The Australian Problem-Base Learning Network, listed hundreds of PBL articles from 31 disciplines.

The PBL learner, in small tutorial groups of six to eight students, engages in an inquiry and knowledge construction process that is ignited by a problem situation

(Barrows, 1980). Problems are designed to provide a purpose for acquiring new knowledge while encouraging students to take responsibility for personally constructing meaning. Although the literature sometimes uses the term *case* interchangeably with *problem* when describing PBL features, problem in PBL differs from case histories. In case histories all the important information to solve case problems are made available to students. In PBL, it is typically unavailable (Barrows & Tamblyn, 1980). The tutor guides students through the inquiry process of a problem during tutorial groups sessions, which usually occur on a regular basis each week. Students identify problems, hypothesize causes, explore existing knowledge (learning resources such as literature or individuals), explore mechanisms that might explain problems and hypotheses, formulate learning issues that extend and transform knowledge, and design problem management solutions.

Barrows and Tamblyn (1980) argued that the clinical reasoning process is similar to the hypothetico-deductive process and is "the scientific method of clinical medicine" (p.19). One of the first academic tasks of the students, as they work through this reasoning process is to formulate questions. These queries or learning issues should be designed to allow students to progress to a new or higher level of understanding. Researching and evaluating learning issues is divided among group members. In addition, to working independently on their inquiry skills during tutorials, students are also expected to undertake self-directed study between group meetings to foster learning autonomy. In each subsequent session students discuss and synthesize what they have learned and apply it to the case problems. As hypotheses are re-examined, new learning issues direct further knowledge acquisition. Students find the necessary resources and structure the acquisition of knowledge that suits their prior learning, their individual learning style and present and future knowledge needs.

Variations of PBL

What has come to be regarded as the original PBL model was designed by Barrows and others at McMaster University in 1968. This model is often referred to as "authentic" PBL, which means that PBL should be authentic from three perspectives: problem selection, problem simulation format, and PBL process (Barrows, 2000). Authentic problem selection means the PBL curriculum should contain real world problems likely to be encountered by graduates of the program. Authentic problem simulation formats means that the design of the problem simulations formats should

challenge the same reasoning skills as required in the current or future practice of program graduates. Authentic PBL process refers to the sequence of learning activities the students go through working with a problem. They should be the same activities as those carried out in their subsequent practice as graduates. Barrows (1986) developed a taxonomy of PBL methods that provided the first guidelines that distinguished PBL from other teaching and learning strategies and differentiated PBL variations. According to Barrows, some applications have been labelled PBL, but bear little resemblance to the original PBL model. For example, PBL approaches that do not allow free inquiry and instead use complete cases or sequentially presented cases with a "seven-step" procedure vary from authentic PBL.

Pure PBL, a term used synonymously with authentic PBL, has been characterized as a learning environment for the learner that is active, adult oriented, problem-centered, student-centered, collaborative, integrated, interdisciplinary, utilizes small groups, and usually presents problems based on a clinical context (Camp, 1996). The curriculum does not include lectures, presentations, or labs. Some applications of PBL combine traditional lecture-based curriculum activities with PBL small group problem-based activities. Authentic PBL most often takes place in professional programs such as medicine or the health science programs (nursing, pharmacology, dentistry, physiotherapy, occupational therapy, and social work).

While variations of PBL have surfaced in medical education for a variety of reasons (Charlin, Mann, & Hansen, 1998), to this author's knowledge the relationship between tutors' pedagogical beliefs and their comfort and challenges with PBL facilitation has not been investigated.

The Role of the PBL Tutor

This section examines the distinguishing characteristics, functions of the general role of the tutor, and guidelines for nondirective facilitation. In discussing the facilitation role of the PBL tutor, Barrows (1986, 1988) considered the nature of tutoring an unplanned variable in the quality of PBL that acts as a major determinant of the success of PBL. He claimed that the tutor's skill influences the development of independent student thinking and reasoning. In essence, the tutor's function is to engage with learners in a positive and active role at the metacognitive level in solving problems. Schön (1983) defined metacognitive problem-solving as reflection in action or a conversation with a problem.

The facilitation role of the PBL tutor role differs from the traditional role of the teacher in higher education (Barrows, 1988; Colliver, 2000; Hemlo-Silver et al., 2006; Norman and Schmidt, 1992; Wilkie, 2004). Dahlgren (1998) described the teachers' role as either a transmission-oriented perspective or an interaction-oriented perspective. The transmission perspective refers to a focus on teachers' actions, learning environment control, and curriculum content. The interaction-oriented perspective refers to a teacher role in a curriculum directed by students' different ways of thinking, where students are empowered to make learning choices. Since tutoring in a PBL approach is a type of interaction-oriented perspective, it is anticipated that for some teachers, tutoring in a PBL context will require a change in beliefs or perspectives from the transmission-oriented perspective to the interaction-oriented perspective.

Researchers and experts in the PBL field have examined tutor facilitation behaviour from multiple perspectives (Anderson, 1996; Hemlo-Silver & Barrows, 2006; Kaufman & Holmes, 1998; Koschmann, 2000; Norman et al., 1992; Wilkie, 2004). Anderson's (1996) review of the PBL tutor literature resulted in three tutor knowledge areas: (1) philosophy of problem-based learning; (2) structure of problem-based learning; and (3) process of clinical reasoning/critical thinking; and three categories of tutor skills: (1) facilitation skills; (2) content knowledge skills; and (3) group learning skills. Norman et al., (1992), proposed several cognitive psychology constructs germane to the PBL tutors role, such as: activation of prior knowledge, the representation of declarative and propositional knowledge, elaboration encouragement, contextual learning, stimulation of curiosity and cognitive dissonance. Tutor knowledge, skills and constructs appear to be a combination of PBL approach, student role and tutor role. The tutor's job is to support learning regardless of problem content. It is the manner in which the tutor handles the learning process rather than the tutor's content knowledge that differentiates tutor behaviour. In a PBL context the tutor focuses on the goals mentioned earlier: development of learner autonomy, lifelong learning, self-directed skills process, communication, teamwork, and social skills process and inspires inquiry and problem-solving (Barrows & Tamblyn, 1980). The goal is not only to support the student in learning the content related to specific problems but to guide learners to autonomously explore the broader range of learning issues that are relevant and transferable to other problems (Barrows, 2001). In general, the tutor appears to portray a humanistic approach. Blust and Willower (1979) considered that teachers with a humanistic

approach believe students should be empowered to make learning choices and trusted to behave in appropriate ways.

When explaining the change processes that occur in the tutorial group, Barrows (1988) referred to the "architecture" of the small group process as consisting of three dimensions that he described as "a sequence of reasoning; a sequence of changes in the tutor's role; and the changes in the group's interpersonal behaviour" (p. 15). He expected tutoring style to change over the course or unit with the same tutorial group "from modelling to coaching and to fading away" (Barrows, p.15). At the beginning of a curriculum unit, when students are unfamiliar with PBL, the tutor needs to initially provide some direction and model reasoning skills in the inquiry into case scenarios. As students gain skill in self-directing learning and inquiry, tutor's coach student reasoning, stimulate students to take leadership, and guide in a nondirective manner without giving directions.

The PBL tutor role employs a mix of direct and nondirective facilitation techniques that adjust to circumstances. Further, the type of nondirective facilitation technique varies from implementing verbal or nonverbal nondirective techniques depending upon situational requirements. In this study, verbal nondirective facilitation refers to overt verbal action that applies tutor principles where the intention of the action is explicit. Nonverbal nondirective facilitation refers to verbal restraint to implement tutor principles where the intention of no tutor intervention is not readily obvious. Barrows (1988) developed 13 general tutor principles. A shortened version of the principles appears in Table 1:1 Barrows (1988) tutor principles - Condensed. For a complete description of each principle, see Barrows (1988). Ideally, tutors use facilitation to implement these tutor principles.

Table 1:1 Barrows's (1988) PBL Tutor Principles - Condensed

1. The tutor's interaction with the students should be at a metacognitive level.
2. The tutor must carefully guide the students through all the steps of the particular learning process required. (See Barrows, 1988 for a complete description)
3. The tutor must push the student to a deeper level of understanding and bring out the knowledge that is embedded in the student's mind by the use of constant, almost irritating questions.
4. It is essential that the tutor avoid expressing an opinion concerning the correctness or quality of any student's comments or contributions.
5. It is also essential that the tutor avoid giving information to the students.
6. Discussions between students, comments and criticisms of each other's ideas or knowledge must always be encouraged.
7. All decisions should be a group process and have a group consensus. The tutor must be certain that all students contribute to the group's activities.
8. The tutor should prevent discussions from being only between the tutor and students.
9. Challenges should be given to students with they are correct as often as when they are incorrect.
10. The tutor should modulate the challenge of learning.
11. The tutor should monitor the quality of each student's educational progress and use metacognitive probes to establish or deny concerns about learning adequacy.
12. The tutor needs to be aware of potential interpersonal problems in the group and make interventions necessary to maintain group process in which all contribute.
13. None of these tutorial activities should become the sole task of the tutor. (pp. 18 -19)

The tutor role includes modelling higher order thinking and challenging student thinking through jargon-free dialogue (Barrows, 1988). The tutor chooses easily understood words and conversational phrases conducive to an informal problem-solving discussion. Using short, probing questions that resemble telegraphic speech, the tutor uses words and phrases such as, "Why?" "Can you explain what you mean by that?" or "How do you know that is true?" Through this line of questioning PBL tutorial groups become highly intellectually and emotionally charged settings. Through tutor modelling, students engage in a process of appropriation and use conceptual tools, which Fogarty

(1999) termed the "tools of constructivism." Cook et al. (2002) described appropriation as a process by which conceptual and practical tools in a social environment, such as a PBL tutorial session, are adopted by an individual and internalized as a way of thinking. Knowledge is reconstructed as it is internalized, whereby the learner's conception of knowledge is transformed. Tutoring in a PBL context may be the first setting in which teachers engage in the appropriation of the conceptual and practical tools used in facilitation. The type of questions and techniques the tutor uses act as practical tools with which the tutor demonstrates conceptual tools and strategies. Cook et al. demonstrated that the extent of appropriation (use of conceptual and practical tools of a context) depends on the congruence of the learners' values, prior experiences, and goals with those of the more powerful members of a culture. In the PBL context this suggests that the extent to which learners appropriate depends upon congruence between their values, experiences, and goals with those of their tutor. Hence, the type of cognitive modelling and questioning techniques used by the tutor serve to influence student experience with the inquiry process.

The PBL tutor has been characterized as an individual who uses Barrows's tutor principles and in doing so, may demonstrate techniques that differ from traditional teaching behaviours. Although differences in tutor behaviour are to be expected from individual to individual and situation-to-situation, wide variations in the manner in which tutor principles are applied have been observed (Camp, 1996; Neild, 2004; Wilkie 2004).

PBL Tutor Development

Little is known about the process of development of PBL tutors beyond the stages of tutor development first proposed by Barrows (1980) even though the area has been of interest to a handful of researchers (Camp, 1996; Kaufman & Holmes, 1996; Miflin, 2004; Schmidt et al., 1994; Wilkie, 2004). In writing about post-secondary teacher development, Osborne (2001) postulated that there are two factors limiting development as a PBL tutor: the dominant use of a transmission approach in the post-secondary context and the post-secondary teachers' lack of formal education in teaching. Miflin, citing the context in which many post-secondary instructors work, indicated that PBL tutors at the university level might not always examine education ideas carefully because of their dual roles of both teacher and researcher. Medical academics may examine educational ideas even less so due to additional professional commitments as practicing clinicians.

The PBL tutor often has experience only with a higher education curriculum that most often follows an objectivism approach. Objectivism is based on the belief that knowledge exists in the world external to personal experience. This often means the curriculum is prescribed and that faculty lecture about facts and theories, which students are expected to memorize. Learning is often assessed through exams composed of objective questions such as multiple choice questions or true-false questions, to name a few (Whitman, 1993). Whitman suggested that students experience an overwhelming paradigm shift when moving from an objectivist learning approach that characterizes traditional curriculum of the classroom to real world applications of knowledge. This raises the possibility that teachers find themselves in a similar situation. Camp (1996) found that even faculty in the sciences, using the scientific method of inquiry in conjunction with objectivism, reported that changing to PBL required a paradigm shift.

Theoretical Framework

This section integrates Barrows's (1980, 1988, 2000, 2007) PBL recommendations and tutor principles with Rogers's (1942) client-centered therapy principles and practices of nondirective facilitation in combination with their underlying assumptions. Next, the way in which these recommendations, assumptions and principles may be applied in practice in a helping relationship through the use of therapeutic communication (Ruesch, 1961) is examined. This leads to a fuller discussion of the concept of beliefs and into a discussion of the theoretical perspectives of Dewey's theory of inquiry and of experience that pertain to the teacher's beliefs about the role of the teacher and the learning experience.

PBL derived from a practical rather than a theoretical base. It is only recently that theory-based explanations for PBL and PBL tutor behaviour have been explored. Whereas many PBL scholars explain the design of PBL in terms of constructivism or cognitive psychology constructs (Campbell, 1999; Colliver, 2000; Dolmans & Ginns 2005; Dolmans et al. 2005; Hendry, Frommer & Walker, 1999; Kaufman & Holmes, 1996; Krivel-Zacks, 2001; Lai & Tang, 1999; Miflin, 2004; Savery & Duffy, 2001; Whitman, 1993; Windschitl, 2002; Wolfhagen and van der Vleuten, 2005), this study's theoretical framework rests on two primary sources: John Dewey's theory of inquiry and of experience and Carl Rogers's client-centered theory.

Dewey's theories pertain to beliefs held by the tutor regarding student inquiry and problem-solving learning experiences that respect and encourage self-direction.

Rogers's client-centered theory involves similar assumptions plus contributes a theoretical framework for the nondirective facilitation techniques that enable the tutors' beliefs and attitudes. Barrows's (1980, 1988, 2000, 2007) recommendations and principles for PBL tutors appear to shape the form and purposes of facilitation and contextualize the theoretical perspectives of Dewey and Rogers. The theoretical positions of Dewey and Rogers advocated self-actualization with the expectation that self-direction and learner autonomy go hand in hand with self-reflection for optimal learning. Hence, these theoretical positions are highly relevant to this study.

Rogers: Client-Centered theory

While the term "nondirective facilitation" has been used to describe the behaviour of the PBL tutor, it has not been widely used in post-secondary education environments to describe teaching behaviours. A nondirective approach is commonly associated with the therapeutic approach of client-centered therapy popularized by Carl Rogers (1942). Using this approach the therapist creates a humanistic nonthreatening environment where the client feels free to explore problems and to provide his or her own answers (Hall, Lindzey & Campbell, 1998).

One of the broad assumptions upon which Rogers's model was built is a unitary force that he called the *actualizing tendency* (Hall et al., 1998). Some scholars interpreted his theory as holding the additional fundamental assumptions of self-authority, self-directivity, and self-regulation (Bozarth, 1999; Zimmerman, 2001). Client-centered therapy is an approach that results "from a therapeutic orientation that relies primarily upon the capacity of the client" (Rogers, 1942, p. 10). As a psychologist, Rogers revised the terminology of his approach first from nondirective therapy to client-centered therapy, then to person-centered therapy (Rogers & Freiberg, 1994). Rogers and other professionals have transferred the therapeutic techniques of client-centered therapy from its origin in clinical counselling to broader applications in schools, industry, social and religious work. Rogers's views on the dynamics of the teacher-student relationship originated with his client-centered approaches (Rogers, 1941; 1951; Rogers & Freiberg, 1994).

Although the influence of Rogers's client-centered theory on education may go largely unnoticed, some researchers have identified his influence as a building block of constructivism. Albrecht and Gross (1948) argued that the roots of nondirective facilitation techniques in education extend back to the humanistic principles developed

by Rogers. Herman (1995) claimed that paradoxically, although Rogers's synthesis of humanistic and existentialist theory surfaces in constructivism, philosophical and theoretical links between Rogers's theories and constructivism are infrequent in the literature. Given that so little attention has been paid to the links between Rogers's theory and education, it is not surprising, then, that associations between client-centered theory and PBL have not appeared in the literature. Nonetheless, the apparent connections between Rogerian philosophy, client-centered theory, the role of the therapist, and the nondirective behaviours of the PBL tutor are particularly relevant to the purposes of this study; this relevance being pertinent to an examination of the tutors' beliefs and behaviours. The nondirective behaviours of the therapist in client-centered therapy concretize Barrows's PBL tutoring principles.

Rather than defining client-centered theory, Rogers advanced a set of hypotheses about the causes of constructive personality change. Rogers was committed to protecting and encouraging the spirit of experimentation and did not want client-centered therapy to be considered a static concept. As such he was more concerned about presenting attitudinal conditions of the therapist than techniques. In essence, in client-centered therapy the therapist respects and protects the autonomy and self-direction of the client, the client is viewed as expert about himself, and the therapist views himself as expert only in maintaining the attitudinal conditions in the relationship with the client, not as an expert on the client (Brodley, 2007).

According to Rogers (1942), cited in Combs (1946), nondirective therapy rests on four basic assumptions that differentiate it from older therapeutic methods. These assumptions concern normalcy adjustment, maladjustments result from emotional satisfaction, focus on the individual's current state, and therapy represents growth. As mentioned earlier, the label for the client-centered approach changed over time to person-centered. Within this study the terms are used interchangeably. Brodley (2007) offered 10 assumptions, beliefs and hypotheses central to the person-centered approach. These assumptions concern human nature, human needs for self-regard and autonomy, perception, adaptation, and the therapist's assumptions regarding abdication of control and authority, and commitment to open-mindedness. According to Brodley, client-centered therapy is fundamentally nondirective therapy.

According to Rogers, cited in Combs (1946), "three aspects of nondirective counselling serve growth in the individual: (a) bringing meanings to a conscious level through the use of a "recognition technique" the client must objectively state his feelings

or attitudes and then have them clarified by the counsellor, (b) development of insight–the seeing of relationships or gaining understanding, which frees the client to move forward in his thinking, and (c) integration and organization are possible due to personal insights into behaviour As the individual gains the insights himself he is committed to them" (p. 596).

As a founder of humanistic psychology Rogers (1951) held that internal forces direct intellectual and behaviour change. This view upholds above all else respect for human dignity and uniqueness of the individual, promotion of personal freedom of choice for actions, and regards motivation as optimal when learners perceive personal meaning in learning. Much like the evolution of Dewey's educational philosophy, Rogers's humanistic approach to education appears to have resulted from a reaction to the perceived weaknesses and limitations of behaviourism, especially in its assumption of the passivity of the learner's mind (Herman, 1995).

In combination with the individual's internal forces, Rogers considered the behaviour of the therapist an external force. The attitude of the counsellor toward the worth and the rights of the individual and the client's right to self-direction was considered as critical to success in the client's growth. According to Rogers (1951), "our experience in training counsellors would indicate that the basic operational philosophy of the individual (which may or may not resemble his verbalized philosophy) determines, to a considerable extent, the time it takes him to become a skilful counsellor" (p. 20). He indicated that individuals that are already striving for such an orientation could readily learn client-centered techniques that implement this point of view. He observed this adoption of a nondirective approach occurred with ease in educators holding strong child-centered philosophies and those in other professions holding a humanistic approach.

In Rogers's existentialist view, man is responsible for his own being (Herman, 1995; Rogers, 1951). From this perspective, what an individual becomes is of his or her own choosing and freedom for action. In applying this concept of freedom to the field of education, Rogers considered it was insufficient that knowledge should be given by a teacher or textbook and accepted unquestioningly by the student. He felt that the student must find the truths in knowledge for himself and incorporate them within his understandings of the world. This position resembles the individual meaning-making concept advocated by constructivism, Dewey's theories of inquiry and experience and PBL.

Rogers (1951) claimed that "one's operational philosophy, one's set of goals, is not a fixed and unchanging thing, but a fluid and developing organization" (p. 21). He theorized that individuals whose philosophical orientation was akin to a client-centered approach found this approach agreeable because it carried them further philosophically and offered the possibility of operationalizing techniques that display respect for individuals consistent with their own attitudes. Rogers felt that the extent of the therapist's nondirective behaviour was dependent upon the degree to which he integrated a humanistic view and that this was genuine to his beliefs. In turn, this implies that the therapist who holds beliefs inconsistent with client-centered theory may have more difficulty behaving in a nondirective manner.

Pope and Keen (1981) considered Rogers's work influential in raising the interpersonal encounter as an important topic in psychology and later in education. As client-centered methodology spread from the psychology field to the education field, it has been observed that educators attempting to adapt the principles and procedures of successful psychotherapy to education used the term student-centered in place of client-centered and that the concepts of the theory eventually surfaced as student-centered strategies (Albrecht & Gross, 1948; Rogers, 1942; Rogers & Freiberg, 1994). In applying his theory to education, Rogers (1983) supported significant, meaningful, and experiential learning that involves personal involvement, is initiated by the learner, is pervasive in its influence on behaviour, attitudes, and personality, is evaluated by the learner and provides meaning to the learner. His theoretical model emphasizes the personal involvement in learner-based learning, meaning the learning is self-initiated and evaluated. As such, the resulting significant learning makes a difference in behaviour, attitudes and personality of the learner and, in essence, of the meaning of knowledge. The knowledge/truth that evolves in self-discovered learning is private knowledge. Rogers claims that the process is not achieved through teacher transmission or impersonal association. Knowledge needs to be personally appropriated. To Rogers this is achieved through a specific type of encounter between the teacher and student, which he terms nondirective facilitation. According to Pope and Keen, teachers who adopt client-centered theory engage in an encounter with students similar to that found between therapist and patient in client-centered therapy.

According to Rogers (1951), learning occurs when a dilemma (problematic situation) that has arisen in the life of an individual causes an appropriate level of disequilibrium to motivate the individual to reorganize his thinking. Rogers theorized that

this unsettling scenario motivates the individual to clarify thinking in order to return to equilibrium. His approach claimed that the teacher, as facilitator of learning, should hold particular attitudes and beliefs in order to enable self-actualized learning (Rogers & Freiberg, 1994). As mentioned earlier, he proposed that the therapist using nondirective therapeutic techniques would need to hold attitudes of unconditional positive regard, empathy, and congruence to promote personal growth in learning about personal problems through therapy (Rogers, 1951). He held parallel expectations for the teacher when helping students' problem-solve subject matter learning in a nondirective manner (Rogers & Freiberg). Albrecht and Gross (1948) indicated that the instructor using a Rogerian approach would take on a more subordinate and flexible role than is customary, would allow leadership to gravitate to learners, and would withhold approval and disapproval in order to provide an atmosphere of free discussion. These researchers described changes in teachers' behaviours in the teacher-student relationship as follows:

> By placing the focus of attention within the group of interacting students, he allows the matching of authority with authority and interpretation with interpretation. In this way he disengages the fixed symbol of truth, which he normally represents and emphasizes learning through curiosity, discrimination, and tested action. (p. 878)

Rogers (1942) differentiated between directive therapy and nondirective therapy. He indicated that in the directive approach, the counsellor accepts the major responsibility in solving the problem. In this approach the counsellor defines the problem and indicates that he will be responsible for discovering the causes of the problem, for diagnosing and making suggestions toward correcting the problem, its causes, and its treatment. The only responsibility of the counselee is the decision as to how far he or she will co-operate. The direction of the process is in the hands of the counsellor. The behaviours of the directive counsellor resemble the behaviours found in teacher directed environments. On the other hand, in a PBL context, the tutor uses a variety of verbal and nonverbal facilitation techniques to stimulate the learner to take responsibility for the learning process, including defining the problem.

Nondirective therapy differs from directive therapeutic techniques in much the same way as it has been claimed here that PBL differs from traditional educational approaches. The professional agents in each field, whether it is the nondirective therapist or the nondirective PBL tutor, appear to use a mix of verbal and nonverbal

actions, encourage more permissive behaviours than their traditional counterparts, with the result of a less predictable learning setting. PBL tutors and nondirective therapists both use techniques that differ from the more common methods in their respective fields. Permissive behaviour in this case refers to the manner in which the psychologist or tutor grants the client or learner permission to self-explore their situation rather than being told what to do by an expert. This is one of the key nondirective strategies claimed by both approaches that make it possible for individual reflections resulting in change (Barrows, 1988; Rogers, 1941; Rogers & Freiberg, 1994), whereas, it could be argued, directive therapies or traditional educational strategies try to support change from without. In both PBL and in nondirective therapy the responsibility for solving the problem is the student's or client's rather than the professional's (tutor or therapist). It appears that one of the ways that the tutor supports this growth is through the tutor's permissive behaviour and in particular in the use of nondirective facilitation techniques. It is only through the individual's acceptance of his thinking or feeling that integration and improvement occur (Rogers, 1951). In PBL the tutor needs to help the student to see his knowledge level for what it really is and accept it to move forward (Barrows, 1988).

In terms of learning, Rogers also proposed a focus on the learning process and mental conceptualization surrounding meaningful learning, emphasizing that the process is as important as the product (Rogers & Freiberg, 1994). He voiced a preference for the term *facilitator* of learning instead of teacher (Robinson, 1985). He claimed, as Dewey (1910/1997) did earlier, that active learning was key to learning—that students must be discovery-oriented and the content under investigation must be meaningful. Rogers emphasized the role of emotional involvement as well as intellectual involvement in learning situations (Rogers & Freiberg). As emotions are difficult to observe, communication becomes a crucial component of the helper's role in this style of learning. To Rogers et al., (1994), the teacher has a responsibility to engage in the role of the student through actively listening to students while guiding the educational experience. He also felt that the teacher must have superior knowledge of the content, demonstrate outstanding communication skills, and hold beliefs consistent with this approach such as helping students discover personal meaning in learning. As well, he believed that students and teachers must be actively involved in a healthy relationship focused on exploring and understanding knowledge and that learning will be unique to each learner, since learners construct their own meaning and solve their own problems.

It appears that Rogers's approach placed the direction of the outcome of the therapeutic process in the hands of the client in much the same way as PBL places the outcome of the learning process in the hands of the student. For the teacher, holding a Rogerian teaching belief means believing in the potential of students to self-realize and self-actualize their growth and that they are fundamentally capable of managing their own learning (Rogers & Freiberg, 1994). The task of the facilitator is seen as helping individuals to clarify their directions and become more autonomous, spontaneous, and confident in their learning.

Some aspects of the Rogerian approach can be traced back to Dewey, especially to his experimentalist philosophy and his belief that truth and value can be found only in the realm of experience. In fact, Rogers indicated that his works represent a rediscovery of the effective principles of Dewey (Rogers, 1951). Both Dewey and Rogers were passionate about the centrality of experience, its dynamic character, its capacity to promote change, its ability to provide a sense of freedom, and to provide a self-directive purpose. What's more, they both believed in a social cohesiveness or as stated by Rogers, "self-actualization."

In summary, strong similarities exist between the therapist role advocated in Rogerian nondirective, student-centered facilitation approach based on client-centered theory and the role of the tutor using PBL as advocated by Barrows (1988). Both approaches view learning as active, where students have a freedom to learn, where there is respect for individual differences and creative ideas, learning involves critical thinking, a search for personal meaning, and there is excitement about the process of learning. For the teacher it means facilitation rather than directing learning, the primacy of self-responsibility for personal change, and the responsibility of the teacher to create an atmosphere of trust and openness in preparation for a healthy relationship between teacher and student. In this way, the ideal PBL tutor's behaviour embodies a Rogerian as well as a humanistic nondirective approach. Since the literature has established that teaching beliefs influence teaching practice (Zinn, 1998/2004), it seems reasonable that the tutor who holds humanistic or constructivist teaching beliefs may have less difficulty in carrying out facilitation behaviours that require passive techniques.

Therapeutic Communication

To delve deeper into similarities between the nondirective facilitation techniques typically used by the PBL tutor and the communication techniques of the therapist, this

section draws on the research in the dialect of therapeutic communication described by Ruesch (1961). Dialectics refers to the words and symbols used in verbal exchange. Therapeutic dialects occur in multiple contexts and, according to Ruesch, are not confined to counselling situations. He indicated that therapeutic communication operates in the context of several individuals, one of whom must be wiser, more mature, and more skilled in communication than the others. At some times this communication is referred to as therapy, while at other times it is referred to as education, counselling, or friendship. While the mutual influence and transmission of information are characteristic of all communication, the difference between therapeutic communication and the kind carried on between people under ordinary circumstances is found in the therapist's motivation.

From the author's experience observing expert PBL tutors, the structure of PBL tutor dialogue often resembles that of nondirective counselling and therapeutic communication. Whereas the PBL tutor helps learners self-analyze their learning issues, the nondirective client-centered therapist helps the client engage in a similar process of self-analysis to solve their personal psychological issues. Although the therapist may say, "Can you explain how this makes you feel?" to stimulate the patient to express emotions, the PBL tutor may say, "Can you explain what you are thinking?" to stimulate the student to express his or her thinking. The conversational techniques or *dialectics* and their purposes parallel each other. The endeavours of both are geared to teaching and understanding. Both aim to guide critical self-reflection. The therapist helps develop self-reflective clients to promote self-knowledge and the tutor helps develop self-reflective learners to promote metacognition. Like the therapist, the PBL tutor seeks to influence positive change, but rather than focusing on emotional adjustments the focus is on learning. Like the therapist, the PBL tutor focuses on the breakdown of non-integrated thoughts and urges active participation to mobilize self-determining thoughts. The facilitation techniques of the PBL tutor, as described in the guidelines for PBL tutor nondirective actions described by Barrows (2007), seemed to be aligned with the behaviours of the therapist using client-centered therapy as described by Rogers (1951) and with therapeutic communication techniques of a nondirective nature as described by Ruesch (1961).

According to Ruesch (1961), therapeutic dialectic manoeuvres consist of multiple techniques that may occur in multiple approaches where the counsellor endeavours to

teach and understand. He classified such techniques as pinpointing, documentation, translation, reformulation, amplification, concretion and abstraction, comparison, contradiction, confrontation, argumentation, acceptance and negation, interjection, delay, interpretation, analysis and synthesis. Although the PBL literature has not classified the facilitation techniques of the tutor using these or any other terms, a closer look at Ruesch's therapeutic communication techniques was undertaken to allow comparison with Barrows (1988, 2007) descriptions and examples of PBL tutor principles.

Pinpointing

Pinpointing refers to the use of language to help an individual move from a general awareness or abstraction of a problem situation to focus the problem, explore solutions and implementations. The therapist does this by asking questions that stimulate the patient to view the problem from various standpoints, by adding information at the right moment, by helping condense information or helping the patient dilute concentrated information. In essence, the therapist helps the patient translate an abstraction into operational terms. According to Ruesch (1961), "working through a problem by discussing it step by step often enables the patient to tackle the problem" (p.189). In this way the patient's autonomy to solve the problem is preserved. According to Barrows's (1988, 2007) the tutor should use a similar technique.

Documentation

Documentation refers to the process of leading the patient to provide evidence to support or correct the picture that the patient presents. The therapist does this by inquiring about evidence using such phrases as "How did you arrive at this...?' or, "what made you conclude that ....?" (p 189). This type of dialectic communication can be used in both direct and indirect facilitation. Typical tutor questions when modelling metacognitive questioning are: "Could there be other possibilities?" "What questions do we need to ask to sort out these possibilities?" "What do we need to look for to rule this hypothesis in or out?" (Barrows, 2007, p. 59).

Translation

Translation refers to the behaviour of the therapist that stimulates the patient to discover assumptions and forces him to define to himself what he really means. The therapist may do this by using phrases such as "I do not quite understand. Please say it in another way"; or he may reformulate what the patient said and check whether the new version makes more sense to the patient (Ruesch, 1961,p. 190). Similarly, according to Barrows (2007) PBL tutors should stimulate the learner to reveal their assumptions and fuzzy thinking through the use of indirect probes, as do client-centered therapists. For instance, the tutor may say, "How did that information help you with the hypothesis on the board?" (Barrows, p.78).

Reformulation

Reformulation involves symbolic exchange. The therapist reformulates patient experiences in operational, localizable, accessible terms. In this way the therapist formulates the less familiar into terms that are more familiar, the obscure into the clear, the variant into the constant, the complex into the simple, the vague into the precise, forms into functions and states into forces. The PBL tutor or client-centered therapist should use this technique using a statement such as, "Let me see if I understand what you are saying correctly?" In this way the tutor provides a mirror of what the student said in order to help the student recognize the clarity of his or her thinking.

Amplification

Amplification refers to behaviour by the therapist that causes the patient to provide more complete information. It is achieved by mobilizing inaccessible experiences inside the patient, adding new information from other people, or by direct observation. The therapist helps this situation by interjecting some probing questions, which may induce the patient to volunteer information that he never knew he possessed. A typical phrase that the therapist and tutor may use is "I don't yet understand". The therapist and tutor use this technique to point out the incompleteness of information, to encourage additional information, or induce the correction of false information. PBL tutors use probing questions to enable students to amplify their thoughts.

Concretion and abstraction

Concretion and abstraction refers to a three-step behaviour by the therapist. This consists of helping to simplify what is in the mind of the patient by weeding out the unessential by defining the purpose of the message, telescoping separate events into one, and a process of abstraction. It involves stimulating deductive thinking from the general to the particular and inductive thinking from the particular to the general. The therapist helps the patient to learn concretion and abstraction and the tutor guides inquiry using the hypothetico-deductive process (Barrows, 1980).

Comparison

Comparison is a process that establishes similarities and differences. The therapist helps the patient compare events that take place in several places or times by juxtapositioning statements. In this way, comparisons of present and past, self with others, of one situation with another allows the therapist to state differences or changes that have occurred over time." (Ruesch, 1961, p.193). The therapist sharpens the patient's ability to observe and to get to the heart of the problem in much the same way as Barrows's recommends the PBL tutor aim to sharpen the student's ability to analyze problems.

Contradiction

Contradiction challenges the patient's opinions and conclusions. By pointing out contradictions in patient's statements, the therapist can force the patient to think of alternatives, which heretofore he has not considered. This tactic tends to stimulate anger, which leads to a sense of identity offering the chance to clarify his ideas. PBL tutors and client-centered therapists may use this technique to assist clarification in thinking. In doing so the learner is lead to consider alternatives without being directly asked to do so. Contradiction may be one of the techniques the PBL tutor uses to push students to deeper levels of understanding.

Confrontation

Confrontation is a procedure by which the therapist confronts the patient with the facts, but not the therapist's opinion. It contains an element of aggressiveness and is designed to produce shock. It gets the patient to perceive the discrepancy between his

report and certain facts and is necessary so that the therapist can help him solve the riddle. According to Ruesch (1961), "Confrontation demonstrates discrepancies between intent and effect, between word and action, between stated rules and actual practices" (p. 194). Barrows et al. (2007) suggested PBL tutors confront learners in directly using statements such as, "Why do you say that?" or "What is your thinking behind that?" (p. 58)

Argumentation

Argumentation consists of formulating reasons, making inductions, drawing conclusions, and applying them to the case in discussion. The therapists present arguments – facts and inferences. The PBL tutor is also expected to promote this type of thinking. For example, Barrows et al. (2007) suggested a typical PBL tutor argument:

> From what I am hearing, it seems as though none of you know enough about this possible hypothesis (or there seems to be disagreement about what you know) to allow you to decide upon its appropriateness. Is this something that you would like to look up? (p. 76).

Acceptance and negation

Acceptance and negation involves helping the patient separate fact from fantasy. It is stimulated by a clear-cut attitude by the therapist that focuses the patient's attention upon the facts and conveyance of the idea of coping with the tangible. The therapist conveys his acceptance of the patient's reality by reviewing the events of the preceding day or week and by planning for the future. Negation refers to behaviour by the patient that is a non-consideration of ideas or events and the behaviour of the therapist to overlook for a while specific patient issues in order to focus on those of higher priority. The effect of this tactic is that the therapist negation of some symptoms teaches the patient to focus on specific issues. It is suggested that PBL tutors use a similar manoeuvre. For instance, the tutor may say, "You have come up with some ideas about the problem... are there others that you can think of before we try to find out which one is best?" (Barrows et al., 2007, p. 57).

Delay

Delay is considered one of the best-known therapeutic communication devices. It refers to waiting for the patient to proceed. The therapist restrains himself or herself from talking, conveys the idea that one can wait without anxiety and that silence is a perfectly acceptable way of behaving. It forces the patient to talk. The PBL tutor uses self-restraint often in tutorial. For example, by preventing himself or herself from intervening in group discussions the tutor encourages responsibility taking by students. (Barrows et al., 2007).

Interpretation

According to Ruesch (1961) interpretation refers to talking about the patient's message and analyzing it. It is one of the four alternatives a therapist has in responding to patient messages. The others are that he/she can remain silent, he/she can acknowledge the message, or he/she can respond to the face value of the statement. Interpretation consists of connecting the statement of the patient with other information, thus enabling the patient to consider his own actions in a broader perceive. Explicit interpretation is considered to restrict patient thinking, coerce action, and is analytical in nature. PBL tutors are expected to guide the learner to make connections rather than making them for the learner. (See Table 1:1).

Analysis and Synthesis

Analysis and synthesis consists of two intellectual operations fundamental to the learning process in therapy and in education. Analysis leads from larger to smaller units and from more complex to simpler levels of organization. Analysis may mean breaking down an event into its smallest parts or to trace it to its source of origin. The process of synthesis gives a macroscopic picture of the parts and a chronological account of various phases of development. Analysis helps clarify foggy notions, whereas synthesis puts things together. Analysis comes first and synthesis later. In therapy, according to Ruesch (1961) the patient must first understood how their present situation evolved before he/she can synthesize disjointed pieces of information. Preparation for integration involves breaking down large tasks into detailed movements that have to be practiced separately until they can make up a complex pattern. Synthesis is not synonymous with interpretation. Interpretation refers to the therapist putting things together whereas in

synthesis it is the patient who coordinates and all the therapist does is to occasionally point to an element that the patient has collected before but may have overlooked adding to the present puzzle. The therapist can do this by pointing out that information is incomplete and that he has to search for information. The PBL tutor guide learners to use analysis and synthesis rather than performing these functions for them.

According to Ruesch (1961), communication manoeuvres transfer and diffuse from one discipline to another and should be expected. For example, the concepts of social psychiatry and communication engineering had been introduced into the theory of therapy while therapeutic and psychoanalytic concepts find their way into social science. Both Ruesch and Rogers (1951) indicated that the implementation of these counselling techniques to help the expression of thoughts and feelings is driven by the therapist's beliefs that the individual has the right to select his or her own learning goals and the right to be psychologically independent. This research seeks to, in part, discover if PBL tutors hold similar beliefs about learner autonomy.

Therapeutic communication uses techniques to indirectly control the direction of exploration, such as selectively replying or not replying to learners. When the tutor delays in responding to the learner this nonverbal behaviour acts to indirectly guide learners to take responsibility for the learning process. The PBL tutor seeks primarily to solve problems in the realm of the intellect. In doing so the challenge is to ensure the direction of the discussion follows the pattern of the student's interest rather than that of the tutor's. Student-centered learning, like client-centered counselling means allowing the student to bring forth the material that is personally relevant.

Beliefs: A variety of interpretations

This section concerns the theoretical research on beliefs, teacher beliefs, tutors' beliefs and changing beliefs. Chapter Two of this document, the literature review, looks at empirical research on beliefs. In particular, this study is interested in examining tutors' beliefs about learning experiences, such as PBL that involve inquiry and in a facilitative role. Following a definition of beliefs, the section presents an overview of research on teachers' beliefs in general including an examination of John Dewey's theory on the influence of beliefs on thinking, his views on the challenges the teacher faces when implementing non traditional curriculum, the resemblance of Dewey's ideal teacher to the role of the PBL tutor, and the way in which his theories suggest possible

relationships between the tutor's beliefs about the nature of problem-solving experiences and their learning and nondirective facilitation.

It is argued here that an examination of PBL tutor beliefs provides a window on the PBL tutor's thinking about tutoring practice. Beliefs are claimed to be the best indicators of decision-making (judgments) and behaviour because they influence perception, knowledge acquisition, and interpretation (Bandura, 1986; Dewey, 1938/1975; Nespor, 1987; Nisbett & Ross, 1980; Pajares, 1992; Rokeach, 1968). Beliefs are seen to influence perception, which in turn influences thinking, and then behaviour. While knowledge may be temporal, beliefs are considered more permanent in nature (Pajares, 1992).

Defining Beliefs

Beliefs are difficult to define and are defined in multiple ways in the literature. The dictionary defines beliefs as "a state or habit of mind in which trust or confidence is placed in some person or thing" and "conviction of the truth of some statement or the reality of some being or phenomenon specially when based on examination of evidence, the mental acceptance of the truth, the actuality or validity of something" (Merriam-Webster Dictionary, 1991, p.142). Dewey (1910/1997) argued that beliefs result from reflection. Sigel (1985) considered them "mental constructions of experience integrated into schemata that are held to be true and that guide behaviour." Harvey (1986) took the perspective that beliefs were "an individual's representation of reality" while Tourangeau and Rasinski (1988) viewed them as "memories of specific experiences, general propositions, image and feelings"(p.300). Pajares (1992) indicated that beliefs are considered to be descriptive, evaluative and prescriptive and more important they serve a purpose: "Beliefs are instrumental in defining tasks and selecting cognitive tools with which to interpret, plan, and make decisions regarding such tasks; hence they play a critical role in defining behaviour and organizing knowledge and information"(p. 325).

Knowledge is considered a component of beliefs (Pajares, 1992; Rokeach,1968) and a factor that influences beliefs (Dewey,1910/1997; Lewis, 1990). Kagan (1990) suggested that beliefs are a form of knowledge, personal knowledge. Abelson (1979) argued that despite attempts at clarifications between knowledge and beliefs, the literature here is inconclusive.

Other terms used interchangeably in the literature for beliefs are perceptions, perspectives, attitudes, and conceptions to name a few. Pajares (1992) lists more than

20 such terms that are aliases for the same concept. Although some authors differentiate between the terms, many do not. Clandinin and Connelly's (1987) review of multiple studies concludes that "the terms and methodology differ but the problem and conclusions arising from the inquiry are remarkably similar in kind" (p.488). Pajares (1992) argues too that researchers have not always clearly defined the term belief and have not differentiated it well from similar constructs. For instance, some theorists consider that perspectives differ from beliefs in scope. Perspectives are viewed as a broader concept that may contain a behavioural component (Rokeach, 1968; Tabachnick & Zeichner, 1984; Zeichner et al., 1990). Further, the belief component contains a cognitive component (knowledge) and an affective component (feelings); (Rokeach, 1968). This ambiguity in the terminology has created difficulties for research on teacher thinking, especially what is meant by teachers' beliefs.

According to some, attitudes represent clusters of interrelated beliefs (Tourangeau & Ransinski, 1988) and in this way organize beliefs (Rokeach,1975). The psychology literature holds that multiple processes are involved when individuals reflect upon their attitudes about a topic. Individuals first retrieve their relevant beliefs and feelings, then they apply the beliefs in rendering an appropriate judgment, and finally select a response (Tourangeau & Rasinski). Beliefs are considered to be the constituents of attitudes.

Interchangeability in the use of terms has also been found between philosophical orientations and teaching beliefs. Some professions, such as nursing, use the terms interchangeably to mean that the beliefs a nurse holds about her professional role shapes her attitudes toward the profession and that it is natural for these beliefs to change with teaching and nursing experiences (Canadian Nurses Association of Ontario, 2002).

In research article titles the term teachers' beliefs appears more frequently than teachers' perceptions. Electronic searches of relevant databases found 150 articles with teachers' beliefs in the title compared to finding only 11 articles with teachers' perceptions in the title. Further, some of the articles that used the term beliefs in the title interchange beliefs with perceptions in their research methodology and discussions (Donche, Vanhoof & Van Petegem, 2003). Much of the research on teachers' beliefs has looked at teachers' *description* of their beliefs (Anderson & Holt-Reynolds, 1990; Kagan, 1990; Tillema, 1994; Tosun, 2000; Wooley, 1999) or at the relationship between the

description of teacher's beliefs and teaching practice (Fang, 1996; Kane, Sandretto & Heath, 2002).

Some psychologists and philosophers indicate that beliefs are shaped by the reality of experience (Dewey, 1910/1997; James, 1978; Nespor, 1987). This influence of experience on beliefs occurs before beliefs influence practice. In this way, experiences impact practice. Perception has been seen as a type of experience. Brown (1968) indicated that perceptual psychologists believe perception determines behaviour and it is only through differentiation in perception that change in behaviour occurs. To perceptual psychologists "perception" means any differentiation an individual makes in his or her perceptual field through seeing, hearing, smelling, or feeling, in addition to the mental image, concept or meaning obtained through these senses. Further, because perceptual psychologists believe the relationship between mental functions and behaviour is mediated by perceptions, the word "perceptions" has been used interchangeably with "beliefs." Brown (1968) speculated that psychologists' avoidance of the term "beliefs" might be due to associations of the word to religious and philosophical connotations. Pajares (1992) stated that the beliefs teachers hold influence their perceptions and judgments. So, not only do experiences influence beliefs, but perceptions (as part of existing beliefs) influence new experiences, which in turn form new beliefs or reinforce existing beliefs. Kuhn (1962) published *The Structure of Scientific Revolutions*, in which he proposed that the scientific basis for an individual's way of interpreting the world was shaped not only by the individual's experience and observation but also by the individual's personal journey. He believed that the recognition of paradigms was essential to scientific inquiry–"no natural history can be interpreted in the absence of at least some implicit body of intertwined theoretical and methodological belief that permits selection, evaluation, and criticism" (p.16). Beliefs enable meaning making, a topic frequently investigated by cognitive psychologists, and in doing so direct behaviour. One aspect of this study looks at differences in the relationship between certain teaching beliefs of PBL tutors from different disciplinary backgrounds.

Although teacher beliefs are a frequent topic in education research, some critics have indicated that little attention has been paid to the structure and functions of teachers' beliefs about their roles and the subject matter they teach (Nespor, 1987). This construct is not easily defined or investigated. The meaning that the literature gives to the term *teachers' beliefs* generally refers to only the teachers' beliefs about matters pertaining to their profession (Pajares, 1992) rather than their beliefs on other matters.

The term teachers' belief has been seen as a construct that has been used to reflect teacher attitudes about education, teaching, and learning (Nespor, 1987; Pajares, 1992; Richardson, 1996). Kagan (1990) defined teaching beliefs as "the highly personal ways in which a teacher understands classrooms, students, the nature of learning, the teacher's role in the classroom, and the goals of education" (p. 423). Others equated implicit theories with beliefs (Clark, 1988) and with personal pedagogies or theories that guide teaching practice (Nespor, 1987). According to Nespor, teachers' beliefs play a more important role than academic theory or research-based knowledge in teachers' personal pedagogies or theories that guide teachers' practice. The literature also situates teacher beliefs within topics such as teacher cognition, teacher thinking, teacher effectiveness, and teacher behaviour (Kagan, 1990).

Some of the difficulty in reviewing the research literature stems from context-specific applications and from specific research agendas (Kagan, 1990). Taylor (2003) argued that because little research on teachers' beliefs exists at the post-secondary level, most of the research of teachers' beliefs draws on the literature of the K-12 and preservice teachers.

For the purposes of this study, beliefs are defined based on the common components described in the education literature. In this study, tutors' beliefs about teaching and learning refers to a complex and interrelated system of personal and professional knowledge that serves as implicit theories for experiencing and responding to reality about learning experiences related to inquiry and problem-solving. Beliefs rely on cognitive and affective components and are often tacitly held. A discussion of beliefs was considered a necessary component of critical reflection and was included in this study because this research asked tutors to critically reflect on their tutoring experience with PBL.

Changing Beliefs

The research indicates that, in general, beliefs are hard to change. C.S. Peirce (1877), an American philosopher, who has been described as the intellectual precursor of John Dewey and William James (Cunningham, Schrieber, & Moss, 2005), argued that true changes in beliefs result only if an irritation of doubt is resolved. Doubt, as defined by Peirce, is an uneasy state of mind from which individuals seek to free themselves. Peirce's doubt-belief matrix of inquiry was, it could be argued, like Dewey's– a struggle to move from doubt to a state of belief using inquiry. Both theorists felt inquiry was a

fundamental process of all human cognition and not just the privileged activity of scientific minds. Doubt is considered, by both Dewey and Pierce to lead the mind into a process of inquiry that leads back to beliefs, driving our ability to think and act. Peirce was one of the first to assert that it is the benefit of dialogue in a community, where we compare and appreciate alternate beliefs that eventually lead individuals to consider changing beliefs (Cunningham et al., 2005).

Peirce recommended changing beliefs through the use of the *a priori* method. This refers to integrating prior knowledge to resolve doubtful situations. In resolving doubts individuals look for conceptual coherence between new, doubtful information and their current understandings. In the context of this study, PBL tutors may draw on an a priori method as they integrate their prior knowledge and beliefs about teaching and learning with knowledge and beliefs associated with a PBL approach. Although it is beyond the scope of this study to assess changes in tutors' beliefs, scholars have indicated that teachers' beliefs are highly resistant to change (Pajares, 1992). As such, this research expects to investigate a relatively stable aspect of the PBL tutor.

Dewey's philosophy of teaching and learning

Scholars such as Koschmann (2000) and Neville (1999) linked PBL with the theories of the educational philosopher John Dewey. Dewey's philosophy of experimentalism, his theory of experience, of inquiry, and pragmatic epistemology and in particular his views on the role of the teacher and the learner contribute to this study's theoretical framework. Experimentalism refers to Dewey's philosophy that focused on relationships between teaching beliefs and practice (Brown,1968). A discussion of Dewey's philosophy of experimentalism is beyond the scope of this thesis study. For a full description of this philosophy see Brown (1968). However, particular aspects of Dewey's philosophy of experimentalism (theory of experience and inquiry) provide a relevant theoretical framework for this study because they concern the role and beliefs the tutor holds in learning experiences that involve inquiry and problem-solving. Brown (1968) claimed, "Dewey connected educational practices to philosophic beliefs to a greater extent than any other major philosopher" (p. 47).

PBL is what some say John Dewey had in mind to build inquiry skills (H.S. Barrows, personal communication, March 20, 2004). Charielott (2006) indicated that the PBL design embodies Dewey's pragmatism philosophy and his hope that education should educate the mind rather than promote memory skills. Dewey is commonly

associated with the Progressivist movement in education and with inquiry associated with a scientific attitude of mind (McDermott, 1981). Progressivism holds that education development should involve direct interaction with the environment to promote active thinking. Pope and Keen (1981) argued that this type of thinking is stimulated by cognitive conflict where knowledge is gained through experiential problem-solving situations. Pragmatism is the particular philosophy aligned with Progressivism, which holds that reality is man's interaction with the environment in what we experience. It emphasizes active engagement in the reconstruction and interpretation of experiences. Although most pragmatists consider that knowledge is produced by transactions between individuals and their environment, Dewey's philosophy and theory of inquiry advocated that knowledge was true only if it was objectively and when possible scientifically tested (Dewey, 1910/1997).

When compared, the essentials of an ideal teaching method advocated in PBL and Dewey's inquiry and problem-solving process are strikingly similar. For example, the stages that Dewey recommended begin with a situation of experience that contains a problem leading to a generation of ideas, the observation and collection of data, a reasoned hypothesis or ideas, experimental application and testing, and a conclusion and evaluation. As mentioned previously, PBL uses similar stages. In addition, PBL exemplifies Dewey's views that educative experiences are constructed from designs where subject matter and method are on a continuum rather than treated as two separate entities. Brown (1968) indicates that Dewey's philosophy of education considered subject matter and method continuous and was expressed in reflective thinking. He was critical that much of education held a dualism where subject matter was separated from method and that method was viewed as merely a means to the acquisition and possession of subject matter.

In the development of his theory of inquiry Dewey analyzed inquiry thinking and reflective thought. A central feature of this perspective was the influence that beliefs have on thinking (Dewey, 1910/1997). Dewey differentiated two types of beliefs. Some beliefs are, in fact, suppositions or beliefs that are accepted without justification, while others are inferential beliefs or those that are accepted because their grounds have been considered. He proposed reflective thought occurs when an individual reasons using inferential beliefs. In this way, individuals consciously choose to consider the basis for underlying beliefs. Simultaneously, Dewey argued that reflective thought is not practiced as frequently as unreflective thought due to a variety of personal and cultural

factors. Dewey viewed a fertile mind as questioning, curious, able to experience comfort with uneasiness and enjoyment in conjunction with an element of suspense. Dewey (1910/1997) recognized that not all teachers possessed these qualities or were able to stimulate this kind of thinking process in others. He anticipated the difficulties teachers and students would encounter in shifting their thought patterns about learning and considered these difficulties linked to prior beliefs and experiences. He reasoned that the transition would prove challenging for teachers accustomed to a traditional curriculum due to professional factors, which emanated from traditional educational values.

To Dewey (1938/1963) traditional education often devalued authentic learning experiences because of unclear connections to abstract thinking and expectations of the role of the teacher as expert to provide information rather than support students' self-discovery. The mental habits of conformity of the teachers' past, the developed standards, and rules of conduct that characterize traditional education could prevent teachers from changing their teaching beliefs. These notions pertain to this research because they suggest the expectation that PBL tutors' prior teaching beliefs may influence their facilitation behaviours. Dewey's ideas on belief formation and its influence on the challenges teachers face in stimulating independent reflective thinking suggests that the teaching beliefs held by PBL tutors may impact the tutors' adoption of nondirective facilitation behaviours.

In conjunction with connecting Dewey's theories of thinking and teaching beliefs with PBL tutor principles, it is relevant to also look at Dewey's (1938/1963) theories of experience and in particular the role experience plays in learning. His theory of experience maintains that education occurs through experience depending upon the quality of the learning experience. Two of the key principles that intersect in this theory are continuity (experiential continuum) and interaction. It is within this principle of continuity that Dewey expresses this belief that democratic social arrangements promote better quality experiences and that this includes the principle of regard for individual freedom (Dewey, 1938/1963). He viewed the principle of continuity as a criterion by which to discriminate between experiences that are educative and those that are mis-educative. Included in this principle is the expectation of the teacher's sympathetic understanding of individuality and that the teacher should refrain from imposing undue control over learning experiences. The concept of control is linked to an assumption that the quality of a good learning experience relies upon consideration of what goes on within the individual rather than the quality of what the teacher has provided. Hence,

there are similarities between the assumptions and beliefs that teachers employ using the principle of continuity in Dewey's theory of experience with those of the therapist using client-centered theory and PBL tutor.

Dewey's principle of interaction maintained that any experience was impacted by objective conditions, such as teachers and the learning environment. Included in the interaction experience with the teacher are the words the teacher uses in communicating with the learner and the social arrangement of the learning situations. This principle, however, does not specify the type of communication of the teacher and thus Dewey does not comment on directive versus nondirective communications.

Dewey believed that teacher actions were a critical factor in determining the success of educative experiences that are social, connected to previous experiences, embedded in meaningful contexts, and related to learners' developing understanding of content. Ideally, PBL tutors provide similar learning conditions (Barrows, 1988) when they facilitate dialogue among a small group of learners, stimulate learners to connect new learning issues to previous knowledge, and provide the meaningful context of working on problematic real world cases that integrate content.

Pope and Keen (1981) indicated that Dewey also recognized that the internal motivation of the learner was another critical variable in the success of the learning experience and that knowledge is a tool for managing experiences. These scholars claim Dewey's theory of experience stems from an experientialist philosophy, which is characterized by individuals discovering the truths of life through experimentally studying the uniformities within experience. According to Dewey, as cited by Brown (1968) "the essentials of the experiential method are identical with the essentials of an educative experience" (p. 53). The PBL tutor's role encourages an experimental approach to learning, but the extent to which tutors hold this philosophy is unclear.

Dewey and Rogers

A comparison of the theoretical views of Dewey and Rogers and Barrows's PBL tutor principles discloses more similarities than differences. All positions hold moral views and instrumental conditions undertaken by the teacher/tutor/therapist that enable the student or client to self-direct their learning. All approaches view self-direction as a factor that shapes the quality of the learning experience. In this study the learning experience refers to the activation and intellectual operations involved in inquiry problem-solving during a PBL tutorial.

While both Dewey's and Rogers's works contribute humanistic elements to education that are consistent with the role of the PBL tutor, their views differ in the amount and kind of direction that should be supplied by the teacher. While to Dewey (1938/1975) the teacher should arrange for beneficial learning experiences, to Rogers (Rogers & Frieberg, 1994) the teacher's intervention is more restrained. According to the principles of client-centered theory that later appear in Rogers's student-centered approach, the teacher does not intervene in choosing the learning experience, the student does. As mentioned earlier, the teacher or therapist with a Rogerian philosophy allows the student or client to self-direct and self-manage their learning, whereas according to Dewey's theory of experience, the teacher arranges for quality learning experiences, the criteria of which is fruitful and creative experiences that enable growth (Dewey, 1938/1963). Rogers, like Dewey, advocated the concepts of self-discovery and self-development. However, his view on the unfolding of the student's knowledge places a higher level of trust in the student for introspective discovery of how to problem-solve.

The guidance offered by the two theoretical views differs as well in the communication behaviours of the teacher. Dewey's theory of experience values interaction with others in the learning process but does not go so far as to describe useful communication styles of the teacher. It restricts itself to the conditions and reasoning for authentic learning experiences. On the other hand, Rogerian client-centered theory explains both the reasoning for the kind of learning experiences and the communication required by the teacher to activate them. Dialogue is seen as an influencing factor in Rogers's student-centered approach. While both Dewey and Rogers maintained that inquiry and problem-solving in learning experiences should be solved by the student and not by the teacher, Dewey (1938/1963) believed that solution finding during inquiry involved social interaction with the teacher and others. Rogers on the other hand maintained that solution-finding as well as problem-finding rested within the individual. There is no expectation for interpretation with the scientific community, only with self-disclosure. With Dewey's approach, the problem may be found introspectively but cannot be understood or solved except in social and scientific terms (Dettering, 1955).

According to the Rogerian approach, it appears that it is critical for tutors to experience dilemmas when transitioning from traditional teaching roles to a role such as a PBL tutor. Like Dewey, Rogers believed that conflict and challenge were necessary factors in self-development; the capacity to solve problems comes from repeated,

experimental, and self-directed efforts to solve problems. Although each problem the individual faces may be new, problem-solving each problem calls for the exercise of past problem-solving training.

In this way, PBL can be seen to exemplify a combination of Rogerian nondirective facilitation with the experimentalist thinking advocated by Dewey. The role of the PBL tutor differs from the Rogerian nondirective approach in the area of the interpretations following problem finding. At this point in the problem-solving process PBL parallels Dewey's beliefs in the importance of a scientific analysis and interpretation of the problem.

Both Dewey and Rogers considered the learning experience (of knowing) to be as important as what is known. For example, consider the similarities between Dewey's definition of inquiry and with Rogers's description of the process of person-centered therapy. In his theory of inquiry, Dewey (1938/1966) defined inquiry as "the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole." (p. 226). Rogers (1986) described the central hypothesis of person-centered therapy, "that the individual carries within vast resources for self-understanding, for altering her or his self concept, attitudes, and self-directed behaviour, and that these resources can be tapped if only a definable climate of facilitative psychological attitude is provided" (p. 258).

Both psychologists shared the ethics of self-directed solutions to problems, but Rogers considered that the student must freely verbalize the solution. The expression of thinking about the problem is a key step in the problem-solving process in both Rogerian and PBL approaches. Helping students self-express their understanding of problems is a form of assisting with self-disclosure. Encouraging self-disclosure more closely resembles counselling skills than teaching skills. It requires the use of therapeutic conversational techniques that most teachers have not developed through prior teaching experiences. It appears unrealistic to expect teachers without this experience to quickly acquire the skills of assisting students with self-disclosure in a nondirective manner. Health professionals on the other hand, who have a patient-centered belief system and/or a clinical psychology and counselling background, may bring these nondirective facilitation skills to their PBL tutor role. The health professional's role differs from teachers in the area of interpersonal relationships. An intimate one-on-one relationship is the norm for health science professionals in their dealings with

patients' private problems. Patients are seen individually rather than together as a class. However, the ease with which tutors with health professional backgrounds are able to transfer this skill of nondirective facilitation in self-disclosure from the clinical setting in their work with patients to the classroom in their work with students has not been investigated.

Rogers's client-centered theory and Dewey's theory of experience complement each other. It appears that to the same extent that Dewey focuses on the conditions that favour inquiry and problem-solving and avoids commenting on the teacher's communication, Rogers omits a detailed analysis of an inquiry process. Both Dewey's and Rogers's theories speak to the critical role of the tutor in student learning. Taken together, these theoretical perspectives pertain directly to the research questions and should provide a theoretical framework from which to understand this research study.

In order to provide a concise view of the integration of the preceding discussion surrounding theoretical frameworks two tables are presented. Table 1:2 illustrates the alignment of the pedagogical beliefs of PBL tutors of interest in this study based on Barrows's (1980,1988, 2000, 2007) recommendations and principles for PBL tutors and PBL with those embodied in Dewey's theory of inquiry (1910/1997), in his theory of experience (1938/1963), and in Rogers's (1942, 1951) client-centered theory. Statements representative of PBL tutor principles were categorized into student role, tutor role, and PBL approach.

Table 1:2 Beliefs Alignment

	Beliefs	Dewey	Rogers	PBL
1.	The learner should self-discover learning resources		x	SR
2.	Students should engage in inquiry and problem-solving to develop problem-solving skills	x	x	SR
3.	Learners need to use a scientific method of inquiry in their analysis of problems	x	x	SR
4.	Learners should provide evidence in their reasoning	x	x	SR
5.	Learners should learn under conditions which promote curiosity, prompt questions and contain suspense		x	SR
6.	The teacher shouldn't act as expert and information source	x	x	TR
7.	Learners benefit more by self managing their learning than by having the teacher manage it	x	x	SR
8.	Learners should actively engage in authentic learning experience which extends their knowledge	x	x	SR
9.	Learners should control/manage their learning	x	x	SR
10.	It is in the best learning interest of the student/patient for the teacher/therapist to withhold case information until it is requested during inquiry	x	x	TR
11.	Solution finding to problems involves interacting with others	x	x	SR
12.	Problem identification and solution finding rests within the individual learner		x	SR
13.	The learner needs to verbalize his or her thinking during problem-solving		x	SR
14.	The teacher and learner will experience dilemmas when confronted with the conflict and challenge of shifting their beliefs about the learning process	x	x	SR, TR
15.	The teacher should use indirect techniques to stimulate the learner to self-express their reasoning and feelings		x	TR
16.	The teacher's dialogue is a factor that influences learning experiences		x	TR
17.	Reflection influences the learning experience	x	x	A
18.	The experience of knowing is as important as that which is known	x	x	A
19.	The quality of the learning experience influences learning	x	x	A

[a] SR=Student Role [b] TR=Tutor Role [c] A=PBL Approach

Table 1:3 Facilitation Techniques Alignment presents the alignment of facilitation techniques based on Barrows's (1980,1988, 2000, 2007) recommendations and principles for PBL tutors with therapeutic techniques that apply Rogers's client-centred theory and Ruesch's (1961) therapeutic communication.

Table 1:3 Facilitation Technique Alignment

		PBL	CCT	TC
1.	Interacts with students at the metacognitive level	x		
2.	Guides students through all stages of the inquiry/reflection process	x		
3.	Pushes student/patient to deeper levels of understanding	x	x	
4.	Requires confirmation through clarification of student comments	x		x
5.	Asks open-ended questions	x		
6.	Avoids expressing opinions concerning correctness of contributions	x	x	
7.	Avoids giving information to the student/patient	x	x	
8.	Encourage discussions between students	x		
9.	Enables group consensus for all decisions	x		
10.	Utilizes techniques to get students to take responsibility for learning	x	x	
11.	Shows unconditional positive regard	x	x	
12.	Displays empathy		x	
13.	Enables student direction of content by withholding directions	x	x	
14.	Responds to expressions of feelings as well as of content	x	x	
15.	Interprets expressed feelings and ideas	x	x	x
16.	Elicits and draws out thinking problems	x	x	x
17.	Gives neutral responses	x	x	x
18.	Summarizes with the student his or her thought patterns	x	x	x
19.	Uses counselling techniques to assist expression of thoughts and feelings	x	x	
20.	Is permissive in encouraging free expression of thoughts and feelings	x	x	
21.	Encourages self-initiated actions	x	x	
22.	Builds independence in the student/patient	x	x	
23.	Uses techniques that guide the student/patient awareness of attitudes		x	
24.	Stimulates student/patient to develop concepts	x	x	
25.	Minimizes specific closed questions	x	x	
26.	Uses in direct probes to prompt the student/patient to talk	x	x	x
27.	Occasionally gives information and explanations	x	x	
28.	Requires the student/patient to select his or her own learning goals and issues	x	x	
29.	Demonstrates the right of the student/patient to psychological independence	x	x	
30.	Translates what the student/patient has said for confirmation	x	x	x
31.	Reformulates student/patient statements (less familiar into more familiar)	x	x	x
32.	Asks probing questions to amplify patient/student statements	x		x
33.	Stimulates deductive thinking	x		x
34.	Compares patient/student information out loud without drawing conclusions	x	x	x
35.	Pinpoints contradictions in student/patient statements	x		x
36.	Confronts student/patient with facts but does not offer an opinion	x	x	x
37.	Delays responses to allow student/patient to proceed	x	x	x
38.	Allows leadership to gravitate to student/patient	x	x	

[a]CCL= Client Centered Theory [b] TC= Therapeutic Communication

Research Questions

The theoretical, conceptual, and empirical analyses in the reviewed literature identify a relationship between beliefs and behaviours. The following research questions are logical outcomes of the literature and contribute to the development of new understandings of the challenges tutors may face in their role.

1. What is the relationship between tutors' pedagogical beliefs with their facilitation comfort and challenges?
    a. What are tutors' teaching and learning beliefs?
    b. To what extent are tutors comfortable with nondirective techniques?
    c. What challenges with their role do tutors report?
2. What is the relationship between tutors' background and their facilitation comfort and challenges?

Significance of the Study

This study focused on the pedagogical beliefs, comfort, and challenges of PBL tutors. While the relevant literature presents many studies of various tutor approaches and areas of discomfort, this work is incomplete. This study provides empirical research that has the potential to enhance the understanding of PBL tutors. Despite the existence of PBL since the late 1960s, Wilkerson and Maxwell (1988) identified that virtually no empirical research had been conducted on the motives, characteristics, and perceptions of PBL tutors. Since then a few researchers have studied the tutors' views on the PBL tutoring experience (Gijselaer, 1997; Jung, Tryssenaar et al., 2005; Kaufman & Holmes, 1998; Maudsley, 2003; Vernon, 1995; Wilkie, 2004).

Scope and Limitations of the study

The scope of this study was confined to tutors' pedagogical beliefs, comfort and challenges with facilitation techniques in a PBL context in medical education programs. This included beliefs based upon Barrows's recommendations and tutor principles categorized by the researcher into PBL approach, tutor role and the student role. Facilitation techniques were based on Barrows's (1980, 1988, 2000, 2007) PBL recommendations and tutor principles and categorized by the researcher into verbal and

nonverbal techniques. It is important to note that this study addressed only the perspectives of tutors that could be obtained through self-reports and did not examine tutors in action. The observation component was excluded from this study to ensure the research focused on the experience the tutor gained over time through multiple tutorials. In contrast to self-reports, observational assessments of PBL tutors include other stakeholders such as students and at times simulated patients (standardized patients). For example, observational studies of tutor behaviour may involve the use of student reports on their perceptions of tutor behaviour.

CHAPTER 2: REVIEW OF THE RELATED LITERATURE

The review of literature organizes relevant research from several viewpoints that pertain to the research questions of this study. In this way, the review presents published information that assists in understanding relationships between pedagogical beliefs and comfort in PBL tutoring. Research on differences in the behaviours and styles of PBL tutors is presented first. This section looks at reports concerning directive behaviours of PBL tutors and the research on the directive and nondirective behaviour differences of counsellors. Next, the research on the process of transitioning to PBL facilitation, reports on difficulties using indirect facilitation behaviour, and the difficulties teachers experience when adopting a new teaching method that requires new teaching behaviours and beliefs are discussed. The review then turns to an examination of the research on teaching beliefs from the broader area of teacher role change. A weakness in this area of research is the absence of research focusing on pedagogical beliefs that may be predictive of PBL tutors' comfort and challenges and the minimal research on nondirective facilitation.

An exhaustive search strategy of primary literature was undertaken. The literature review sourced information from peer reviewed journals and books. Key terms related to the research questions appropriate for searching databases were used in different combinations. By searching the databases of the Educational Resources Information Centre (ERIC), Medline, PychArticles, PsychLit, PsychINFO, Web of Science, and others, over 400 abstracts and over 200 studies were reviewed. References to relevant studies were also found searching bibliographies, reviews in specialized secondary literature, such the *Handbook of Educational Psychology*, from PBL and higher-education conference publications, and from personal recommendations. Every attempt was made to be as thorough as possible. Following a review of all abstracts, complete articles and sections of texts were read that met the criteria of research studies on PBL tutors, teachers in higher education, beliefs, teacher belief change, and tutor challenges, taking care to select only those based on original data and published in English. No restriction was placed on the field of publication

(health sciences, arts, and science), the date of publication, or type of research study. Quantitative, qualitative and a combination of both designs were reviewed.

When few studies were found on the beliefs of PBL tutors and on the role change experiences of tutors, the broader literature of studies of teachers at all levels was examined. Fourteen studies on this topic were located and reviewed. The handful of teachers' belief studies at the post-secondary level appeared to build on research conducted on K-12 teachers and preservice teacher development. Since the research on the relationship between teaching beliefs and teacher behaviour of this level of teacher has been quite active, it gives rise to speculations regarding assumptions that teaching beliefs influence teaching practice and in turn student achievement.

Facilitation Differences in PBL Tutors

PBL tutors differ in their facilitation style. Following an introduction of the area, three areas of facilitation differences are presented: content expertise versus noncontent expertise, content expertise and directive tutoring, and process expertise. Examination of facilitation differences has been of interest to scholars and researchers of PBL due to suspected causal linkages between facilitation behaviours, effectiveness, and student achievement. Although PBL tutor effectiveness has not been defined explicitly, some studies associate it with tutor success in carrying out the role as evidenced from student feedback (Barrows,1988). Scholars and researchers exploring the differences in PBL tutor facilitation begin by acknowledging the significant role change often required by the teacher moving to a PBL approach of tutoring and the potential impact tutor behaviours can have on student learning and achievement. (Barrows, 1988; Dolmans et al., 2002; Maudsley,1999). As might be expected, researchers approach the topic from several perspectives. In the early PBL literature, Barrows (1988) recommended that ideally the PBL tutor should have both process-facilitation expertise and subject-matter expertise. As discussed in Chapter One, process-facilitation expertise refers to the tutor's skill in stimulating the learning process, whereas subject-matter expertise refers to the tutor's content knowledge. The advantage of duality of tutor expertise has been confirmed empirically through multiple studies using student feedback and student grades (De Grave, Dolmans and Van der Vleuten,1999; Dolman et al., 2002; Schmidt et al.,1993, 1995; Schmidt & Moust,1995). Failing this duality of expertise, process-expertise was considered by Barrows to be more crucial to student learning than content expertise.

Most researchers have approached PBL facilitation indirectly. Until recently, most of the research on tutor behaviour focused on measuring directive behaviour, tutor expertise, and its effect on student achievement (Schmidt, 1994). Dolmans et al.'s (2002) review of the research on tutor differences between 1992 and 2002 found three major trends: (1) content expert and noncontent expert, (2) studies on process variables, and (3) relationships between tutor characteristics and differential contextual circumstances. These researchers recommended that future research should detail the relationship between key PBL variables and obtain in-depth knowledge about the teachers' conception of the tutor role. Dolmans (2000) also recommended tutoring should be investigated as a process that results from interactions with the educational context in which it occurs. Norman (2001) suggested that although tutors might strive to maintain the PBL philosophy, they might revert to directive tutoring when circumstances demand, such as working with dysfunctional groups. Hmelo-Silver and Barrows's (2006), interaction analysis of an expert PBL facilitator's behaviour aligned facilitation strategies with students' educational goals and performance goals of the facilitator. Their research found the expert facilitator used a mix of 10 strategies adapted on the fly to the context that included: open-ended and metacognitive questioning, pushing for explanation, revoicing, summarizing, generating/evaluating hypotheses, mapping between symptoms and hypotheses, checking consensus that whiteboard reflects discussion, cleaning up the board, creating learning issues and encouraging construction of visual representation.

Content expertise versus noncontent expertise

According to Maudsley (1999), expertise as a PBL tutor carries an array of meanings. The distinction between content expertise and noncontent expertise has been made (Dolmans et al., 2002). To a lesser extent, literature exists that contrasts tutor types into content or process expertise. Content experts are labelled according to their own or a researcher's rating, different frames of reference, being in a particular discipline, being medically qualified, or being an academic (Maudsley). For example, Schmidt et al. (1993) defined content expert backgrounds as staff with medical degrees (clinical medicine), whereas nonexperts are nonmedical, such as basic science staff (biomedicine) and social science staff. Davis et al. (1992) defined content experts as individuals who had an active research interest in the specific content area of the case. On the other hand, Regehr et al. (1995) defined content experts as individuals who are

involved in case development or in the type of case in practice. In Kaufman and Holmes's (1998) study, tutors' self-rated the degree to which they considered themselves content experts in the cases covered in the first year of the medical curriculum. In several studies researchers included student tutors in the nonexpert category, also labelled peer-directed tutoring (Kassab, Abu-hijleh, Al-shboul, & Hamdy, 2005; Moust & Schmidt, 1995; Steele, Medder, & Turner, 2000). Noncontent experts are individuals with general knowledge in a field but without in-depth knowledge usually obtained by a specialist in an area.

Some research on tutor expertise originates through studies on tutor effectiveness. The studies that have used student academic achievement in end-of-unit tests as the benchmark for student learning effectiveness have not produced conclusive differences on the impact of expert versus nonexpert tutors in PBL curricula (Davis, Nairn, Paine, & Anderson, 1992; Schmidt, van der Arden, Moust, Koks, & Boon, 1993; Silver & Wilkerson, 1991; Steele et al., 2000). On the other hand, empirical research that has investigated student opinions on tutor behaviour has found tutors that emphasize the learning process are considered more effective than tutors that stress content or have content expertise (De Grave et al., 1999).

Content Expertise and Directive Tutoring

The topics of tutors as content experts and of directive tutoring have been popular in PBL tutor research. Dolmans et al. (2002) and Neville (1999) in their reviews of the empirical research on tutor behaviours discovered numerous researchers drew links between content expertise and directive tutoring. It has been found that tutors with content expertise are more directive: speak more often, talk longer, provide quicker and more direct answers to student queries, use more teacher-directed activities, explain more case material, dominate tutorial time, and suggest more items for discussion in the tutorial group than noncontent expert tutors (Davis, 1992; Kaufman & Holmes, 1998; Regehr et al., 1995; Schmidt, 1995; Silver & Wilkerson, 1991; Thomas, 1992). Kaufman et al. found content experts had difficulty transitioning to the facilitator role. It has been argued that the directive tutor does not give students freedom to reason or learn on their own (Barrows, 1986).

The majority of the studies reported that content experts used more time giving information to students, whereas noncontent expert tutors spent more time stimulating group dynamics (Dolmans et al., 2002). De Grave (1998) found that some tutors rely on

their expert knowledge, whereas others rely on their abilities to stimulate the learning process. In studies where student and tutor behaviour was examined in tandem, researchers found differences in learning and values. Eagle, Harasym & Mandin, (1992) found that students in tutorials with content experts generated more learning issues that were congruent with faculty objectives and spent more time studying them. Alternatively, Wilkerson's (1995) research indicated that although students value the tutors' use of a nondirective approach that encourages student direction and control above all other tutoring skills, faculty rate this skill less highly. In summary, research on content expertise and directive tutoring has been an area of interest for researchers for quite some time. Research in this area has predominantly analyzed tutor behaviour through time-behaviour analysis and student evaluations, finding differences in content and noncontent experts.

Process Expertise

Following the research interest in content expertise, in the last decade research studies have emerged that have examined specifically the process tutors use. Process expertise refers to the manner in which the tutor engages students in the learning and includes direct and nondirective facilitation behaviours and that are also known as strategies, techniques, moves, and questioning. Little research has probed deeply into process behaviours in the tutor-student interaction process (Visscher-Pleijers, Dolmans, Wolfhagen, & van der Vleuten, 2005). Research into process interactions has mainly resulted from studies comparing content or staff tutors to student tutors. Schmidt et al. (1994) showed that student tutors spent more time on evaluative matters. Moust and Schmidt's (1995) study comparing staff and student tutor behaviours using a sample of first-year law students at the University of Limburg reported on some aspects of process expertise in conjunction with other tutor behaviours. Their study examined six factors of tutor behaviour: use of expertise, cognitive congruence, achievement orientation, authority, role congruence, and co-operative orientation. They defined role congruence as a willingness to be a co-learner, to seek an informal relationship, and to display interest and caring.

In another study addressing tutor behaviours also at the University of Limburg, Schmidt and Moust (1995) investigated tutor behaviours in undergraduate health science programs. In this study the process variable of cognitive congruence was again examined along with a variable labelled by the researchers as social congruence. The

researchers define this variable as a combination of their understanding of role congruence combined with authoritarian behaviours. In their theoretical model of tutor behaviour, which they consider a causal model, social congruence led to higher student achievement. In this way, when higher levels of social congruency are paired with higher use of subject-matter knowledge, the tutor becomes more cognitively congruent with students. They argued this factor expresses itself in higher student interest in the subject matter, evidenced by higher self-study times and higher achievement. The model was tested through a program evaluation questionnaire administered at the end of each course, which included items designed to tap social congruence, subject-matter expertise use, and cognitive congruent behaviours of tutors. When their findings were inconsistent with their theoretical model, the researchers modified their theory to predict social congruence alone can directly impact tutorial-group functioning without the interaction on cognitive congruence.

Schmidt and Moust's (1995) work confirmed Barrows's (1988) earlier advice that effective tutors require both content and process expertise. Simultaneously, Schmidt and Moust's study sheds light on how the qualities of a suitable knowledge base of the problem topic, authentic interest in students, and use of language understood by students can impact tutorial-group functioning, self-study time, academic achievement, and interest in the subject matter. In regards to process facilitation expertise, the researchers concluded that it is important for tutors to convey an empathetic attitude to student learning by creating an open atmosphere through informal communications. This attitude and accompanying behaviours, though, were measured in a nonspecific way. As the construct validity of the measurement instrument was not reported, there are gaps in the research that ignite questions regarding questionnaire items. It is not clear that the few items regarding social congruency alone represent a conclusive demonstration of an empathetic attitude, creation of an open atmosphere in the tutorial group, or process expertise. For example, an item that asked about the tutors' demonstration of liking informal contact with students was phrased in such a general way that it does not reveal enough detail about what informal contact actually means.

However, both studies by Moust and Schmidt were significant contributions to the topic of process expertise of the PBL tutor. While the study comparing student and staff tutor process behaviours explained student perceptions of differences in the teacher-student relationship versus the student-student relationship in terms of cognitive and role congruency, the study expanding on cognitive and social congruency factors clarified the

equally important influence of social congruency. Taken together, these studies confirmed that a tutor's process interactions are perceived by students to matter to their learning. The results showed the importance of process expertise by focusing on the cognitive and affective behaviours of the tutor.

More recently, Kassab et al. (2005), using the Tutor Intervention Profile (TIP) (described below) questionnaire on third-year medical students at the Arabian Gulf University, found that student tutors were perceived better in providing feedback and in understanding student difficulties in tutorials than faculty tutors, but faculty ranked better at enabling problem understanding and analysis. These researchers also concluded that student tutors displayed more cognitively congruent behaviour with students than did faculty tutors.

Another way that researchers approach process behaviour is through looking at the simulation of the learning process. De Grave et al.'s (1999) examination of tutor behaviour found different tutor interventions are required at different times in the tutorial session. Their research divided PBL tutor behaviour into two phases: the discussion preceding the generation of learning issues and the reporting of the learning issues. Based on their review of the tutor behaviour literature, De Grave et al. further sub-divided tutor behaviour into four dimensions: (a) stimulating elaboration, (b) directing the learning process, (c) stimulating integration, and (d) stimulating interaction and individual accountability. These four dimensions resulted in four factors assessed in their Tutor Intervention Profile (TIP) questionnaire. Stimulating elaboration was defined as stimulating in-depth brainstorming and stimulating identification of gaps in student prior knowledge. Directing the learning process was defined as stimulating the generation of learning issues and drawing attention to the students' gaps in prior knowledge. Stimulating integration was defined as stimulating student integration of newly acquired knowledge with previous knowledge and stimulating students to apply knowledge acquired through self-study to explain case phenomena. Stimulating interaction and individual accountability was defined as stimulating students to inventory learning resources used in self-study and stimulating students to report in their own words information gathered from resources. Sample items in the TIP questionnaire are, "stimulates the formation of structured hypotheses" and "stimulates interaction and discussion." The research instrument does not ask how the tutor stimulates elaboration, just if students agree it was done or not. Although research using the TIP questionnaire extends research by probing deeper into the interaction between tutors and students

during the facilitation process, it did not differentiate directive from nondirective tutor facilitation.

Using two case studies, Gilkison (2004) found differences in tutoring behaviour and teaching and learning expectations between medical and nonmedical tutors, with each tutor type emphasizing different aspects of the tutoring role. Like earlier studies, Gilkison found that the medical tutor as expert tutor behaves in a directive manner. However, this study showed that the directive tutor spends more time informing and raising students' critical awareness and metacognitive skills whereas the nonmedical tutor spends more time in facilitation techniques that cause students to challenge each other. Consistent with earlier studies, this research does not identify the kinds of comments or questions used by the tutors, so the use of nondirective facilitation techniques cannot be established. Nonetheless, this study revealed that the medical tutor recognized that directive behaviours conflicted with the expected role of the PBL tutor and personal teaching beliefs. The researcher deduced that the difference between the PBL tutor role and medical tutors' past experience as a teacher impacts tutoring style. It appears plausible that the medical tutor might have been influenced by prior clinical experience, whereas the nonmedical tutor may be influenced by experience with PBL groups and student and faculty objectives. The researcher acknowledged that the transcription of the tape recordings of tutors' and students' interviews was incomplete and that by presenting only a summary of the main ideas, bias is introduced. Despite the limitations of this study, it provides empirical evidence that suggests a relationship between teaching beliefs and tutor behaviour exists and that previous experiences influence teaching beliefs.

A few studies have examined the type of questions, strategies and moves tutors use in the process of facilitating in PBL settings. Profetto-McGrath, Bulmer Smith, Day & Younge (2004) in their examination of nursing tutors' dialogue with students in a context-based baccalaureate nursing program found tutors' questions were aimed at seeking yes/no responses and factual information more frequently than probing using questions that required analysis, synthesis, and evaluation. Their recommendations included the need for tutors to be taught how to question and the use of appropriate strategies to teach the use of higher-order questions.

In summary, the research on tutor differences has concentrated on content versus noncontent expertise and to a lesser extent on process expertise. Nondirective facilitation is approached in an indirect and circumstantial manner through examinations

of these two areas of expertise. The *amount* of tutor talk time has received more attention than the *kind* of tutor talk. Researchers have looked at some of the behaviours that comprise non-directive facilitation by its opposite, by examining congruence, collaborative learning, or other circumstantial evidence. Questionnaires are the most common research instrument of the studies. What appears to be lacking is research that inquires directly into the tutors' use of a nondirective approach and the specific behaviours that the tutor would demonstrate when using a nondirective approach. The information gained from the review of this body of literature suggests that the present study holds the possibility of extending knowledge, especially if tutors' pedagogical beliefs and nondirective facilitation are measured in specific ways.

Directive versus Nondirective facilitation in the psychological domain

As the number of studies on the type of facilitation techniques used by tutors and specific research on the tutors' use of nondirective techniques in the PBL literature was minimal, the psychological literature on nondirective facilitation techniques was examined. In turning to the psychological literature for reports of empirical studies concerning directive versus nondirective facilitation, Rogers (1942) explained that nondirective facilitation and client-centered therapy were developed from his clinical experiences. Porter (1941), as cited by Rogers, found that although all counsellors tended to consider themselves as noncoercive and nondirective, when their behaviours were analyzed for directness and nondirective behaviours, the majority were directive. Using a sample of 19 counsellors, Porter's study found 11 categories of response behaviours characteristic of directive counsellor, three categories of responses more heavily used by the non-directive counsellors and four behaviours common to both. Counsellors in the non-directive group were observed to respond in three categories; (a) the counsellor defined the interview in terms of client responsibility for directing the interview, reaching decisions, etc. (b) the counsellor responded in a way as to indicate recognition of expression of feeling or attitude, and (c) the counsellor responded in such a way as to interpret or recognize feeling or attitude expressed in some way other than in the immediately preceding response. Rogers used Porter's findings to show the difference between the two therapeutic approaches. In his analysis he associated the amount of counsellor talk time with the amount of directive behaviour. He reported that the directive counsellors did most of the talking in the client interview, talking nearly four times more than the client. On the other hand non-directive counsellors talked one

seventh of the time that the client talked. He concluded that the directive counsellor talks to the client whereas in the non-directive counsellor situation the client comes to talk about his problem. He indicated that the directive approach is characterized by persuading the client, pointing out problems needing correction, interpreting test results, and asking specific questions. Conversely, the nondirective counsellor was found to use techniques that recognize and interpret the client's verbally expressed feelings. He indicated that the directive group stressed techniques, which control the interview and move the client toward a counsellor-chosen goal, whereas the nondirective group stressed techniques, which cause the client to be more conscious of his/her own attitudes and feeling, with a consequent increase in insight and self-understanding. His analysis examined the seven techniques used most frequently by counsellors of both types. This data showed that the direct counsellor most frequently asked closed-ended questions, explained and gave information related to the problem, indicated the topic of discussion, proposed client activity, recognized the content of what the client had said, provided evidence so the client would undertake the proposed action, and pointed out the problem needing attention. On the other hand, the nondirective counsellors most frequent behaviour was to recognize the feeling the client expressed, interpret expressed feelings, indicate topics of conversation but leave development to the client. As well, the nondirective counsellor recognized the content of what the client had said, asked specific questions, explained and gave information related to the problem or treatment, and defined the interview in terms of the client's responsibility for using it. Although defining client responsibility for the interview was within the top seven behaviours of the non-directive counsellor, the frequency rate for this behaviour was the lowest of the behaviours.

Rogers concluded that directive counselling is characterized by many highly specific questions to which specific answers are expected and by information and explanations given by the counsellor. In this way, the therapist proposed actions the client should take to effect change. On the other hand, non-directive counselling is characterized by client activity and counsellor techniques that consist primarily of helping the client more clearly recognize and understand his/her feelings, attitudes and reaction patterns and encourage the client to talk about them. The counsellor may further achieve his/her aim by restating or clarifying the subject content of the client's conversations. Less frequently he asks specific questions of an information-getting sort. Occasionally he/she gives information or explanations. There is considerable redefinition of the

interviewing situation as being primarily the client's situation, to use for his own growth. The nondirective approach is associated with giving the client ample opportunity to *talk freely*.

Rogers (1942) felt it was necessary to explain the differences between directive and nondirective because there was tendency to assume that all counselling was alike and that differences in techniques were minor. Rogers (1942,) indicated that, "differences between the directive and nondirective approaches lie deeper in differences in philosophy of counselling and the values, which are assumed to be important" (p. 126). Related to this are the implicit purposes of both directive and nondirective counselling. The first difference in purpose centres on the question of who is to choose the patient's goals. The directive group assumes that the counsellor selects the desirable and the socially approved goal, which the client is to attain and then directs his/her efforts toward helping the subject to attain it. Non-directive counselling is based on the assumption that *the client has the right to select his/her own life goals*, even though these may be at variance with the goals that the counsellor might choose for him. There is also the belief that if the individual has insight into himself/herself and his/her problems, and he/she will likely be able to chose wisely. The non-directive viewpoint places a high value on *the right of every individual to be psychologically independent* and to maintain psychological integrity. This viewpoint relates to social and political philosophy as well as to therapeutic techniques. Rogers maintained that due to differences in value judgments, the directive group focuses efforts upon the problem that the client presents, whereas the non-directive group emphasizes the client, not the problem. This means that when clients achieve sufficient insight into their situation, they can choose their preferred method of adapting to reality. The expectation is that the client will be much more capable of coping with future problems that arise, because of increased insight and increased experience in independently solving problems. Here Roger echoed Dewey's educational philosophies and in particular the benefits of experiential learning.

Rogers's opinion that the differences between directive and non-directive counsellors behaviour lies in differences in philosophy of counselling provide a basis for expecting that differences in PBL tutors use of nondirective facilitation techniques may likewise stem from their differences in pedagogical beliefs.

Facilitation Comfort and Challenges

Difficulties with the tutor role may create discomfort and challenges. Besides studies on differences in facilitation styles, some studies also address facilitation difficulties, while others view the role dilemmas that PBL tutors face as parallel to the difficulties teachers face using a constructivist approach. A number of reasons have been put forward to explain the challenges PBL tutors' experience in transitioning their teaching behaviours to those required in a PBL tutor role (Barrows, 1988; Koschmann et al. 2000; Neville, 1999; Jung et al., 2005; Wilkie 2004). In one of the initial guides to PBL, Barrows (1980) indicated that tutor difficulties often stem from insecurities that PBL is not as efficient in the learning of facts as methods that present a systematized body of knowledge. According to Barrows, when problem-solving in real life, individuals don't recall previously learned systematized knowledge but do recall how to reason through a problem. His argument suggests that teachers who hold pedagogical beliefs that learning's main goal is the acquisition of facts will experience more difficulties with PBL tutoring than those who view learning as the acquisition of a reasoning process and the organization or systematize knowledge in a way that suits individual style. Barrows also argued that teachers who believe learning revolves around the production of scholarly knowledge and view problem-solving cases as vocational knowledge will have difficulties with the PBL tutoring.

Another challenge proposed in the literature for teachers moving to PBL tutoring has to do with the power relationship between the tutor and the student. There are reports that ideally the PBL tutor-student relationship should be more aligned to a discussion between colleagues where students are regarded as novices (Koschmann et al., 2000; Maudsley, 1999). In PBL, tutor authority is expected to be exercised differently, which Maudsley speculated could potentially threaten the tutor. From Margetson's (1991) standpoint, becoming a PBL tutor requires a radical change of attitude for many tutors in higher education, where paternalistic attitudes are often the norm.

While most studies on tutor facilitation styles examine behaviour at one point in time, some research on this topic tracks changes in facilitation style over time. Wilkie's (2004) research revealed the circumstances surrounding directive facilitators and their transition or lack of transition to PBL style facilitation. This qualitative research, based on interviews with 18 nursing lecturers implementing PBL over a 3 year period, found facilitation style varied, despite the same PBL training, from tutor to tutor and that

facilitation style changed. Although all nursing lecturers received the same PBL tutor training, their facilitation styles varied. Differences in facilitation style were noted at the beginning of the study period. From her analysis of tutors' dialogue during PBL seminars, Wilkie classified tutor facilitation into four categories, which she labelled as liberating supporter, directive conventionalist, nurturing socializer, and pragmatic enabler. The study indicated that most facilitators aspired to use a liberating supporter approach but that this approach was adopted least often. Eleven of the 18 tutors shifted their approach between years one and three of tutoring experience. A small number of the facilitators began facilitating with the liberating supporter approach that Wilkie refers to as a noninterventionist flexible approach and continued to use it throughout the 3 years of the study. The majority of the tutors began with a directive conventionalist approach, and two continued with it. The remaining participants' search for alternate approaches led them to act as a nurturing socialiser or pragmatic enabler. The report also indicated that some individuals adjusted their teaching beliefs to work with a PBL philosophy and that two individuals adjusted their concepts of PBL to better fit a directive conventionalist approach.

Wilkie's (2004) study also found that a facilitator's increasing awareness of the importance of dialogue can change their facilitation style. Her research reported that in the participants' first year of tutoring, most of them used a facilitation style characterized as facilitator centered. In this way, direct questions were used to elicit factual content, and open discussion between students was not encouraged. With additional facilitation experience, most facilitators in Wilkie's study shifted their style to allow more student discussions of case scenarios and identifying issues independently with less tutor intervention. The dialogue analysis noted that silences in discussions were less likely to be broken by facilitators as they gained facilitation experience. Wilkie claimed, "the shift in approach appears to lie less in the acceptance of a new belief system and more in exploring how the espoused concepts apply in practice" (p. 92).

Wilkie's (2004) exploratory research described changes in facilitation style and touched on corresponding changes in teaching beliefs. She considered that experiencing the dialogic nature of PBL promotes changes from using a teacher-centered approach with little dialogue between students to a student-centered approach where dialogue between students predominates. The conclusions of this study point to tutoring experience as a key factor in adopting a less directive facilitation style. The rich data in this research resulted in part from the study's longitudinal design that allowed the

collection of repeated participant reflections over time. Although this design differs from that in the proposed research study, Wilkie's findings regarding a relationship between facilitation style and beliefs supports the expectation that the questions explored in this study may be a fruitful area of research.

Most empirical research on tutors reports that in general the role transition from teacher to tutor is challenging. Lai and Tang (1999) reported that PBL tutors within a health science faculty in Hong Kong had difficulties adopting the PBL tutor role due to their past teaching practice using a transmission mode of teaching and the lack of career incentives to engage in implementing PBL strategies. Research by Jung et al. (2005) corroborates the tutors' difficulty transitioning to PBL due to prior teaching experiences based in traditional approaches. In this qualitative study interviews were conducted with 10 PBL tutors participating in the tutor training program at McMaster University within 18 months of their first-time tutoring experience. Five themes emerged related to the self-reported benefits of the tutoring experience: transitioning to a new role, uncovering learning opportunities, maintaining vigilance, and explicating the implicit. This research provides some evidence that participants with a more traditional approach to learning indicated that the PBL tutoring experience brought difficulties in transitioning to the role of a nondirective facilitator. Unfortunately the general nature of these research findings does not distinguish the degree of the tutors' challenge and relationships between struggles in performing the facilitation role of the tutor with pre-existing teaching beliefs or the nature of the difficulties in facilitating reasoning skills.

Transitioning to a constructivism approach to teaching

The challenges that PBL tutors experience with their role may exemplify typical difficulties teachers in non-PBL environments experience when changing from a traditional teaching approach to a constructivist approach. As PBL is more like the latter approach, the literature in the larger field of teacher transition difficulties to constructivist approaches was consulted. The empirical literature described the transition from traditional teaching to facilitating with a constructivist-like method as a bumpy, sometimes unsuccessful road. Cook (2002) claimed that when constructivist beliefs are not well enough conceptualized during teacher training, they are subject to erosion during teaching. This type of research found that although preservice teachers applied constructivist principles during their teacher education coursework, these principles were abandoned in the first full-time teaching job when support from their university

professors ended and the culture of the classroom dominated. Cook claimed that role struggle arises when the teacher finds internal contradictions between his/her unexamined beliefs and his/her practice. The results of this study suggest the importance of examining teaching beliefs during training and early in the tutoring experience for potential relationships between beliefs and behaviours. These findings provide further evidence to suggest that the PBL tutors' struggle to implement nondirective facilitation may be interwoven with unexamined and conflicting pedagogical beliefs.

In a study on teacher development using a case study design with a sample of 4 participants, Levin's (2003) findings led to speculations that pedagogical understandings develop at an inner and social level simultaneously. Inner level development refers to change in the complexity of teachers' thinking, which resulted from solving problems or challenges in their teaching practice. In Levin's study the participants held attitudes that viewed problems as puzzles to be solved. When student problems arose, these teachers recognized the need to change their instructional method and investigate their learning issues. The ensuing struggles were manifested through reflection and metacognitive thinking about their teaching practice and how learning occurs. Levin compared this to Piaget's concept of self-regulation. According to Piaget's ideas about disequilibrium, the teachers in Levin's study entered a state of cognitive conflict when a problem arose that they needed to solve. Her research showed that their struggles continued until the teachers found a solution by consulting with others, such as other teachers, reading or attending workshops, or during dialogue with students or family members. Teachers engaged in both metacognitive thinking and self-regulation. Levin found that dialogue with other teachers in similar situations and who hold similar theoretical perspectives and similar developmental-constructivist orientations fostered transition. Thus, Levin concluded that social dialogue in conjunction with inner dialogue about the dilemmas they faced with their teaching problems helped these teachers' pedagogical development. She also found that specific personal and professional factors influenced tutor development such as prior beliefs, professional teaching experiences, teaching contexts, personal relationships, and other life circumstances. Levin acknowledges that the teachers in the sample had a predisposition to reflection on their practice and found that personal and professional factors were intertwined.

In his analysis of constructivism in practice, Windschitl (2002) described the dilemmas that resulted from the transition to constructivist teaching. His analysis

presented a highly problematized view of the teacher who faces ambiguities, contradictions, and compromises when implementing a constructivist instruction that he felt characterized any reform teaching. PBL may be considered an educational reform because it uses strategies that vary from traditional educational approaches. As such, PBL tutors may experience similar dilemmas as teachers transitioning to constructivist teaching.

Research concerning the difficulties that teachers experience suggests that the transition is not easy and that PBL tutors may experience similar difficulties. In the context of this study, these findings indicate the possibility that the impact such a transition has on a PBL tutor may surface in their comfort with nondirective facilitation techniques.

Teaching beliefs

Research on beliefs about teaching and learning is presented in three sections: (1) an overview of the relevant findings on PBL tutor beliefs, (2) teaching beliefs in non-PBL environments, and (3) measures used to investigate teaching beliefs.

PBL tutor pedagogical beliefs

Wilkerson and Maxwell (1988) conducted a qualitative study of 27 PBL tutors in Harvard University's medical school shortly after the school adopted PBL. They argued that tutors perceptions of the educational goals and methods of the program were explicitly linked to personal beliefs about teaching and learning. Their research, which examined the attitudes, goals and expectation of tutors, found individuals were drawn to tutor because PBL gave students opportunities to learn independently, to think and problem-solve rather than memorize, and contained small-group active learning discussions. Additionally, the role was more appealing because it was in keeping with the tutors' own strengths.

Recently scholars have examined the specific nature of tutors' pedagogical beliefs and where they differ from the beliefs central to a PBL philosophy. Researchers have noted that teachers who are accustomed to teaching with a traditional approach face a challenge in shifting to a PBL approach (Barrows & Tamblyn, 1980). Tremblay et al. (2001) indicated that, "educators need to examine their fundamental beliefs about the learning process when shifting to PBL" (p. 561). Some researchers have commented on

the influence of teaching beliefs on PBL tutors' success and the techniques they use (Hmelo-Silver & Barrows, 2006; Hockings, 1990; Wilkie, 2004). In a case study concerning teaching beliefs, Hockings's (2004) recordings of a colleague's initial PBL tutoring experience, found conflicts surfaced between the tutor's traditional teaching beliefs and PBL philosophy. Hockings (2004) reports that in this case, even though the individual stated that he held social constructivist epistemological beliefs, he also indicated that, "his position on knowledge prevented him from relinquishing his transmission pedagogy despite his espoused desire to move to PBL" (p.75). It would be interesting to determine if the teaching beliefs dilemma reported by other PBL tutors rests with the knowledge issue or with other attitudes that comprise their teaching beliefs. The value of Hockings's (2004) research resides in the information it provides on changes in the new PBL tutor's behaviour over time. The study reports that the facilitator begins with a range of teaching skills, which do not always include PBL tutor skills. The facilitator responds in one of three ways: by adopting new skills and practice with ease and confidence; by supplementing with traditional methods; or by avoiding change and reverting to traditional methods.

The different types of facilitation behaviours found by Hockings (2004) are consistent with those found by Wilkie (2004). Other researchers have found differences in facilitation due to different pedagogical goals and perspectives. Koschmann, Glenn, and Conlee (2000) contrasted a segment of a PBL tutorial conversation with a segment of non-PBL tutorial interaction. This study concluded that the goal of the non-PBL tutor was to bring the tutee to a negotiated level of understanding whereas the goal of a PBL tutorial seemed to be to help the learner identify deficiencies in their understanding. These researchers also indicated that different goals are evident in the ways in which problem-solving is approached. They argued that non-PBL or conventional tutoring uses an Inquiry, Respond, Evaluate (IRE) sequence. The IRE sequence occurs in the following way: The instructor inquires, the student responds, and the instructor evaluates (Cazden 1988; Mehan, 1978). Koschmann et al. (2000) argued that PBL results in a more differentiated exchange. They claimed that one of the most significant differences is that the PBL tutor withholds assessment of the student answers, whereas in the conventional one-on-one tutoring exchange the tutor confirms the student's answer immediately.

Other investigations of PBL tutors' attitudes and pedagogical beliefs have centered on attitudes comparing PBL and traditional curriculum. Kaufman and Holmes

(1998) compared tutors' satisfaction with PBL to traditional curriculum using general indicators of student outcomes consisting of students' interest and enthusiasm, factual knowledge of basic sciences, understanding of general principles, faculty interest and enthusiasm, personal satisfaction, efficiency of learning, reasoning ability, preparation for clinical rotations, and overall value. The researchers found that less interventionalist tutors held pedagogical beliefs that favoured PBL over traditional medical school methods. It found that most tutors who are content experts are likely to present/explain case content and are less concerned with group dynamics. This study moved the research of the field forward by providing a way to differentiate tutor behaviours and compare them to the tutors' pedagogical beliefs. While the study was limited to gathering peripheral data on the pedagogical beliefs it provided an example of probing into PBL tutor beliefs using a questionnaire.

Berstein, Tippin, Bercovitz, and Skinner's (1995) study using a questionnaire of the attitudes of 250 students and 15 faculty tutors at the University of Toronto's Faculty of Medicine reported that faculty participants, all of whom used traditional teaching methods for a long time, indicated that although they were anxious about the transition to PBL, they "found the interaction between themselves and the students to be more collegial, fun, easy and engaging and relaxed" (p. 246). This study provides a further example of the use of a questionnaire to investigate tutor attitudes to teaching and learning.

In summary, a review of the relevant studies that have researched PBL tutors' beliefs reveals that numerous research methods and instruments have been used including interview, direct observation, and questionnaire. The majority of the investigations collected data at one point in time. These findings are relevant because they provide the foundation on which the present study builds.

Teaching Beliefs in non-PBL environments

Calderhead's (1996) review of the history of research on teachers' beliefs indicated that the 1970s heralded a trend of increasing exploration of teachers' beliefs including what they think about learners and learning, teaching, subject matter, learning to teach, the teaching role, and the ways in which they understand their work. His findings revealed that three factors influenced the shift away from the previous behaviourist-dominated research with its focus on teacher competencies and behaviours in relation to student achievement: the narrow focus of the behaviourist research

models, developments in cognitive psychology and cognitive science constructivist-like theories, and increasing acknowledgement of the central role of the teacher in the learning process. The intrinsic involvement of the teachers' own professional development in the process of curriculum change had gained attention in the research community.

The research literature revealed that, in general, experience influences beliefs. Beliefs about teaching are believed to be influenced by beliefs that the teacher has developed through non-teaching as well as through teaching experiences. Teachers hold a range of teaching beliefs about education often derived from prominent thinkers and educators such as Rousseau, Dewey, Skinner, Bruner, Vygotsky, and others that are developed over time. Feinman-Nemser and Floden (1986) claimed that prior socialization experiences in the educational field, as a teacher transmits existing teacher beliefs, knowledge, and attitudes. Lortie (1975) holds a similar view that some prior experiences that influence teachers' beliefs originate from "apprenticeship of observation" as a pupil (p. 67). Rightly or wrongly, teachers naturally absorb teaching values, beliefs, and attitudes from their culture, their role models and their teacher training programs (Bruner, 1990;Dewey, 1903).

Instruments to measure beliefs

Pajares (1992) indicated that beliefs could not be directly observed or measured but must be inferred from what individuals say, intend, and do. No measurement instruments were found that specifically examined tutors' pedagogical beliefs. As such this section looks broadly at research that has investigated teachers' beliefs from a number of perspectives using a variety of methods. While some researchers have developed new instruments (questionnaires, inventories and scales) to measure beliefs (Bowman, Bright, & Vacc, 1998; Brown, 1968; Donche, Vanhoof, & Van Peregem, 2000; Hoy & Jalovick, 1979; Pratt, Collins, & Jarvis Selinger, 2001: Silvernail, 1992; Tillema, 1994; Wooley, 1999; Zinn, 2004) others have modified existing research questionnaires for quantitative or qualitative use (Lai and Tang, 1999; Tosum, 2000; Vacc, Bright and Bowman, 1998).

Kagan (1990) found five different approaches have been used to study the field: (a) direct and noninferential ways of assessing teacher belief; (b) methods that rely on contextual analysis of teachers' descriptive language; (c) taxonomies for assessing self-reflection and metacognition; (d) multimethod evaluations of pedagogical content

knowledge and beliefs; and (e) concept mapping. The studies Kagan selected for review were based on three criteria: examples of methodological approaches, important or significant qualities of a particular measurement procedure, and viability of particular measurement procedures in terms of a coherent set of findings. The population of teachers in the studies she reviewed consisted of preservice and K-12 teachers as well as teachers enrolled in continuing education and teacher additional qualifications programs.

Beliefs have acted as the dependent variable when researchers looked for changes in beliefs following training. Tillema (1994) assessed the beliefs of 146 teachers seeking special education certification about topics in advance and after training. An attitude scale to rate 10 different attitudes towards professional action was developed by the researcher. The beliefs assessment instrument was administered at two points in time during the training program. Although the published report of the scale did not include all items, the report indicated communicative-directive was one of the dimensions measured. This research study found that although the teachers did not expand their knowledge of specific topics, their teaching beliefs (also referred to by Tillema as the teachers' orientations about topics) did change as a result of the training program.

Some researchers have approached the study of teachers' beliefs from the perspective of Dogmatism. Rokeach (1960) defined and measured this concept as the degree to which an individual is oriented to an open or closed belief system. Hoy and Jalovick (1979) considered open education as one end of the continuum, with traditional education at the other. The Teacher Attitude Inventory (TAI) was used in these studies to measure two aspects of beliefs about education: teachers' attitudes about the nature of knowledge and how pupils learn.

The relationship between teaching beliefs and teaching approaches has been studied in relation to particular subject areas. It has been suggested that teaching approaches in a particular subject area are shaped by beliefs about education. Silvernail (1992) used the term "philosophical orientations" to track changes in a comprehensive set of key educational concepts. He approached the topic from three teaching approach orientations: traditionalism, progressivism, and romanticism. The traditionalist orientation aims learning toward a set of predetermined facts and skills. Here, the role of the teacher is to transmit knowledge. The progressivist orientation supports discovery of facts through logical inquiry. The role of the teacher in this approach fosters the inquiry

method acting as facilitator. The romanticist orientation is described as more individualized learning. Here the teacher is seen as guide, where learners are free to experience and chose directions for their exploration of ideas and issues.

Brown (1968) developed a questionnaire to measure teachers' agreement and disagreement with John Dewey's educational philosophy. An Experimentalism scale was developed concerning basic philosophic beliefs about knowledge and teacher practices in the relationship of subject matter and method. In addition to using a panel of judges for content validity purposes, Brown tested the validity of his instrument with individuals whose beliefs (pro or con) in this area were well known. The list of prominent American educators included Carl Rogers and B. F. Skinner. In addition, the instrument was given to professors in the fields of Education, English, Mathematics, Languages, History, Social studies, and Natural sciences at four American universities distributed across the nation. Brown predicted that scholars in natural and social sciences (particularly the field of Education) would hold more experimental beliefs than would scholars in the other fields tested. The findings of his research corroborated his hypothesis. Results of Brown's study revealed discrepancies between what teachers' state they believe is good teaching practice and what they were observed to do in the classroom. Specifically, while many teachers said they believed that students should work on problems they were interested in rather than ones originating from the teacher or textbook, only a handful of the experimentalists' organized learning around student-initiated problems. Although experimentalist teachers organized learning problems of genuine concern to students, the same teachers showed a preference for problems shallow in depth. Non-experimentalist teachers tended to choose instructional problems that were remote from the concern and interest of students.

Pratt, Collins, and Jarvis Selinger (2001) developed the Teaching Perspectives Inventory (TPI) to measure the educational beliefs, intentions, and actions of educators of adults most of whom worked in the higher education field. This instrument is based upon Pratt's four teaching perspectives: transmission, apprenticeship, developmental, nurturing and social reform. This 45-item inventory consists of 15 statements in each of the sections (beliefs, educational intentions, and actions). None of the statements in the belief section pertain to the rights of individuals to self-manage their learning, to be self-regulated or to learner autonomy.

A number of researchers have employed other instruments to document various aspects of teaching beliefs within a framework of educational philosophy (Hiemstra,

1988; Silvernail, 1992; Tillema,1994; Zinn,1983). Zinn's Philosophy of Adult Education Inventory (PAEI) was designed for educators of adults. This self-report questionnaire elicits responses and categorizes them into one of five philosophical categories: liberal, behaviour, progressive, humanist and radical.

Scholars warn about the temporality of beliefs and philosophies. Zinn (1983) indicated Apps suggested that an individual might wish to just follow whichever "belief seems appropriate at the moment" (p. 30). This point of view echoes that of Anatole France, as quoted by Eduard Lindeman, that "each of us must be allowed to possess two or three philosophies at the same time," for the purpose of saving our thought from the deadly formality of consistency (Lindeman, 1926/1961, p. 51).

Summary

A review of the empirical literature specific to PBL tutors was conducted. Highlights of the studies appear in Appendix A Empirical Research Concerning PBL Tutors. The literature review did not produce any studies that directly investigated nondirective facilitation that examined PBL tutors pedagogical beliefs related to PBL tutor principles, or explored the relationship between the two concepts. Instead, PBL research has looked at tutor content knowledge background as a key variable in tutor behaviour. In examining the influence of tutor backgrounds research has considered expertise in content or in process. Barrows (1988) recommended that the ideal tutor needs expertise in both areas. Research published over the last 15 years focusing on feedback from PBL students supports this opinion.

Content expertise and directive tutoring account for the majority of the studies of PBL tutor behaviours. Process expertise has been looked at to a substantially lesser extent and in an indirect manner. Research has probed this area by examining if tutors stimulate certain aspects of the PBL process. This has resulted in general indicators of the PBL tutors' behaviours regarding process but does not distinguish, examine in-depth, or measure nondirective facilitation.

Although almost every study on PBL tutors begins, by acknowledging the difficulties teachers have in adopting a PBL tutor approach, research on this topic appears to have surfaced as an aside to other tutor behaviour investigations. Barrows (1988) has provided insight into this topic through speculations about the influence of prior teaching beliefs that interfere with a successful transition of the teacher to the role of PBL tutor. Barrows argued that teaching beliefs about how knowledge should be

organized during learning, what knowledge is, how students should learn, the value of reasoning, and norms about the teacher-pupil relationship all influence the PBL tutors' success in PBL facilitation. Some recent research in tracking PBL tutors finds that some tutors change their style due to the difficulties that they encounter in reconciling their teaching beliefs and the tutor PBL role. Although prior teaching experiences are considered as a factor in enabling transition in roles for success as a PBL tutor, the research to date on this has been superficial.

In order to become better informed on teacher transition difficulties, the literature on non-PBL tutors' transition difficulties was consulted. Literature on K-12 and preservice teachers revealed numerous studies on this topic. Because PBL exemplifies in many ways a constructivist approach and places similar adjustment demands on the teacher, studies on the transition teachers encountered in moving to a constructivist curriculum were consulted. This literature confirmed transition to any form of curriculum where changes in beliefs are required is a bumpy road. It offered some insights into the dynamics that influence transition difficulties such as prior learning experiences, internalized constructivist beliefs, dialogue, and reflection.

Research on PBL tutors' beliefs is miniscule. Only a handful of studies could be located. By far, most studies compared the tutors' teaching beliefs about PBL with those for traditional medical curriculum. However, other studies have probed more deeply into beliefs in order to determine if teachers examine their teaching beliefs and to what extent they understand constructivism.

In their report of the ongoing professional development needs of teachers from a range of disciplines offering PBL, Egan-Lee, Harvey, and Silver (2006) observed that 3 of the top 10 faculty development needs are small group teaching, teaching clinical reasoning skills and teaching communication skills. While additional professional development may benefit PBL tutors, it seems this needs to include attention to teaching beliefs. Richardson (1996) argued that attention should also be given to the teachers' beliefs, which are interactive with their practices. Although it is considered that beliefs determine behaviour, experiences and reflections on behaviours may influence changes in beliefs.

Because so little has been written about teaching beliefs of PBL tutors, the wider body of literature on teaching beliefs of teachers in general was consulted. Review of this literature indicates interest in this area did not begin until 1970, at a time when a shift was occurring away from behaviourism and towards integrating new research from

cognitive psychology, including the central role of the teacher in the learning process. The professional development of teachers gained importance, especially the influence of experience on beliefs. Richardson (1996) echoed the earlier recommendations of Peirce (1877) and Dewey (1938/1975) that teachers should examine their beliefs through conversations about beliefs and practices. Kagan's (1990) extensive review of assessment techniques to measure teaching beliefs suggested three guidelines for future studies in the field: (a) pedagogical beliefs specific not only to a content field but to certain topics in the field; (b) focused, pervasive pedagogical orientations that affect every aspect of a teacher's classroom practice; and (c) a very specific instructional model (p. 446).

CHAPTER 3: METHODOLOGY

The methodology addresses the research questions using a mixed methods research design known as an explanatory mixed methods type (Creswell, 2005). Data were collected through a researcher-developed survey consisting of an online questionnaire followed by telephone interviews with some of the individuals who completed the questionnaire. Combining methods allowed the researcher to approach the research questions from multiple perspectives and cross-check findings from each method. In doing so, the data collected were expected to provide a clearer view of tutors' pedagogical beliefs, comfort, and challenges with facilitation than a view from any single perspective alone. This chapter describes the sample, ethics review, survey and interview design including validity and reliability planning and analysis of both measures. In this document the terms survey and questionnaire are used interchangeably.

Survey Sample

According to Bandura (1986), research that examines relationships between beliefs relevant to behaviour must be researched as context specific while Gall, Borg, and Gall (1996) suggest that the groups be reasonably homogeneous. As this study examined the pedagogical beliefs of tutors and their comfort and challenges with facilitation techniques in a medical school context that uses an integrated curriculum based upon PBL, the sample was drawn from medical schools fitting this context. After creating a list of Canadian medical schools that use PBL and contacting several of them, McMaster University and Dalhousie University were selected. Each program had substantial PBL experience, a large number of tutors working in the program, employed practitioners (clinicians, physicians, basic scientists, pharmacists, researchers) as tutors, and endorsed the study. Some medical education programs have only begun using PBL recently, have very few tutors, and use a mix of graduate students as well as practicing clinicians and professional staff. Each program selected has used PBL as the central curriculum design for a number of years, is known in the medical education community as an example of PBL curriculum in medical education, and employs over 100 tutors. At

McMaster, the original medical school PBL curriculum has been revised and is now referred to as concept-based and known as COMPASS. At Dalhousie the medical school program is referred to as COPS (an acronym for case-oriented, problem-stimulated learning). In each program the tutor works with small tutorial groups of medical students three or more times a week for 2 to 3 hour sessions on problems and each program has reintroduced weekly lectures into the curriculum.

The tutor population at McMaster and Dalhousie are similar. Both programs use clinicians, basic scientists, researchers and others in professional roles. Because one of the research questions bears on the relationship between tutor background and their comfort with facilitation challenges the sample was not drawn from programs using senior or graduate students. Student PBL tutors may differ in background and beliefs from individuals that are employed in a professional role. Instead, the population of tutors at McMaster and Dalhousie consisted of a group of individuals that were heterogeneous in age, gender, tutor experience, medical speciality, professional role, and tutor training to name a few demographic characteristics. Although demographic information on tutors is not widely available some demographic information was obtained on tutors at McMaster and Dalhousie. Holmes & Kaufman (1994) reported the characteristics of first-year tutors in the Dalhousie program when it began using PBL included: three times as many male as female tutors, tutors mean number of years teaching was 16 years, just over half of their tutors had MD degrees, and a third had PhD degrees. A few demographics on tutors in McMaster's Fall 2008 curriculum block description were also used for comparison purposes. According to Neville (2008) the Fall tutor group is reasonably representative of McMaster tutors, although the concepts of the fall block, which covers Respirology, Cardiology and Hematology, impact the tutor mix. This group had the following characteristics: approximately an equal number of male as female tutors, drawn from 8 medical departments (medicine, surgery, anesthesia, and so on), and a comparable number of full-time and part-time faculty (including 2 residents).

Sample size estimation was based upon a representative sample of the population. Mertens (1998) considered 15 participants per variable as the minimum sample size. Gall et al. (1996) recommend about 30 participants for correlational research. As this study consisted of three main variable clusters (beliefs, comfort, and background), and expected to conduct correlational analysis, a minimum of 45 participants was targeted in total.

The majority of the tutors are practicing physicians (doctors of medicine) who in addition to their full-time clinical position also serve as tutors. Decisions regarding selection of the sample were weighted by considerations of access, hospitality and time constraints. Access to PBL tutors was through the medical education office of each university. Other access routes explored were tutor training programs and PBL list-serves. These were dismissed as viable sample sources because the number of possible participants and their position (student or clinician) were unknown. The sampling strategy used was a convenience sample, with individuals invited to participate because they were readily available. The researcher acknowledges that this strategy limits the generalizability of the results.

Consent Ethics

Individuals voluntarily consented to participate in the study by linking to the online survey electronically after reading the letter of consent included with the letter of invitation posted on the first page of the survey. The letter of consent explained that participants had the right to withdraw from the study, the risks associated with participating in the research, and the confidentiality of their responses (See Appendix C: Consent Form). Consent for interview was obtained through the survey invitation Participants had the option to indicate if they were interested in participating, on a voluntary basis in a follow-up interview. Consent was confirmed with interviewees at the beginning of the interviews. Three research and ethics boards approved the research ethics proposal, the Research and Ethics boards of Simon Fraser University, McMaster University and Dalhousie University.

Survey Design

This section describes the survey design process and includes justification for the use a survey, issues of validity and reliability addressed before survey administration, item development, administration of the survey and procedures to establish validity and reliability after survey data were gathered. Guidance for the development of the survey tool was drawn from the survey design literature (Creswell, 2005; Fink, 2000; Suskie, 1996) and from the Likert scale design literature (Abdel-Gaid, Trueblood & Shirley, 1986; Likert,1932). The survey was titled the Facilitation Perceptions Survey (FPS)

Justification

The use of a survey questionnaire was based upon practical considerations, appropriateness, and the use of surveys for similar purposes by PBL researchers and non-PBL researchers. A survey was the primary data collection technique of this study. The researcher was interested in collecting data in an immediate and direct way that was as free as possible of investigator filtering. The type of survey research technique used in this study was a simple descriptive approach, which Mertens (1998) refers to as a one-time event used for the purpose of describing the characteristics of a sample at one point in time.

A survey offered the most practical, time-efficient way to study the proposed research sample. The participants, most of whom are physicians, are bombarded with research study invitations and have little time or inclination to participate in studies outside of clinical medicine or conducted by a researcher outside their home institution. In order to collect data from this sample, a technique was required that placed minimal time demands on the individuals but allowed a large number of questions to be presented. The intention was to consume no more that 30 minutes of respondents' time.

At the same time, the use of a survey acknowledges that sometimes individuals have difficulty expressing (articulating) their attitudes and beliefs or can't find the right words to express their thoughts. The survey provides a vehicle to trigger thinking on topics presented by the researcher, provides time for reflection before responding, and enables expression.

Delivery of the survey online was selected for psychological as well as practical reasons. Over the past decade the use of online surveys has increased substantially. While once unique, online surveys are increasingly considered a mainstream data collection format. The ease of accessibility to the online format at any time from anywhere combined with the lure of interaction with technology was expected to motivate individuals to participate and to complete the survey and thus increase the chances of a high response rate. As the target population was considered proficient in computer technology use due to their professional roles, it was anticipated that they would find the online format consistent with their expectations of contemporary survey research. From a financial standpoint, the online survey was more economical for the researcher than sending print surveys.

From a practical perspective, the online format was easier to launch logistically through the administrative staff at two different university departments than a print

survey. Sending an electronic invitation required less intrusion on departmental staff time than asking them to obtain mailing addresses, create mailing labels, and apply mailing labels to survey packages, and post surveys.

The online survey allowed survey responses to be collected electronically to build a database of responses automatically. These features were advantageous because the threat of transcription errors was minimized and the researcher could monitor the rate of survey completion during the survey completion period.

Alternative methodological tools considered were observation accompanied by taping of tutorials followed by a think-aloud protocol or face-to-face tutor interviews. Direct observation is advantageous to see an example of tutor behaviours but does not provide a view to the tutors' beliefs or their facilitation challenges across multiple tutorial sessions. Face-to-face interviews allow in-depth exploration of concepts through dialogue. As the research aimed to design a questionnaire with a large number of questions that could be completed independently and was conducted at two geographically different locations (different provinces), the logistics of gathering data through direct observation or face-to-face interview proved unfeasible and unsuitable.

A survey instrument such as the one designed for this research is also commonly referred to as an attitude inventory. Attitude inventories are used extensively in educational research (MacMillan & Schumacher, 2006). This type of instrument was appropriate to collect data on thoughts about beliefs, comfort and challenges because when individuals respond to a question, they first retrieve relevant beliefs and feelings and apply the relevant beliefs in judging their response (Tourangeau & Rasinski, 1988). Nonetheless, attitude inventories have been criticized for the possibility that respondents may fake their responses. To MacMillan and Schumacher the most serious type of faking is social desirability, where "subjects answer items in order to appear most normal or most socially desirable, rather than responding honestly" (p. 194). Kagan (1990) claimed that this conscious dishonesty was accompanied by unconscious dishonesty—a situation that arises when a respondent does not recognize a statement as his or her own because of the language in which the statement is couched. In addition, in order for individuals to self-report their beliefs and challenges, they need to reflect on their self-knowledge. Some individuals may not have previously considered these issues. Despite these limitations, surveys are widely used in educational research, often because they are economical, ensure consistency of the same questions for all respondents, and can ensure anonymity (Creswell, 2005).

A final practical consideration is that surveys enable efficient data retrieval and interpretation. The survey design lends itself to the development of aggregate responses because answers can be added together to produce results, which apply to the whole sample (Hutton, 1990 cited in Blaxter, Hughes & Tight, 2001).

The utility of self-report surveys in assessing teaching beliefs has been established in several studies of tutors in professional programs using a PBL approach (Groves, Rego, & O'Rourke, 2005; Moust & Schmidt, 1995) and in studies of teachers in higher education (Pratt, 1992; Zinn, 2004). Researchers have also found surveys useful in collecting data about interactions that occurred during a PBL session. For example, surveys have been used to gather information on PBL tutors' interactions with students (Visschers-Pleijer, Dolmans, Wolfhagen, & van der Vleuten, 2005; Cottrell, Wimmer, Linger, Shumway, & Jones, 2004; De Grave, Dolmans & Van der Vleuten, 1998).

In the post-secondary environment, PBL researchers have used pre-existing questionnaires or developed new questionnaires depending upon the research objectives. Most often tutor behaviours have been researched using course evaluation questionnaires completed by students. This type of questionnaire usually produces data pertaining to general tutoring skills and course organizational skills in conjunction with evaluations of tutor performance. In addition to reviewing instruments used to measure teacher beliefs and philosophies (Brown, 1968; Pratt, 2001; Silvernail,1992; Zinn, 1968) several questionnaires specific to PBL tutor skills were examined.

Cottrell et al. (2004) developed a questionnaire that targeted facilitator skills and produced global indications of facilitator performance. This questionnaire was deemed unsuitable for the present research study, as only two of the nine items, "the facilitator guided the group by asking questions" and "the facilitator accepted feedback from the group non-defensively," specifically related to the directiveness of the tutor's behaviours. Similarly, the Maastricht Tutor Skills Questionnaire developed by De Grave (2006) at Maastricht University (an updated version of the Tutor Intervention Profile (TIP), collects student responses to statements about what tutors do in broad terms but not on specific behaviours or techniques. Because no previously developed questionnaire could be found that measured tutors' beliefs on learning that was specific to inquiry and problem-solving issues and the tutors' comfort, difficulties, or challenges with facilitation, the development of a survey was undertaken. The survey developed aimed to increase the granularity of questions about beliefs and indirect and nondirective facilitation behaviours in a PBL context.

Validity and Reliability

The first step in the design of the survey for this study was to focus the content in order to construct a valid and reliable tool that addressed the research questions. The objectives of the survey were to collect data to determine tutors': (a) beliefs about teaching and learning in a PBL context, (b) comfort with facilitation techniques, and (c) tutor background.

Validity refers to many aspects of survey design. Suskie (1996) considers validity to represent the 'truthfulness" of the data and a valid questionnaire to measure accurately what the researcher wants it to measure (p. 56). de Vaus (2002) indicates that validity can never be proven but must be argued for by the researcher. Creswell (2005) defines content validity as "the extent to which the questions on the instrument and the scores from these questions are representative of all the possible questions that a researcher could ask about the content or skills" (p. 164). According to Murphy and Davidshofer (2004), validity is a function of what the scores on the test mean, content validity is established by examining the test itself, whereas construct validity is established by examining the relationship between test scores and other measures.

Establishing content validity for the questionnaire used in this study included defining content domain boundaries and structure. A content domain represents the total set of behaviours used to measure a specific characteristic or attribute to be tested. As suggested by Murphy (2004) three steps were followed to design for content validity: (1) describe the content domain; (2) determine the areas of the content domain that are measured by each test item; (3) compare the structure of the test with the structure of the content domain. In this way, a detailed description of the content domain yields categories to classify survey items. The content of the survey used in this study was derived directly from the recommendations, principles and theories reviewed in Chapter 1. According to Murphy (2004), "a test that appears to provide a representative sample of the major parts of a content domain will be judged to show high levels of content validity" (p. 159).

In this study, some measures of validity were conducted once the survey data were collected and these procedures are discussed in a later section entitled, "Validity and reliability testing post-survey administration." Creswell (2005) indicates that construct validity is established by "determining if the scores of an instrument are significant, meaningful, useful and have a purpose" (p. 165). In this study construct validity was established by finding if scores on items were related in ways expected.

Cronbach (1984) recommended that test developers look for a convergence of indicators in establishing test validity. This refers to collecting two or more kinds of data that are regarded as evidence. If these indicators are consistent the proposed theoretical interpretation is supported. Two kinds of data were expected to emerge from the survey: data from the closed-ended survey items and responses to open-ended questions. Agreement between content in each type of response (closed-ended versus open-ended) was expected. For example, the researcher expected that if participants indicated that they were uncomfortable with the use of directive techniques on the survey, they would talk about preferring to use indirect or nondirective techniques in the open-ended questions.

Another form of validity addressed in the survey design was external validity. This refers to the trustworthiness of the generalization of research results (Jaeger & Bond, 2006) and depends on people, contexts, and instruments. The two principal threats to external validity in survey research are bias error and random error. In this study, efforts to control bias error included avoiding systematic differences in the sample to ensure individuals who completed the questionnaire and respondents who were interviewed did not differ systematically from individuals in the population to which generalization was desired. How these issues were addressed is explained in the following paragraphs.

Two medical education programs were selected that use a similar curriculum and teaching strategy (a PBL approach) and that have the same role expectations of tutors. All tutors in each program were invited to participate in the research. Each institution sent out a broadcast invitation to their tutors, as the researcher was not privy to the tutor list. The individuals that completed the questionnaire and those that consented to be interviewed were volunteers and were not selected by the researcher. However, the researcher acknowledges that bias could result because research volunteers as a group may not have been those, for example, who experienced the greatest challenges with the PBL tutor role or who may have been systematically different from the general population in other ways. Because the population that was of real interest included tutors with a variety of experiences, generalizing from a sample of volunteers to the larger population may be problematic.

At the same time, the researcher aimed to enhance the generalizability of the research findings by varying the context. Although both medical schools are located in major Canadian cities, their geographical location and length of time using a PBL

approach vary. McMaster University is located in Hamilton, Ontario in central Canada, while Dalhousie is located on the east coast of Canada in Halifax, Nova Scotia. The schools also differ in that Dalhousie is an older medical program established in the late 1800s that began incorporating PBL in 1993, whereas the medical education program at McMaster began using PBL in late 1960s. The programs are similar in that they employ tutors from a variety of clinical and nonclinical backgrounds. However, neither program keeps demographic data on tutor demographics such as age, gender, education, department, and so on.

Issues of reliability constituted another critical component in survey design. Suskie (1996) recommends that questionnaire designers should plan to collect evidence of reliability in any study that investigates sensitive issues on which respondents may not answer truthfully. Reliability in questionnaire design refers to a characteristic of a questionnaire that indicates it elicits consistent responses. Suskie (1996) indicates that there are factors outside of the control of the researcher, factors where the designer has some control, and factors that the designer can control. This research acknowledges the existence of factors, such as variations in mood, fluctuations and idiosyncrasies of human memory, fluctuations in attention, health, fatigue, and distractions beyond the researcher's control. The design of this survey attended to recommendations of factors that are within the researcher's control, such as scoring accuracy, motivation, comfort with item formats, question order, clarity of directions, clarity of questions, and questionnaire length. Scoring accuracy was attended to through the use of an electronic online survey with electronic scoring. Motivation was addressed through the wording of the cover letter, testing the functionality of the technology involved in survey use to avoid participant frustration and providing a monetary incentive. Comfort level with item formats, question order, clarity of directions, clarity of questions and questionnaire length were addressed through feedback on these issues by a panel of PBL experts and pilot test participants.

Furthermore, since the FPS was administered only once, its reliability was evaluated by examining the instrument's internal consistency once the survey data were collected. According to Suskie (1996), internal consistency means that responses to similar questions within a questionnaire should be similar and involves examining the stability of an individual's responses throughout the instrument. This refers to looking at the correlations between individual items (items that covary) indicating a consistency of response, by examining their correlation coefficient values between +1.00 and -1.00 on

the survey. The coefficient alpha statistic was selected for this purpose as it is considered a highly acceptable statistic to measure internal consistency (Ambrie et al., 2001; Creswell, 2005; DeVaus 2002; Gerber & Finn, 2005). Cronbach's alpha is a reliability coefficient that reveals the strength of the relationship between variables. This procedure to establish internal consistency is described in a later section. In summary, issues of validity and reliability were core considerations in designing the survey.

Survey Item Development

Survey items were organized into three sections (beliefs, challenges, and background) and developed progressively through four iterations as depicted in Figure 3-1.

Figure 3-1: Survey Development Sequence

First Draft

Using trial statements generated from the reviewed literature and theoretical framework, the first item pool was developed with considerations for content, comprehension and usability as recommended by Groves et al. (2004). This first item pool included 19 items in Part A (Beliefs), and 38 items in Part B (Challenges). Items in Part A were representative of Barrow's PBL recommendations and tutor principles. In this study, PBL tutor principles, refers to Barrows's PBL recommendations and tutor principles. These statements were differentiated in three ways: (1) into three categories (PBL Approach, Tutor role, Student role); (2) by PBL recommendations and tutor principles, Dewian and Rogerian approaches; and (3) by PBL, Behaviourist and Both. PBL items that explicitly referred to learner autonomy were flagged. Part B close-ended items were classified into verbal or nonverbal nondirective facilitation technique type and by domain (PBL, Client-centered theory and therapeutic communication). The open-ended question at the end of Part B probed tutors for challenges in general. The number of items in each category was more than seven, the minimum suggested by Bohrnstedt (1970).

To ensure the questions were clear to respondents the recommendations (criteria for good question construction) of Suskie (1996) were followed: (a) brevity; (b) readability; (c) one question at a time; (c) clarify definitions, assumptions and qualifiers; (c) low memory demands; (f) avoid asking for very precise responses; (g) avoid asking for broad generalizations about attitudes or opinions; (h) easy and fast to answer; and (i) avoid biased, loaded, leading or sensitive question.

Suskie's recommendations also acted as a guide to prevent response bias. In general, response bias refers to inaccurate response data that may be caused by a number of factors. One of the factors hypothesized to influence response bias is the manner in which survey questions are written. To prevent response bias and aid comprehension statements were written in a simple, unbiased, jargon free manner. Each statement contained only one idea and asked for specific attitudes or opinions. The statements were designed to place minimal memory demands on the respondent and efforts were made to balance cognitive complexity with ease of response completion. Every effort was made to avoid psychologically threatening questions, to achieve clarity, be concise, and provide a mix of positive and negative wording. In addition, reverse wording was used in some questions to prevent response sets (tendency for a respondent to answer a series of questions in certain direction regardless of the content). Because SPSS will compute coefficient alpha correctly only when all items are scored in the same direction (Gerber & Finn, 2005) it was anticipated that these items would require transformation of their values upon survey completion.

The structure of the survey considered the location of each section. The belief statements were located first in Part A Learning Beliefs before the challenges section in Part B Facilitation in order to reduce psychological influence of items from one section on another. Creswell (2005) suggests locating sensitive questions later in the survey, "after the individual has warmed up by answering neutral questions" (p. 363). It was assumed that participant responses concerning questions pertaining to more sensitive issue of their comfort level with facilitation might influence responses about their beliefs if the comfort statements appeared first in the survey. Likewise, the gentler term *comfort* was used rather than challenges in the opening question for Part B. Comfort was considered more palatable to participants to minimize possible response interference caused by question wording. Questionnaire items were organized in a logical sequence beginning with a few interesting and non-threatening items. Background (demographic)

questions (Part C) were located last. Questions that addressed a similar topic or theme were grouped together (Cozby, 2001).

In the first draft Parts A and B contained 4-point Likert type scale. The use of an ordinal scale with the same number of categories in these two sections of the survey ensured unidimensionality to the responses and provided a format so responses were suitable for assessment of survey reliability. Unidimensionality has been described as a characteristic of a scale "that assures that a numerical value assigned to any particular phenomenon to represent a point on a measurement scale will be assigned to one and only one real world state" (Veney & Kaluzny, 1984 p. 222). It aims to prevent multiple interpretations of the phenomena that can result in problems of multidimensionality where respondents make multiple interpretations of a statement. The scale in Part A was designed to provide mutually exclusive and exhaustive responses that ranged from: 1 *highly disagree*, 2 *disagree*, 3 *agree*, and 4 *highly agree*. The scale in Part B ranged from: 1 *very uncomfortable*, 2 *uncomfortable*, 3 *comfortable*, and 4 *very comfortable*. Participants were asked to respond to each item on the questionnaire.

In order to enhance internal consistency similar questions were located in different parts of the questionnaire so that response data could be analyzed and assessed whether the participant responded in a similar way to similar questions. For example, in Part B, item 5 (asking primarily open-ended questions) and item 24 (minimizing closed–ended questions) are similar questions that are expected to covary. Reliability was also examined through correlations of individual items or overall questionnaire "scores" (Suskie, 1996). The forced choice questions in Part A and B were followed by one open-ended item that allowed response elaboration on the personal meaning of the constructs measured. This design component was meant to encourage the expression of personal meanings. Open-ended questions, follow-up interviews, and the option of completing the survey online were strategies used to express the humane intentions of this study. Consideration of overall questionnaire construction also included creating a visually pleasing document with plenty of white space and simple graphic elements to provide visual interest. For example, the graphic design of the survey items varied the background colour from white to grey.

Second Draft: Expert Review

Another step in establishing content validity included testing the representativeness of the relevant content by knowledgeable experts. Four PBL experts

were asked to assess each item in Parts A and B of the first draft of the survey to determine how closely it represented the content of each domain. One participant was a founder of PBL associated with American and Canadian PBL medical schools programs and a member of the researcher's thesis committee. A second expert was a prominent writer in the field associated with an American PBL medical education program. The other two experts were from the Netherlands and associated with PBL programs in medical and non-medical education. As illustrated in Appendix D, The Expert Review Form was used as a vehicle for experts to rate the importance of each item on a 1- 4 Likert-type scale ranging from 1 = not very important to 4 = very important. A comment section was also included. Because of geographical distances between experts they were asked to provide written feedback electronically.

Results of the expert review provided useful feedback on the face validity of survey items. For Part A items, three of the four experts rated items in this section. One expert indicated 17 of the 19 items were very important, one expert indicated 15 of the 19 statements were either important or very important and one expert felt 12 of the 19 statements were important. As consensus of disagreement on items was not reached, all items remained. However, as two experts indicated two of the items in Part A were unclear (items 15 and 16), these items were rewritten. For Part B items, two of the experts rated all items in Part B and one expert returned a partially completed survey rating 16 of the 39 items. One expert agreed with 32 of the 39 items, one expert agreed with 33 items, and the third expert who partially completed rating this section agreed with 13 of the 16 rated items. One of the experts disagreed with two of the items and one expert disagreed with one item. As unanimous agreement on which items were representative of nondirective facilitation behaviours was not reached, all items remained. However, several items were expanded for clarity. For instance, the phrase, "Unless asked for during inquiry" was added to Part A item 7.

In general, the experts felt some items needed to be reworded for clarity using less jargon. They indicated the survey was not difficult to complete, did not arouse any feelings of anxiety, and did not take long to complete and the statements were properly sequenced. One reviewer felt the survey did not allow for a sufficient range of responses.

Third Draft: Pilot Test

A pilot test of the survey questionnaire was conducted in a focus group format to gather feedback on the instrument. Cozby (2001) indicated that a pilot study could reveal whether participants understand the survey instructions and whether any of the questions are confusing. Creswell (2005) recommended the pilot test as an acceptable process to evaluate some aspects of content validity when, as in this case, a list of possible questions on these constructs can be identified. The pilot test of the draft survey (following the revisions described above) was conducted with 8 tutors in McMaster University's medical education program. The group was heterogeneous by background (medical specialty, age, gender and experience) and representative of the target population to ensure face validity, content validity, the feasibility of completion, statement clarity, ease of answering and to test out technical problems associated with web-based completion. This group of tutors was selected and contacted by the Director of McMaster University's undergraduate medical education program; they were unknown to the researcher.

Five participants completed the questionnaire anonymously in print format and one participant completed it online. Two participants who were unable to attend the pilot test meeting completed the survey individually. Participants provided written comments and shared in an open discussion of the tool. All dialogue was digitally recorded. They were encouraged to verbalize their thoughts as they completed the survey. Participants identified items that were ambiguous or needed emotional intensity. Fishbein and Ajzen (1975), as cited in Abdel-Gaid, Trueblook, & Shirley (1986), described the emotional intensity of an item as an attribute that is unique to attitude statements and represents its tendency to be for or against an object, event, issue, or person. Items that contain emotional intensity are considered important to achieving discriminative qualities. Pilot test group members also suggested the use of a 5 choice Likert scale so that respondents had an opportunity to indicate no opinion. The scales were revised to 5-point scales. Pilot test participants were also asked to record any additional questions they thought should be asked on the survey.

The results of the pilot test showed that the survey was easy to complete and could be completed in 30 minutes as estimated. Ambiguous items identified in Parts A and B were rewritten for clarity and emotional intensity during the pilot test, and agreement on revisions was obtained by all present before the item was considered revised. For example, item 14 was revised to specify tutors instead of individuals. One

participant flagged item 15 (concerning the tutors' use of indirect techniques) as unclear. Participants suggested the addition of an example to several items to aid clarity of meaning. Examples were added to flagged items. Other modifications included the deletion of items rated as of little or no value and the addition of several new items considered important by the pilot test group. For example, participants felt an item should be included regarding the challenge of dealing with students who talk privately in pairs rather than with the whole group. In general, participants felt items were representative of beliefs about teaching and learning in a PBL context and challenges faced by tutors.

After the pilot test additional items were added to prevent instrument bias by giving participants the opportunity to select another type of teaching and learning belief (Likert, 1932). Bias would result if participants were offered the opportunity to respond only to items reflecting beliefs characteristic of PBL and PBL tutor principles. In this way slightly less than half of the items (labelled Behaviourist) were written "negatively" (meaning the beliefs the items represented were less consistent or inconsistent with pure PBL and PBL tutor guidelines).

In total 19 new items were added to the 19 original items in Part A and two items were deleted bringing the total number of items for this section to 36 items. The categorization of items in Part A and B was updated.

Pilot test participants also recommended revisions to survey items in Part B. Of the original 38 items in the item pool, 33 were retained following rewriting for clarification and amplification. Two items were rewritten negatively (item 17 and item 31).

Review and Revise

Following revisions to the survey from pilot test recommendations, three members of the pilot test and one member of the expert panel reviewed the fourth version of the instrument. One item was subsequently modified to increase clarity. When item consensus was reached the survey was considered to be in its final form (see Appendix F: Facilitation Perception Survey.

Final Version

Part A (Beliefs) contained 36 items. Part B (Challenges) contained 33 items. The classification of items was updated. The mix of items in Part A consisted of 20 items

related to PBL tutor recommendations and principles, 11 items related to a behaviourist approach, and 5 items that were considered applicable to either approach. The supplementary classification of belief items resulted in a distribution of 12 PBL items also representative of a Dewian approach and 14 items also representative of Rogerian approach.

Items in the other two parts of the survey were also updated. The classification of items in Part B was updated to 32 PBL items, 25 of which were also representative of client-centered theory, and 13 of which were representative of therapeutic communication. Three items were representative of a behaviourist technique. The PBL items, as nondirective techniques, were further differentiated into verbal and nonverbal types. Part C Background contained 15 tutor background items that included demographic questions such as age, gender, university affiliation, education, discipline specialty, tutor position, teaching and tutoring experience, psychotherapeutic/counselling experience, and professional development in tutor training interest. In total participants were asked to respond to 84 questions in the survey questionnaire.

Survey Administration

This section describes the procedures to recruit participants and to administer the survey.

Sample Recruitment

The researcher met with directors and administrators of the medical education and tutor training programs at McMaster University and Dalhousie University. The research outline was presented, and local support in contacting tutors was obtained. The local director or administrator identified participants, created a list of current PBL tutors, and a cover letter describing the survey indicating their support of the research project containing a link to the online survey. The local sponsor sent a broadcast invitation by email to tutors in their program that included a link to the online survey. The online survey was published on a secure server at Brock University, St. Catharines, Ontario where it was tested for functionality prior to release. The online survey site contained the letter of invitation that explained the purpose of the study, risks, process, time requirements, and remuneration (see Appendix C). Participants were offered a $20 Tim Horton's voucher as an incentive to participate in the interview and invited to also

participate in follow-up interviews. Follow-up reminders were sent at 1 and 2 week intervals after the initial invitation.

An email invitation to participate in the survey was sent to 286 tutors, 179 at Dalhousie University and 107 at McMaster University. Fifty-one, (18%) individuals responded, meeting the minimum sample size suggested. Several Dalhousie tutors contacted the researcher by email during the response period with technical problems. Although the source of the problem could not be confirmed, it appears that when some Dalhousie respondents tried to connect using their local hospital computer system the computer's background colour display prevented visibility of the link in the letter of invitation to the survey. In the meantime survey responses had been received from McMaster tutors and some Dalhousie tutors without any technical problems. None of the McMaster respondents contacted the researcher. Measures were taken by the researcher to correct the problem experienced by Dalhousie participants by increasing the visibility of the survey link. However, the technical issue cannot be dismissed as having an impact on response rate.

Data Management

Extensive pre-planning was undertaken to ensure that survey data were collected and managed in a systematic fashion incorporating recommended procedures (Creswell, 2004; Dillman, 2006; Suskie, 1996). Data collection was undertaken during September and October 2007. The respondents' data compiled from the survey was electronically assembled automatically as an Excel file by the data collection program. These raw data were imported into SPSS Version 16 for analysis. Data management processes included saving the data file each time a change was made using file name and date as the file label. All data analysis was saved as an output file and similarly labelled. In addition, the researcher maintained a research log documenting all work undertaken on the data.

Validity and reliability testing post-survey administration

This section describes analysis undertaken to establish survey validity and reliability. It includes data screening, transformation, central tendency and variability, internal consistency, content, construct, convergent, and discriminant validity. The first step in analyzing survey data was coding in SPSS in the variable-by-case data grid form.

Each column represented a variable, each row represented a case, and each cell contained the response (or value) of a particular case to a specific variable. The codes echoed the response categories on the survey. The distinctive code of 99 was assigned to non-responses to signify missing data. Codes for closed questions with an open-ended category (e.g., Other, please specify) were assigned after data were received. The codes that emerged from the responses replaced the "other" value on the related item. Coding was also developed from the responses to the two open-ended questions at the end of both Parts A and B.

Screening, cleaning and preparing data

Raw survey data were first screened and cleaned. As an electronic survey was used the responses were automatically entered into a database, removing the possibility of miscoding or incorrect data entry. Fifty-one individuals completed Part A of the survey; 49 of them completed Part B, and 48 of them completed Part C. Item 22 in Part A was omitted from analysis due to complexity reported by participants. As the number of survey responses were small, it was possible to inspect the data visually for errors. Eleven cases where respondents opened the survey but did not respond to any of the questions were removed. Where respondents did not respond to a few of the questions, the non-responses were treated as missing values and assigned a value of 99. Missing values were included for two cases in Part B and three cases in Part C. Errors in the data set were further assessed following frequency analysis as discussed under a following section entitled "Analysis of central tendency and variability."

Transforming data

Transformation of some items in the raw data was undertaken for analytical purposes. As mentioned earlier in the discussion of the survey design, in order to minimize the problem of habituation of responses (responses answering all questions the same way) the verbs of 12 items in Part A and 2 items in Part B were written so that the item conveyed the reverse of a PBL principle or nondirective technique. This means that respondents who disagreed with the items entered low values (1 and 2). The values of responses to 12 items in Part A of the survey items 5, 9, 12, 21, 23, 24, 27, 29, 31, 33, 35, and 36) were transformed to new variables by reversing values (e.g. an old value of 1 was transformed to a new value of 5) in order to conduct instrument reliability and

validity tests with Cronbach's alpha. de Vaus (2002) indicated transformation of responses is required as SPSS assumes responses are coded in the same direction. The value transformation shifted the lower value responses on these items to higher codes (4 and 5). Similarly in Part B item 17 and item 31 were transformed. The values of two items in Part C (items 5 and 6) were collapsed into new items in order to reduce the number of response categories for association testing.

Analysis of central tendency and variability

Measures of central tendency and variability were calculated for all items. Means and standard deviations were computed for all items in Parts A and B as illustrated in Appendix G Survey Responses Part A and B. Frequencies and mode were computed for items in Part C, the demographic section of the survey. This preliminary analysis scrutinized the data for oddities and for curious patterns. Analysis of the distributions for items in Parts A and B were undertaken considering measures of central distribution. Items in Part A showed 31 of the 36 items had a mean over 3 (scale 1-5), ($M>3$) and $SD < 1.2$. Similarly, responses to the items in Part B revealed that 29 of the 33 items (scale 1-5) had a mean over 3 ($M> 3$). In general, the low standard deviations in both Parts A and B indicated low variability in the responses on most items. However, the slightly higher variability ($SD > 1$) of 9 items in Part A and 6 in Part B indicated participants did not answer all questions the same way and contributed evidence to support claims that sample results did not demonstrate response bias.

The distribution of the responses was non-normal in Part A and Part B. Visual displays of the response distribution (histograms) showed negative distributions for most items. All items in Part A had a negative distribution with the exception of five items (items 8, 22, 24T, 26, and 32) that had a positive distribution. All of the items in Part B had a negative distribution with the exception of two of 33 items (items 17T and 32) that had a positive distribution. The skewness statistic was also negative for all negatively skewed items. These findings indicated more high-end values (more 4 and 5 values) for most items. In this way, the skewed distribution suggested alignment with the constructs in the test (beliefs about the tutor's role in teaching and learning consistent with Dewey, Rogers, and PBL recommendations and tutor principles). In other words more responses were consistent with the perspectives of Dewey, Roger and PBL PBL recommendations and tutor principles than were inconsistent with them. The skewness of the responses

(non normal data distribution) did not present a problem to further analysis, as this survey was not norm referenced or intended for norm referenced analysis.

Internal Consistency

As previously discussed Cronbach's Alpha statistic was used (Appendix H: Survey Reliability Item-Total Statistics) to determine internal consistency. Hinton et al. (2004) indicated a Cronbach's alpha above 0.75 is recommended for establishing high reliability of an instrument, de Vaus (2006) indicated the alpha coefficient should be at 0.7, and Fink (2006) indicated that adequate reliability depends upon the purpose of the survey with a Cronbach's alpha over 0.5 often viewed as acceptable. As both alphas for the survey in this study were over 0.7, it appeared that the internal consistency of the FPS, when determined using Cronbach's alpha was adequate.

Nonetheless, items with lower correlations were removed to increase reliability. According to de Vaus (2002) items should be deleted if they result in substantial increases in alpha. On this basis one item that substantially increased alpha, if deleted, was deleted from Part A, item 26 (Subject Expertise). Item-total correlations, which provide evidence of unidimensionality of a scale, also provide grounds to delete weakly correlated items. de Vaus (2002) recommended that to remain in a scale an item should have an item-total correlation of at least 0.3. This statistic reveals how well an individual item correlates with the entire group. When the corrected item-total coefficients for Part A (see Appendix H Reliability Item Total Statistics) were examined it could be seen that 17 of the items fell below the 0.3 level indicating they may be tapping a different concept from the other items. The corrected item-total correlation values for Part B revealed only seven items are below 0.3. This finding indicated that the group of items in Part B were more internally consistent than the items in Part A.

de Vaus (2002) recommendation to drop items with unacceptable item-total coefficients if there are enough items and then repeating the analysis without them was followed. The more items a scale contains, the more confidence researchers have in the scale and the less impact a biased or inadequate item has on the scale (survey section). Seventeen items were removed from Part A: Items 1, 7, 8, 9, 11, 12, 19, 21, 22, 24, 25, 26, 28, 29, 30, 31, and 36. Seven items were deleted from Part B: Items 4,15, 17,19, 22, 31, and 33. As Part A still retained 19 items and Part B still had 26 items after deletion of items with lower item-total coefficients the reliability analysis was rerun following deletion of these items. When the analysis was repeated, the alpha for Part A

increased from 0.70 to 0.83 and the alpha for Part B increased from 0.84 to 0.86 (See Table 3:1 Cronbach's Alpha of Survey). In addition to increasing the reliability of the tool, the deletion of the items from each part ensured a more homogeneous grouping within each part.

This analysis determined those items in the survey that contributed significantly to the model. Items that showed no real contribution to the whole were deleted.

Table 3:1 Cronbach's Alpha of Survey

	Before item deletion		After item deletion	
	Cronbach's Alpha	*n* of items	Cronbach's Alpha	*n* of items
Part A - Beliefs	0.70	36	0.83	19
Part B - Facilitation	0.84	33	0.86	26

Mean scores and standard deviations for all reliable items in Part A appear in Appendix G Table 1 and for Part B in Table 2. The average scores per item on Beliefs (Part A) varied between 2.0 and 4.3, with corresponding standard deviations varying between 0.7 and 1.2 (n = 51). The average score on Facilitation Comfort (Part B) varied between 2.7 and 4.3 with corresponding standard deviations varying from 0.7 to 1.2 (n = 49)

In order to examine the relationship between participants' responses on Beliefs (Part A) with their responses on Facilitation Comfort (Part B), composite scores for each part were created. As recommended by de Vaus (2002) new variables can be created for subsequent analysis instead of using individual items. In this way a participant's score is produced by arithmetically creating a new variable, also known as a derived variable, by adding their scores on items. Although each item in each part of the survey represents multiple measures of the overall concept putting them together creates a more rounded overall measure. As both Parts A and B were 5-point Likert scales the creation of new variables was possible. Two new composite variables were created using the Transform tool in SPSS and analyzed. Total Beliefs was created from all the responses to items in Part A and Total Comfort was created using all the items in Part B. Total Beliefs scores ranged from 22 to 69 with the mean of 58.86, median of 59 and mode of 59. Total Comfort scores ranged from 72 to 121 with a mean of 96.35, median of 95, and mode of 95. These new variables were used for the correlation analysis presented in Chapter 4.

Content, Construct, Convergent, and Discriminant Validity

As mentioned earlier validity of the FPS was examined to determine the extent to which the instrument measured the intended concepts. Validity of an instrument cannot be proved but must be argued using multiple tests (de Vaus, 2002). In this research external validity and construct validity were examined in multiple ways after data collection.

The sample consisted of tutors from medical education programs at McMaster University and Dalhousie University. The invitation was sent to a total of 286 tutors in medical education programs, 179 at Dalhousie University and 107 at McMaster University. The survey sample consisted of 51 respondents comprised almost comparable percentages from McMaster University (45% or 23) and Dalhousie University (49% or 25). Three respondents did not respond to item 10 Part C regarding university affiliation. All 51 participants completed Part A, 49 participants completed Part B and 48 participants completed Part C. Because as noted by de Vaus (2002) SPSS automatically adjusts for missing data, the three cases that did not provide responses for Parts B and C were retained for analysis. The sample size represents approximately 18% of the total population of tutors invited to participate in the survey. The researcher acknowledges that the majority of the tutors who received the invitation did not respond.

Construct validity estimations were explored in various ways. As mentioned earlier, all items in the FPS were judged to have face validity. PBL experts and pilot test (focus group) members indicated items in the tool were highly representative of the content and constructs surrounding the tutor role, the student role, and the PBL approach. The tool was expected to measure the constructs identified in Chapter One, PBL Approach, tutor role, and student role.

In terms of construct validity, it was expected that items in Part A that measured the same concepts should correlate with each other and that items in Part B that measure the same concepts should correlate with each other. Despite the small sample size, factor analysis was undertaken for Parts A and B before and after reliability testing in order to explore construct validity. Using items that survived reliability testing, a principal component analysis of Part A items was undertaken. The Kaiser-Meyer-Olkin Measure of sampling adequacy (KMO) and Bartlett's test of sphericity indicated factor analysis could proceed. The KMO was 0.76 indicating items in the sample were adequate to correlate because they did not have multicolinarity (highly correlated). Barlett's test of sphericity indicated a relationship between variables with a chi-square

statistic of $\chi^2(171, N = 51) = 412.68, p < .001$. The results revealed 5 factors with eiginvalues over 1 explaining 65% of the variance. Examination of the scree plot suggested a five-factor solution. The component matrix and Varimax rotated component matrix (Varimax rotation) revealed that most items loaded onto the first factor, explaining 33% of the variance. In the component matrix 15 of 19 items loaded on the first factor and in the rotated component matrix 13 items loaded on the first factor as illustrated in Table 3:2. These items were a mix of PBL approach, student role and tutor role.

Table 3:2 Part A Item Factor Loadings

	TR	SR	PBL approach
Factor 1	13, 17,18, 20, 35T	4, 15,34	3, 5T, 6,10,14
Factor 2	10,13, 32, 33T		2, 5T, 14
Factor 3	23T		2,3, 6
Factor 4	27T, 35T		3, 5T, 14
Factor 5	32, 35T	16	

The findings were considered inconclusive in differentiating items by tutor role, student role, or PBL approach concepts. According to de Vaus (2002), small sample sizes often produce inconclusive factor findings.

Factor analysis (FA) was carried out on Part B survey items with absolute values over 0.3 as the Kaiser-Meyer-Olkin Measure of sampling adequacy (KMO) and Bartlett's test of sphericity indicated a factor analysis could proceed. The KMO was 0.53 indicating items in the sample were adequate to correlate because they did not have multicolinarity (highly correlated). Barlett's test of sphericity indicated a relationship between variables with a chi-square statistic of $\chi^2 (325, N = 49) = 628, p < .001$. The principal components analysis resulted in nine factors with eiginvalues over 1 and explaining 75% of the variance. Most items loaded on factor one. The scree plot showed a possible four factor solution. A four-factor principal components analysis with a Varimax rotation showed four factors explaining 50% of the variance.

Table 3:3 Part B Item Loadings

	Verbal nondirective facilitation items	Nonverbal nondirective facilitation items
Factor 1	11,13,18, 28, 32	6,7,8, 20
Factor 2	3, 9,10,12,13, 18, 21, 23, 24, 27	16
Factor 3	2, 5,14, 21, 23, 26, 28, 29, 30,32	16, 25
Factor 4	1, 2, 3,12,13,14,18	

The principal component analysis did not differentiate tutor role behaviours into verbal or nonverbal types as illustrated in Table 3:3.

Convergent validity was explored through item correlations. The value of the correlation coefficient (*r*) allows inference about whether a correlation exists between variables. Convergent validity was explored using the items in Part A and Part B that resulted from the reliability analysis. Earlier analysis showed that each group of items had unidimensionality—that they were measuring one thing or overall construct. In Part A this construct was identified as overall pedagogical beliefs in PBL and tutor principles including the tutor role, student role, and PBL approach. In Part B this construct was identified as the overall nondirective facilitation techniques in a PBL context including verbal and nonverbal nondirective facilitation.

The correlation matrix of Part A items resulted in numerous significant correlations at the $p < .05$ level (see Appendix J: Intercorrelations of Survey Items Part A). As significant correlations reveal items that converge on the same construct, show a pattern of correlations and provide evidence of convergent validity, they provided evidence that items were related and converging on the same thing. However, this did not automatically prove that the construct was PBL tutor principles. Similarly, the correlation matrix revealed those items that have low relationships. Typically, this means that the items measure dissimilar constructs. However, according to de Vaus (2002) low cross-construct correlations do not automatically provide evidence that the constructs were unrelated.

A number of significant correlations were apparent between Part A items. The highest significant correlation emerged between item 3 (Learners need to use inquiry in their analysis of problems) and 15 other items, $p < .05$ level (items 4, 5, 6, 7, 10, 13, 14, 15, 17, 18, 20, 22, 27T, 34, and 36. The correlation statistics suggest that tutors who believe in the importance of inquiry also believe in PBL tutor principles measured in this survey as well. This finding provides evidence of convergent validity for the PBL construct in Part A.

Correlation analysis for content and construct validity for Part B using the 26 items that survived the reliability testing revealed many significant correlations (see Appendix J: Intercorrelations of Survey Items Part B. All items significantly correlated with several other items. All seven nonverbal nondirective facilitation items (6, 7, 8, 20, 25, 28 and 32) correlated significantly, $p < .05$. However, these items also correlated

with one or more verbal facilitation items. For example, item 6 (Avoid expressing opinions) correlated significantly with five other nonverbal items: item7, r (47) =. 63, with item 8 *r* (47) =. 49, item 20 *r* (47) =. 45, item 28 *r* (47) =. 52, item 32 *r* (47) =. 45), item 25 *r* (47) = .30. Item 6 also correlates significantly with two verbal facilitation items: item11 (Using neutral responses) *r* (47)= .46, and item 18 (Prompting expression of understanding) *r* (47) =. 38) at $p < .05$. The significant relationship between these seven items demonstrates convergence on a construct around tutor intervention techniques that use nonverbal techniques to indirectly facilitate such as avoiding expressing opinions, withholding suggestions, restrain offering key information, withholding information, using neutral responses, and using silence.

Eight items (items 1, 2, 3, 11, 13, 14, 18 and 21) converged, $p < .05$ representing facilitation techniques that actively stimulate learning, such as probing, guiding, encouraging self-expression, and prompting expression of understanding.

Convergence was found between five items (p <. 05): item 5 (Asking primarily open-ended questions), item 21 (Rewording learner dialogue for learner clarification), item 26 (Probe to induce information sharing), item 30 (Stimulate learners to explore group dynamics), and item 32 (Avoiding intervening in groups). This group of items appeared to center around tutor behaviours that empowered learners to control the learning situation. In this way, they demonstrated comfort with facilitation techniques related to learner autonomy.

Item correlations in Part B were also observed for a pattern of correlations, that many of the items that should be related were and many of those that should not be related were not. Table 3.4 shows an example of a selection of items used to test convergent and discriminant validity. The analysis shows, as predicted, that verbal nondirective facilitation items such as item 2, item 14 and item 16 correlated and nonverbal nondirective facilitation items such as item 6, item 7, item 8, item 20, item 28 and item 32 correlated. The first group seemed to reflect the same construct, the second group appeared to reflect a different construct and the two sets of measures appeared to reflect two different constructs.

Table 3:4 Part B Convergent and Discriminant Validity

Item	2	14	16	6*	7*	8*	20*	25	28*	32*
2	1.00	.44	0.46	-0.02	-0.02	-0.05	-0.31	0.27	0.04	0.04
14		1.00	0.35	0.05	0.16	-0.13	-0.03	0.14	0.33	0.16
16			1.00	0.01	-0.03	-0.21	0.01	0.14	0.27	0.25
6				1.00	0.63	.499	0.52	0.30	0.52	0.45
7					1.00	0.55	0.33	0.11	0.50	0.48
8						1.00	0.35	0.32	0.35	0.34
20							1.00	0.22	0.43	0.51
25								1.00	0.48	0.27
28									1.00	0.49
32										1.00

[a] Items represent nonverbal nondirective facilitation items.

However, the six items representing nonverbal nondirective facilitation (items 6, 7, 8, 20, 28 and 32) that appeared to act as discriminating items (significantly correlated at $p < 0.05$) also correlated significantly with at least one verbal item. For example, item 28 (Using silence) also correlated with item 14 (Encouraging Self-expression). This result may have indicated that the verbal nondirective items with which the nonverbal nondirective items correlate cannot be classified as verbal or nonverbal but remain as unspecified nondirective techniques. In conclusion, items in Part B of the survey show high construct validity but conclusive discriminant validity could not be demonstrated with this sample.

Two threats to construct validity of surveys are inadequate preoperational explication of constructs and mono-operation bias. Earlier, in Chapter 1, constructs considered before survey implementation were described. The three main constructs were described: (1) pedagogical beliefs in a PBL tutor principles; (2) comfort with nondirective facilitation in a PBL context; and (3) background. Mono-operation bias means that the survey was only administered at one point in time and only one version of the survey was used. The chance exists that the full breadth of the concepts was not captured. The researcher acknowledges that the results of the study only reflect the peculiar version of the constructs implemented in the survey. However, support that the research was measuring the constructs emerged from the pilot study, statistical analysis, and through interviews with a sub-sample of the survey respondents.

Analysis of open-ended questions

The frequency counts of codes developed from open-ended questions were totalled and listed along with frequency counts for each code. Survey items representing

similar concepts were identified where possible. Comparisons were made between participant responses to close-ended survey items (using the mean statistic) and the content of open-ended questions in order to further explore the construct validity of the tool. Results of this comparison are addressed in Chapter Four in the discussion of the findings for the survey.

Conclusions drawn from validity and reliability testing

Based on the response rate, the FPS responses were suitable for validity and reliability testing using commonly accepted statistical procedures. Content, construct, convergent, and divergent validity testing as well as reliability testing revealed that the instrument had acceptable validity and reliability. Correlation analysis revealed that items in each part of the survey had unidimensionality and measured the same construct. This analysis led the researcher to believe analysis and interpretation of the data could proceed as planned.

Interview Design

This section describes the purpose, administration, coding rationale, coding procedure and efforts undertaken to establish trustworthiness of interview data.

Interview Purpose and Administration

Follow-up telephone interviews were selected to accompany the researcher developed survey because interviews provided an alternative viewpoint on the research questions and held the possibility of providing examples of tutors' conversational techniques. Since the research was carried out with tutors in two geographically distant locations, telephone interviews were the only practical option. Limiting the interview to 30 minutes and offering to call participants at a time convenient to them were two strategies used to motivate participation.

Interviews in this study allowed participants to further elaborate on their beliefs and experiences with facilitation and to reflect on multiple tutoring examples of their choice. Researchers indicate that interviews are widely used to study teacher beliefs (Calderhead, 1996), are successful in collecting responses to open-ended questions (Mertens, 1998), and can promote reflective thinking by the interviewee useful for researchers to develop a deeper understanding of topics under investigation (Taylor et

al., 2002). The interview has the advantage of a more conversational style and the opportunity for the interviewer to probe for understanding and additional information. It allows the participant, to express themselves in their own words and allows the researcher a greater opportunity to build trust (Mertens). Efforts were made throughout interviews to put interviewees at ease, build rapport, and build trust, which at times required some complementary reciprocity as defined by Rapley (2004) as a form of help, assistance or information.

At the same time interview data it is recognized that what tutors' say in their survey responses or during interview may be influenced by the situation (e.g. how open or closed the agenda appears to be), by the topic (e.g. how controversial the topic may be), by individual factors (e.g., personal agendas), and by factors limiting their performance (e.g. recall; Shoemaker, 2003).

The interview design consisted of semi-structured, one-to-one telephone interactions conducted by the researcher who is an experienced interviewer. She introduced the interview process with a greeting, reviewed the survey topics, research purpose, explained the format of the interview and confirmed agreement for a recorded interview. The interview guide consisted of 22 open-ended questions (Appendix K: Interview Guide). Interviewees were invited to talk openly about anything they wanted to concerning the research topics first, then asked to respond to probing open-ended questions. Interviews were approximately 30 minutes in length and were digitally recorded. The questions were designed to elicit pedagogical beliefs, comfort and challenges with facilitation. In doing so they were based upon the concepts in the research questions and the 11 themes that emerged from the comments to the open-ended questions in the FPS. The first question on the guide was designed to capture thoughts on beliefs, comfort, challenges and/or background. Six questions probed teaching and learning beliefs (questions 2, 3, 4, 7,10, and 14), two questions related to facilitation techniques (questions 9 and 13), five questions asked about facilitation comfort and challenges (questions 5, 6, 15, 16, and 17), two questions related to each of tutor background (questions 11 and 12) and the survey instrument (items 20 and 21), and one question pertained to each of tutor training (question 19), the beliefs-behaviour relationship (question 18), and facilitation style change (question 8).

The methodological guidelines for interviews suggested by Rapley (2004) were followed: introduce the topic for discussion, listen to answers and then produce follow up questions, listen to interviewees talk and ask them to explain key terms, and provide

neutral responses such as mm, yeah, laughing, and so on. The researcher adopted an attitude of flexibility and sensitivity to the specific dynamics of each interaction. The format was loosely structured to permit adjustments so that the researcher could take cues from the ongoing dialogue with the interviewees about what to probe next. This meant that the order of specific questions shifted in relation to the interviewee's response. As Ripley observed, the questions mutate in relation to the person being interviewed. The intention was to follow the interviewee's talk and not restrict discussion to only the predetermined questions.

The interviewing technique was approached as both an excavation and construction of knowledge to report more than facts. It is expected that for both interviewer and interviewees new meanings and understandings were created during the interaction. Interviews are dependent upon people's capacities to verbalize, interact, conceptualize, and remember (Mason, 2002). As the tutors were all individuals with post-secondary education and responsible positions in medical schools it was assumed they would be especially capable of expressing their views during interviews. Because the researcher was interested in exploring situational knowledge, questions were situational (the PBL context) rather than abstract. The interview is viewed as a social encounter producing a retrospective account of past actions and experiences, feelings, and thoughts (Rapley, 2004). It was expected that participants interpreted the questions from their life experiences and that responses were original and unique.

Digitally recorded telephone interviews were conducted between November 1 and 15, 2007 with 11 respondents who volunteered to be interviewed as a follow-up to completing the FPS. Interviewees indicated their wish to participate in a telephone interview via a response box located on the last page of the survey. The interview sample consisted of 7 tutors from McMaster and 4 tutors from Dalhousie. All topics in the prepared questions were explored with all interviewees. A summary of research results was offered to participants upon completion of the study.

The digitally recorded interviews were transcribed into Microsoft Word files where the participant name was replaced by a pseudonym to ensure participant anonymity. The transcribed telephone conversations were imported into Atlas-ti -The Knowledge Workbench, Version 5.0, a qualitative data analysis software program developed by Scientific Software Development, to allow sorting and retrieval of data, creation of a database, and enable an audit trail. Yin (2003) stated that creating a database of original data that can be viewed by others increases research reliability. Data coding using

qualitative software more easily enables linkages to themes, and data can be manipulated more easily and thoroughly than through hand coding (Mason, 2002).

A priori codes and rationale

The coding scheme evolved from a combination of partially predefined codes and discovery of unexpected codes and themes (See Appendix L: Code Schedule and Definitions). The a priori codes, as anticipated codes, were established before survey completion for the three main categories based on anticipated responses to the main concepts (beliefs, challenges, and background), the purpose of the study, and the knowledge of the researcher. Organized in this way the macro-categorization of interview data paralleled that of survey data, enabling cross-data source comparisons. An additional section for feedback on the survey instrument was also established beforehand.

Coding Procedure

The analysis process incorporated commonly used qualitative data analysis steps: read the transcripts carefully question by question, compare the answers of specific questions of all interviewees, review documents for surface and underlying meaning, identify text segments and assign a code word/phrase to describe the meaning of the text segment, list all code words and group similar codes with the intention of reducing the number of codes, go back to the interview transcript with the codes to see if new codes emerge and identify specific quotes that support the code, reduce the list of codes to five to seven themes (categories) (Blaxert, Hughes and Tight, 2001; Creswell, 2005).

The coding process started with reading the text of the transcripts several times in order to get a sense of the whole, gain a preliminary understanding of the essential factors of the text, and develop an organization system. Responses were examined to distinguish key concepts, phrases, and repeating themes, with the unit of analysis being complete thoughts. The researcher aimed to interpret passages as little as possible to let the interviewees talk for themselves.

Responses were coded literally and interpretively. Literal coding refers to the literal content of the words used by the interviewee, whereas interpretive coding can refer to either interviewee or coder interpretations (Mason, 2002). In this research,

emphasis was placed on interviewee interpretation of the interview questions accompanied by coder interpretation of interviewee words and phrases.

All transcripts were read twice, then manually coded lean by the researcher. Creswell (2004) refers to lean coding as preliminary broad codes used to identify main topic areas. In the first code iteration, repeating concepts in interviewee talk were coded into the three broad a priori categories: beliefs, challenges, and background and the minor category of survey instrument. In the second code iteration two additional minor categories were added Tutor Evaluation and Co-learner. These categories were unexpected and emerged from the interviews. As detailed in Appendix L- Code Schedule and Definitions, the Tutor Evaluation code referred to comments participants made about the effectiveness of their role performance while the Co-learner code referred to participant remarks about acting as a co-learner with students during tutorial.

A three-level hierarchy emerged for each main coding category. Each of the three main categories (beliefs, challenges, and background) constituted the highest level and broadest level of classification followed subcategories, which were also subsequently subdivided. Level 2 codes are subsets of Level 1, and Level 3 are subsets of Level 2 codes and represent the lowest coding level. The Belief category contained six sub categories (Level 2): PBL Approach, Tutor Role, Student Role, Belief Change, Belief–Behaviour Link and Tutor Training. The Challenge category contained three sub-categories that were the same sections used in the Belief category (PBL Approach, Tutor Role, and Student Role). The Background category contained five sub-sections: Facilitation Technique Knowledge, PBL Student Experience, Similar Experience Connections, Therapeutic Communications, and Facilitation Style Change. Codes are defined with examples in Appendix L – Code Schedule and Definitions.

Establishing trustworthiness

The coding process included procedures for establishing trustworthiness of the analysis. Trustworthiness as a key issue in qualitative research has been associated with validity (Golafshani, 2003). It refers to the systematic collection of data, using acceptable research procedures, and allowing the procedures and findings to be open to critical analysis by others. While a number of methods can be used to establish trustworthiness (Creswell, 2004; Kefting, 1991; Lincoln & Guba, 1985) an audit trail and peer examination were used in this research study. In this way the research aims to demonstrate credibility and confirmability. Credibility here refers to the extent to which

the data collected (coding and interpretations) from the interviews accurately reflect the realities of the conversations.

The development of a coding system that resulted from comparison and agreement upon code choices between the researcher and her supervisor served as a method to develop trustworthiness. This process began by establishing intercoder reliability, which refers to the extent the two coders agree on the coding of interview text. The coding scheme was made as complete and explicit as possible. The researcher documented her understanding of the meaning of each a priori category and provided examples to the co-rater. (Appendix L, Code Schedule and Definitions) After a sampling of interview text was co-coded, code assignment was discussed between two raters. When differences in opinion arose they were discussed and revisions to code assignment were made until agreement was reached. This process was repeated three times on the same interview and once on two other interviews. Each coding iteration served to reduce the number of codes, modify code labels, test the goodness of fit of grouping categories, and compare interpretations of text. A third sample interview functioned as the final test of coder agreement, during which time agreement was found in over 95% of the codes and classifications. Because interview text and assigned codes were stored in a retrievable electronic database, they are viewable to others and provide an audit trail.

The researcher acknowledges possible researcher bias in interpreting interviewee talk due to her familiarity with the role of a PBL tutor. However, the researcher's thesis supervisor, who independently coded a sample of the interviews, was unaffiliated with PBL. The co-coding procedure provided a suitable strategy to minimize researcher bias and increase confirmability and validity of the findings (Miles & Huberman, 1994).

The frequency of codes was retrieved from the code database in conjunction with examining the extent to which quotations illuminated and expanded upon codes. Code frequencies provided an overall view of the number of times the same topics surfaced during interview talk, revealed participants' views on interview guide questions, and provided a quantifiable format that enabled comparison of the most frequent codes with survey data. The frequency of counts of codes and examples are presented in Chapter 4.

Summary

This chapter demonstrates awareness of the literature on research methods applicable to the research questions of this study. The research design methodology was guided by the socio-psychological literature on survey design and interview procedures. This chapter explained in detail the research sample, development of the survey and interview protocol, and data collection procedures to make the process transparent. Justification for the use of an online survey coupled with follow-up telephone interviews was explained. Validity and reliability planning and testing of the survey instrument were explained along with systematic procedures used to establish trustworthiness of the interview data. The design of the interview guide was explained as well as coding procedures. In summary, the procedures described in this chapter indicate that the instruments and methods used for collecting and managing the data for this study were valid, reliable, and trustworthy.

CHAPTER 4: RESULTS

This chapter presents the results of the data analysis of the study. Survey findings are presented first followed by interview findings.

Survey Findings

This section presents the findings that emerged from the data collected from the survey. The background characteristics of the sample are presented first followed by findings on tutors' beliefs about challenges, the relationship between beliefs and challenges, and the relationship between challenges and background,

Background

Forty-eight participants completed Part C of the survey, which included standard demographic questions such as age, gender, university affiliation, education, teaching and tutoring background on 11 dimensions. Analysis for descriptive statistics was undertaken using SPSS. Items were coded using the response options in the survey. Those items containing open response options, such as, "other" were coded with classifications that emerged from survey responses.

The sample was heterogeneous in a number of categories. There were an equal number of male and female respondents (24 males and 24 females). Representation from each of the medical education programs was comparable (Dalhousie University 52% and McMaster University 48%). The survey respondents' ages were mixed and ranged across all three age groups: 31% were less than 40 years (n =15), 22% were 40 - 49 years (n =11), and 47% were over 50 years (n = 22). Just over two-thirds of the tutors (70%) were over 40 years old (n = 34).

Results showed the sample represented a cross-section of tutors by academic preparation and a range of disciplines. The majority, 80% of the respondents had MD degrees while 21% had a PhD. Six respondents did not report their discipline. In terms of discipline specialties approximately one-third of the respondents (33%) specialized in medicine with the remaining respondents worked in 1 of 17 other medical and health

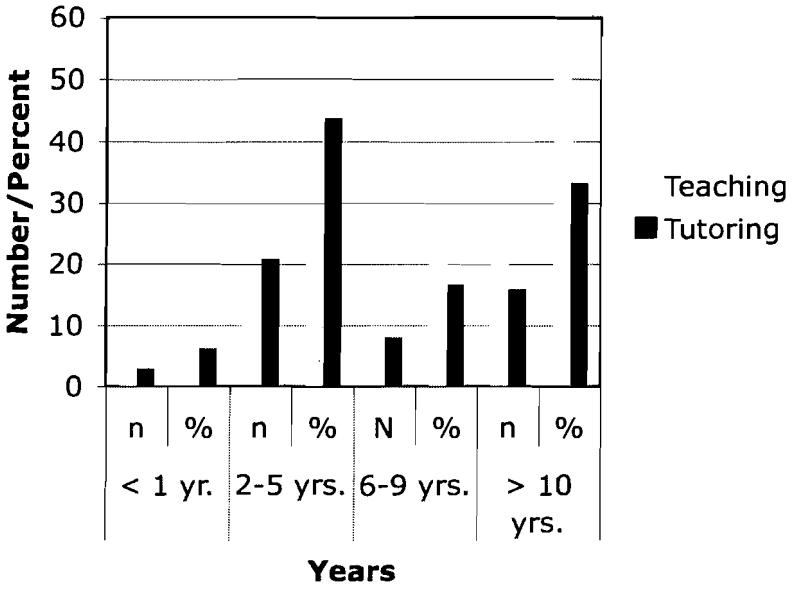
sciences specialties, (Anaesthesiology 10%, Pharmacology, Surgery, Paediatrics 6%, Laboratory Medicine, Reproductive endocrinology, Biochemistry/Physiology 4%, Oncology, Respirology/Critical Care, Neuroscience, Pathology, Psychology, OB/GYN, Bioethics, Education 2%). Twelve percent of the participants did not report their specialty area. These data indicated a heterogeneous sample by discipline.

With regard to professional relationship to the medical education program, the sample was also mixed. The majority of the respondents (42%) were full-time clinical educators, 25% were non-specified, 17% were part-time clinical educators, 13% were full-time basic scientists, and 4% were full-time research educators. This finding indicates the sample of tutors was heterogeneous for university positions and representative of the variety of different educational roles from which tutors typically emerge in medical education programs.

Both teaching and tutoring experience were mixed. Teaching experience varied from less than 1 year to greater than 10 years. Approximately half of the sample had over ten years teaching experience while the remaining participants had been teaching between 6-9 years (20.8%) and 2-5 years (22.9%). Tutoring experience was measured from multiple dimensions: time tutoring in years, time per week tutoring, recency of tutoring, and level or topic area of tutoring in a medical school program. The majority (94%) of the respondents had been tutoring for more than three years, 6% of the respondents had been tutoring less than one year. Therefore, just over a quarter of the respondents had been tutoring between 3-5 yrs, and 18% had been tutoring for more than 16 yrs. As shown in Figure 2, for tutors with the highest number of years of teaching and tutoring experience, the number of years of teaching experience exceeded tutoring experience, whereas for tutors with fewer years of teaching and tutoring experience tutoring experience exceeded teaching experience.

The sample contained a mix of tutoring levels. The majority of the respondents tutored at the year 1 level (45%), 23% tutored at the year 2 level, 12% tutored in both years 1 and 2, and 19% tutored in specialty areas.

Figure 4-1: Teaching and tutoring experience



In order to analyze relationships between tutoring experience and other survey findings, the tutor experience values were collapsed from six to three categories as a new variable labelled Tutor Experience. In this way, responses from tutors with less than 3 years experience were combined into one category labelled "Junior tutors", responses from those with 3-5 years experience were classified as "Intermediate tutors" and responses from tutors with more than 6 years were grouped as "Senior tutors." Senior tutors comprised half of the survey sample (50%), intermediate tutors (29%) and junior tutors (21%).

Data on recency of tutoring and amount of tutor work per week were also collected. Two-thirds of the respondents indicated they tutored less than 6 months from the date of the survey, while one-third tutored more than 6 months ago but less than 1 year from the date of survey completion. The amount of tutoring time devoted to tutoring was also measured. Just over half of the tutors spend less than 10% of their normal work week tutoring, while approximately a quarter of the tutors spend 10-20% and fewer still (10%) indicating they spend over 30% of their time tutoring.

In terms of tutor preparation, the majority of the respondents, 64.6% did not have any tutor training, 16.7% had basic training, 10.4% had taken advanced training and 8.3% were at the facilitator level. Interest in professional development in tutoring spanned four areas: 35.4% communication, 29.2% educational psychology, 16.7% in group dynamics, and 5.9% (n=3) expressed interest in "other". Of the three respondents that indicated that they were interested in *other* training only one respondent described what that might be, which was tutoring as a non-expert. A small percentage, 12.5% indicated they did not wish additional training.

Because this research investigated the communication used by tutors in facilitating tutorial groups and relationships between facilitation behaviour and client-centered theories respondents were asked about any specific training experiences in psychotherapeutic approaches or counselling. The majority (80%) of the respondents indicated that had not had any training in this area. The 14% of the respondents that indicated they had training in this area identified this training occurred within their medical education training, such as training in clinical behaviour therapy (CBT). One respondent indicated enrolment in a professional development program focused on these skills.

Table 4:1 Survey participant demographics

Survey Item	Response	*n*	%
(2) Tutoring Level	Year 1	22	45.8
	Year 2	22	22.9
	Years 1 and 2	6	12.5
	Specialties	9	18.8
(13) Teaching Experience	> 10 years	26	54.2
	6-9 years	10	20.8
	2-5 years	11	22.9
	< 1 year	1	2.1
(3) Tutoring Experience	3-5 years	14	29.2
	> 16 years	9	18.8
	6-10 years	8	16.7
	1-2 years	7	14.6
	11-15 years	7	14.6
	< 1 year	3	6.2
(4) Recency of tutoring	> 6 months	16	33.3
	< 6 months	32	66.7
(5) Tutor training	Facilitator	4	8.3
	Advanced	5	10.4
	Basic training	8	16.7
	No training	31	64.6
(11) Tutoring Position	PT- Clinical Educator	8	16
	FT – Basic Scientist	6	12.5
	FT – Research Educator	2	4.2
	FT – Clinical Educator	20	41.7
	Other	12	25.0

[1] Results are based on responses to Survey Part C (n = 48)

In summary, as illustrated in Table 4.1 and Table 4:2 Tutor Demographic Descriptors, a demographic profile emerged from the survey sample indicating a heterogeneous sample in a number of categories (age, gender, university affiliation, education, specialty area, teaching experience, tutoring experience, medical specialty, tutoring position, and tutor training). According to Gobo (2007), in order to claim representativeness survey researchers often estimate the variance of a few variables,

usually sociodemographic ones such as gender, age, education) of which the true population parameters are known.

As demographic data on PBL tutors is not collected or published by either McMaster or Dalhousie claims of representativeness of the tutors in this study to tutors in medical education programs at McMaster University and Dalhousie University or elsewhere have not been made.

Table 4:2 Tutor Demographic Descriptors

	Demographic Profile
Age	Heterogeneous (less than and greater than 40 years)
Gender	Heterogeneous
University affiliation	Equal percentages McMaster and Dalhousie
Education	Heterogeneous and primarily M.D.
Advanced education	Masters from a range of disciplines (health science, religion, education, anthropology)
Discipline specialty	Heterogeneous specialties
Tutoring position	Heterogeneous mix full-time and part time tutors
Teaching experience	Heterogeneous mix of short and long teaching careers
Tutoring experience	
• Years	Experienced (3 or more years tutoring)
• Recency	Within last 6 months
• Time per week	Heterogeneous mix of less than and over 10% /week
• Program level/area	Heterogeneous mix of program levels
Psychotherapeutic/counselling Experience	Minimal outside of medical education
Tutor training	Heterogeneous (none, some and advanced)
Advanced tutor training interest areas (PD)	Communication

Tutor Beliefs

Fifty-one participants completed Part A of the survey that concerned tutor pedagogical beliefs. Descriptive statistics illustrating the mean (*M*) as the measure of central tendency, the standard deviation (*SD*) as the measure of variability and frequency percentages were calculated. A presentation of these data appears in Appendix G: Survey Responses Part A and B, Table G1 Part A - Reliable Items. The relative frequency of scores 1-3, representing disagreement or "no opinion", and scores of 4-5 representing positive agreement with item statements were computed for items that passed the reliability test. This collapsing of scores simplified the data so that agreement and disagreement percentages could be more easily understood. A high percentage of participants agreed with 18 of 19 item. Eight-two percent of participants disagreed with the item concerning tutor expertise, item 32 (The tutor should be an

authority on the information being learned). The high percentage of agreement showed the majority of tutors held beliefs in agreement with PBL tutor principles. In addition, the data indicated tutors were in agreement with each of the three PBL beliefs types: eight items concerned PBL approach (items 2, 3, 5, 6, 10, 21T, 33T), 13 items concerned the tutor role (items 9T, 13, 17, 18, 20, 22, 23T, 24T, 25, 27T, 35T, 36T), and five items concerned the student role (4, 7, 12T, 15, 34).

Further analysis using Kruskal-Wallis and Bonferroni tests determined there was a significant difference between the three belief types $a = 0.05$. The chi-square statistic was 14.78 (df=2). As the chi-square statistic was greater than the critical value, $a = 0.05$, the null hypothesis was rejected (the three categories were equal in terms of beliefs). This finding indicated participants believed more highly in student role belief items and PBL approach belief items than tutor role belief items.

Table 4:3 Survey Part A Relative Frequencies

	Survey Item	Disagree		Agree	
		n	%	*n*	%
2	Problem first	14	27.5	37	72.5
3	Inquiry	6	11.8	45	88.2
4	Justify	12	23.5	39	76.5
5T	Learning Conditions	6	11.8	45	88.2
6	Contextual learning	11	21.6	40	78.4
10	Verbalize thinking	6	11.8	45	88.2
13	Indirect communication	10	19.6	41	80.4
14	Group work	7	13.7	44	86.3
15	Self-evaluation	3	5.9	48	94.1
16	How and why	23	45.1	28	54.9
17	Learning diagnosis	11	21.6	40	78.4
18	Group dynamics	3	5.9	48	94.1
20	Redirect discussion	6	11.8	45	88.2
23	Tutorial control restraint	17	33.3	34	66.7
27T	Tutor learn issue restraint	15	29.4	36	70.6
32	Expertise	42	82.4	9	17.6
33T	Real life application	22	43.1	29	56.9
34	Opinion formulation	4	7.8	47	92.2
35T	Tutor summary restraint	15	29.4	36	70.6

Items with $M > 4$ ($SD < 1$) appear in Table 4:4. These items were a mix of PBL tutor principles belief types: tutor role, student role and PBL approach.

Table 4:4 Survey Part A Items with means greater than 4 (M > 4)

#	Item	Mean	SD
5T	Conditions which promote curiosity, prompt questions and contain suspense are necessary for learning	4.3	0.97
15	Learners need to constantly evaluate the information they use	4.3	0.75
18	The tutor needs to regularly monitor group dynamics	4.3	0.85
10	Learning is enhanced when learners verbalize their thinking as they work through a problem	4.2	0.73
20	The tutor needs to redirect problem discussion when it is off target	4.2	0.93
3	Learners need to use inquiry in their analysis and formulation of problems	4.1	0.71
14	Group work	4.1	0.84
34	The learner ought to be able to formulate and defend an opinion or judgment	4.1	0.95
13	Tutors should communicate indirectly using open-ended questions	4.0	0.85

A similar pattern of belief items was found in responses to the open-ended survey item in Part A. Just under half of the participants (n = 23) responded to the invitation to comment to item 37 (Please comment on other teaching and learning beliefs that you feel are important as a PBL tutor). Comments in Part A contained one comment about the ambiguity of item 8. The remaining comments were coded and summed. Themes emerging from the comments as illustrated in Table 4.5 were grouped into 8 categories. The most frequent comments concerned learner autonomy, tutor intervention, and PBL approach. Tutor intervention comments related to the tutor's control over the learning process. Respondents indicated that the tutor should refrain from controlling the tutorial group whenever possible to encourage learner autonomy. For instance, here is how one participant described the issue:

> [the tutor} must believe the student is an independent and thoughtful learner. It is important to believe that learning is best done (for some subject areas) through discussion, shared resources, and the dynamics of group interaction. The tutor must believe that students can learn without didactic methods.

At the same time, content expertise and clinical background were linked with guiding and intervening in the tutorial process.

> Although the theory states that tutors need not be experts, the reality is that groups work better with expert tutors, so long as they are aware of

the boundaries of their role and don't take over the process and prevent students from generating hypotheses.

Intervening was seen as appropriate when the group was mired in superficial learning or requested tutor input. Other participants linked tutor process expertise to providing an environment that supported learner autonomy. The most frequent themes were incorporated into the interview guide as open-ended questions.

Table 4:5 Themes Emerging from Survey Part A open-ended item

Theme	Frequency
Learner autonomy	7
Tutor intervention	7
PBL approach	7
Group dynamics	3
Clinical background	3
Attitude	4
Expertise	4
Problem materials/ objectives	1
Total	36

The comments from the open-ended item in Part A indicated that tutor content expertise, process expertise, clinical background, belief in the PBL approach, and attitude to learning integrated with encouraging learner autonomy are topics of importance to tutors. The similarity between belief themes from open-ended questions concerning tutor beliefs with the concepts of closed-ended questions in the survey in Part A supports the assumption of construct validity of this section of the questionnaire. As both measures provided partial views of tutor beliefs on PBL tutoring the researcher's understanding of this phenomenon was enhanced by data from the combination of methods.

Facilitation Comfort and Challenges

Forty-nine participants completed Part B concerning facilitation comfort and challenges. Response analysis used several statistical tests. Item responses varied (M = 2.7, SD = 1.02 to M = 4.22, SD = .58); see Appendix G: Survey Responses Parts A and B). Frequency responses of the Likert values were calculated. The relative frequency of scores 1-3, representing discomfort or in between, and scores of 4-5 representing comfort with item statements were computed and appear in Table 4:6. Frequency percentages show higher percentages of participants were comfortable than

uncomfortable (discomfort) with 22 of 26 items. Five items had the highest comfort frequencies: 91.8% of participants were comfortable with item 5 (Asking open-ended questions), 91.8% were comfortable with item 26 (Probing to induce information sharing), 85.7% were comfortable with item 16 (Stimulating link searches), 83.7% were comfortable with item 25 (Allowing learners time to respond), and 79.6% were comfortable with item 23 (Comparing learner comments). The four items associated with high discomfort percentages included: 77.6% of participants indicated they were uncomfortable with item 32 (Avoiding intervening during group struggles), 63.3% indicated they were uncomfortable with item 8 (Withholding suggestions), 59.2% of participants indicated they were uncomfortable with item 27 (Stimulating self-reflection), and 55.1% of participants indicated they were uncomfortable with item 20 (Withholding information).

An initial impression of participants' comfort levels with items was also obtained by eyeballing mean scores. Six items with high means ($M > 4$) included: item 2 (Guiding learners through the inquiry/reflection process), item 5 (Asking primarily open-ended questions), item 14 (Encouraging learners to express their thoughts and feelings), item16 (Stimulating learners to search for links between issues), item 25 (Delaying my responses with silence to allow learners to search for answers), and item 26 (Using probing questions to induce learners to volunteer information). Examination of item responses with low means less than 3 revealed two items: item 32 (Avoiding intervening during group struggles), and item 8 (Withholding suggestions).

Table 4:6 Survey Part B Relative Frequencies

	Item	Discomfort		Comfort	
		n	%	*n*	%
1	Probing	15	30.6	34	69.4
2	Guiding	11	22.4	38	77.6
3	Indirect stimulation	13	26.5	36	73.5
5	Asking open-ended questions	4	8.2	45	91.8
6	Avoid expressing opinions	18	36.7	31	63.3
7	Restrain offering key info	22	44.9	27	55.1
8	Withholding suggestions	31	63.3	18	36.7
9	Verbalizing my interpretations	22	44.9	27	55.1
10	Eliciting reasoning lapses	18	36.7	31	63.3
11	Neutral responses	18	36.7	31	63.3
12	Summarizing learner's reasoning	18	36.7	31	63.3
13	Indirect communication	15	30.6	34	69.4
14	Encouraging self-expression	10	20.4	39	79.6
16	Stimulating link searches	7	14.3	41	85.7
18	Prompting expression of understanding	14	28.6	35	71.4
20	Withholding information	27	55.1	22	44.9
21	Rewording learner dialogue	13	26.5	36	73.5
23	Comparing learner comments	10	20.4	39	79.6
24	Confronting learners	23	46.9	26	53.1
25	Allowing learners time to respond	8	16.3	41	83.7
26	Probe to induce information sharing	4	8.2	45	91.8
27	Stimulate self-reflection	29	59.2	20	40.8
28	Use silence in group discussions	13	26.5	3	73.5
29	Promoting group self-management	15	30.6	34	69.4
30	Stimulate learners to explore group dynamics	15	30.6	34	69.4
32	Avoiding intervening during group struggles	38	77.6	11	22.4

In order to provide a more powerful analysis of differences in participants' comfort level with each type of nondirective facilitation technique, a paired *t*-test using composite scores was conducted between verbal and nonverbal items. The composite score is just the average of all the items in the category. The difference between the two averages was calculated (Verbal Average–Nonverbal Average). This difference was tested for normal distribution. The Kolmogorov-Smirnov Test results showed that the items in Part B were normally distributed at a = 0.05 level.

The null hypothesis for the differences between the two types of items was written as "participants feel more comfortable with nonverbal items" and the alternative hypothesis was written as "participants feel more comfortable with verbal items." The level of significance was set to alpha, a = 0.05. The *t*-test analysis indicated a difference between the two composite verbal and nonverbal variables at $t = 3.88$, $p = 0.0003$. The null hypothesis was rejected at alpha = 0.05 level. From the data there was sufficient evidence to say that participants felt more comfortable with verbal items than nonverbal items at a = 0.05 level.

In order to examine differences between items in the verbal and nonverbal categories analysis was undertaken using Friedman and Bonferonni tests. As illustrated in Table 4.7, the Friedman test showed that there was a significant difference ($a = 0.05$) between items in terms of comfort level within each category. Multiple comparisons of items in the verbal category for the highest comfort levels using the Bonferoni test showed tutors had significantly higher comfort (a = 0.05) with item 16 (Stimulating learners to search for links between issues), item 26 (Using probing questions to induce learners to volunteer information), and item 22 (Asking probing questions to simulate learners to elaborate their statements with additional information). Multiple comparisons of items using the Bonferonni test for lowest comfort levels for the Verbal category showed that tutors had lower comfort with item 27 (Simulating self-reflection), item 9 (Verbalizing my interpretations), item 24 (Confronting learners), and item 11 (Responding with neutral language). The Bonferonni test showed that item 16 (Simulating learners to search for links) and item 26 (Using probing questions to induce learners to volunteer information) were the most comfortable verbal facilitation techniques.

In terms of comfort with nonverbal nondirective techniques, the Bonferonni test showed participants had the lowest comfort with item 32 (Avoiding intervening during group struggles), item 8 (Withholding suggestions for specific resources), item 20

(Refraining from providing information to stimulate learners to identify their learning goals and issues by themselves), item 6 (Avoiding expressing opinions), and item 7 (Utilizing self-restraint from offering important information). The multiple comparison test also showed participants had the most comfort with item 25 (Delaying my responses with silence) and item 28 (Remaining silent during group discussions). In summary, the Bonferonni test provided a more substantial item comparison than means alone on facilitation technique comfort – See Table 4:7.

Table 4:7 Facilitation Technique Comfort Levels

Category	Friedman test	Bonferonni test (highest comfort levels)	Bonferonni test (lowest comfort levels)
Verbal Items: 1, 2, 3, 5, 9, 10,11,12,13,14,16, 18,21,23,24,26,27,29, 30 Total = 19	Significant difference between items in terms of comfort level within category at a=0.05	Higher comfort levels within items 16, and 26 at a =0.05 level.	Least comfortable item was item 27 followed by item 9, 24, and 11.
Nonverbal Items: 6,7,8,20,25,28, 32 Total = 7	Significant difference between items in terms of comfort level at a=0.05	Highest comfort level : item 25. Items 31 and 28 also show considerable higher comfort levels than rest of the items at a =0.05	Least comfortable item 32 with item 8 as the second most uncomfortable 20, 6, and 7.

Approximately half of the participants (n = 23) responded to the open ended-question, item 34 (Please comment on the areas of facilitation that you find the most challenging). Two respondents indicated they did not know the meaning of the words "passively stimulate" in item 33. Frequency counts of the themes emerging from the Part B open-ended question appear in Table 4.8.

Table 4:8 Themes emerging from Part B open-ended item

Theme	Frequency
Learner autonomy	3
Tutor intervention	11
PBL approach	3
Tutor role	5
Problem materials/ objectives	3
Interpersonal conflict (dysfunctional learners)	3
Choice of words	3
Total	31

Approximately half of the respondents who responded to this question (n =11) commented on the challenges of intervening and one quarter (n = 6) commented on the tutor role. Other, less frequent comments concerned dealing with interpersonal conflict, learner autonomy, word choice, tutorial materials, and the PBL approach. A few tutors commented on the challenge of finding the right words to use when communicating, but the majority indicated their main challenge was is in deciding when and how much to intervene. Several respondents commented on the challenge of finding a balance between giving a bit of knowledge and letting the group find their own way. For example, one respondent commented, "I find the most difficult aspect of facilitating is knowing when to "jump in."

Comparison of the agreement between themes from open-ended questions (see Table 4:8) and the most uncomfortable facilitation techniques noted in survey items (see Table 4:7) in Part B supports construct validity of this section of the questionnaire. Both analyses reveal tutor intervention was a topic of concern to tutors.

Although not interfering during tutorials may be critical for PBL tutor role fidelity, some nonintervention aspects of the tutor role appear to be more challenging than others for tutors. These include: avoiding interfering during group struggles, withholding suggestions for resources, using closed questions, and providing information and direction to solve problems. However most of the sample (70%) indicated they were comfortable remaining silent during group discussions: item 28 (M 3.92 SD 1.02) and 74% of the sample indicated that they were comfortable avoiding lecturing: item 31 (M 4.1 SD 1.12).

Relationship between beliefs, comfort, and challenges

To examine the relationship between tutors' pedagogical beliefs and their facilitation comfort and challenges, the association of responses to Part A with those of Part B of the survey were determined.

de Vaus (2002) and Hinton et al. (2005) suggest cross tabulations as the statistical method to investigate relationships between variables. As the number of responses to each value (1 to 5) for each item was small, the responses for Part A and Part B needed to be compiled to generate a larger number of responses in each response category. Part A items were compiled to form a new composite variable, and Part B items were compiled to produce another new composite variable. In this way the

data analysis permitted the researcher to see the relationship between tutors' beliefs as a whole with their facilitation comfort as a whole. de Vaus indicates that if a variable has only two categories (i.e., dichotomous), it can be treated as an interval variable. By collapsing each of the two composite variables into dichotomous variables cross tabulations were possible. The compiled variables (Total Beliefs and Total Comfort) were recoded into two new dichotomous variables labelled TB3 and TC2a. New values for each new variable were assigned as 1 = low and 2 = high. As suggested by de Vaus, in order to enhance the interpretation of the correlation coefficients, low numeric codes were used to indicate low scores of a variable and high codes indicated higher scores. Values for compiled Part A items, Total Beliefs, ranged from 29 to 83 (*M* = 73, *SD* = 8.9). Values for compiled Part B items ranged from 72 to 121(*M* = 96, *SD* =11.1). The median of the score range was used as the midpoint to cut the two sections in the SPSS transformation process. The median for Total Beliefs was 73 and for Total Comfort was 96. This transformation permitted measurement of the relationship between pedagogical beliefs and facilitation comfort.

Crosstabulations accompanied by a chi-square statistic are commonly used to measure the association between variables (de Vaus, 2002; Hinton et al., 2005; Norusis, 2006). The crosstabulation with chi-square undertaken on the two variables, Total Beliefs 3 and Total Comfort 2a, (see Appendix I Relationship between beliefs and facilitation comfort) resulted in frequencies in excess of five counts in all cells and sizable percentage differences between columns. de Vaus explained that, "differences between column percentages (within rows) indicate that the two variables are related and the greater the percentage differences the more strongly the variables are related" (p. 243). Table 4:9 reveals percentage differences across columns within rows. For example, 69% of Low Belief Tutors (tutors with belief scores below the mean) compared to 36% of High Belief Tutors (tutors with belief scores above the mean) indicated lower comfort (higher discomfort) with facilitation techniques. Similarly, only 30% of the Low Belief Tutors compared to 64% of the High Belief Tutors had high comfort with facilitation techniques. The crosstabulation data appeared to represent a positive association between beliefs and facilitation comfort.

Table 4:9 Crosstabulation between beliefs and comfort

	Beliefs	
Facilitation comfort	Low beliefs %	High beliefs %
Low comfort	69	36
High comfort	30	64
n	26	25

The significance of the crosstabulation percentages reported here was determined by the chi-square test statistic, $X^2 = 5.65$, $df = 1$, $p < 0.05$. This test indicated there were significantly different belief levels in the two comfort levels ($p < 0.05$) and that this is likely not due to chance. The appropriate correlation coefficient selected for correlation analysis between Total Beliefs3 and Total Comfort 2a was based on recommendations in the statistics literature for variables with the same number of categories in a 2 X 2 table. Supplementary to the chi-square statistic, in situations such as this, de Vaus (2002) recommended using Fisher's Exact value, which was 5.54, $p = .025$. These correlations showed a positive relationship existed. A symmetric measure of association analysis (it does not matter which variable is considered dependent) was also calculated. The result of this test was a positive Gamma y =.600, $p = .012$, which indicated there were more concordant pairs of cases than unlike pairs and that there was a positive relationship between the two sets of scores.

The crosstabulation indicated a relationship between the two variables. There was a large percentage difference between the attitudes of tutors with low beliefs and tutors with high beliefs, there was a large chi-square coefficient, and the probability of the statistic was small and significant. According to de Vaus, the rules of thumb for judging the size of correlation coefficients are as follows: 0 – 0.09 = trivial, 0.10-0.29 = low to moderate, 0.30-0.49 = moderate to substantial, 0.50-0.69 = substantial to very strong, 0.70-0.89 = very strong and 0.90-0.99 is near perfect. As the chi-square statistic was 5.65 it falls in the substantial to very strong range.

Relationship between background, comfort, and challenges

To explore the relationship between tutor background with facilitation challenges tutor background items in Part C of the survey were analyzed with Part B data using

cross-tabulations. Five background items were selected for comparison: tutoring experience, medical specialties, counselling and psychotherapeutic experience, tutor training experience, and tutor training interest. These items were selected because they showed the most promise in providing data in response to the tutor background research question. The crosstabulation between the compiled facilitation comfort variable from Part B (TComfort 2a) and Part C item 3 (Tutor Experience), showed that less experienced tutors were less comfortable (see Table 4.10). More junior tutors (60%) indicated discomfort with facilitation than indicated a high comfort (40%). More senior tutors (62.5%) indicated that they had high facilitation comfort than junior (40%) or Intermediate tutors (35.7%). These data appeared to support the general expectation that experience improves facilitation comfort. However, the chi-square test statistic showed no statistically significant relationship. The chi-square statistic, $_x^2$= 3.04 p >.05 and the Likelihood Ratio was 2.78 p >.05. This means that level of experience does not appear to be associated with level of comfort according to the statistic presented.

Table 4:10 Tutor Experience and Facilitation Comfort Crosstabulation

	Tutoring Experience					
	Junior		Intermediate		Senior	
Facilitation Comfort	*n*	%	*n*	%	*n*	%
Low comfort (discomfort)	6	60	9	64.3	9	37.5
High comfort (comfortable)	4	40	5	35.7	15	62.5
Total	10	100	14	100	24	100

The relationship between facilitation comfort and tutor medical specialties, and between comfort and experience with counselling or psychotherapeutic experience were also explored. As the number of medical specialties of the participants was so wide (17 different medical specialties), the small number of participants within each specialty area precluded analysis. A crosstabulation between facilitation comfort and experience with counselling or psychotherapeutic experience using TComf2a from Part B and item 7 from Part C also revealed no significant relationship.

Part of a tutor's background is the tutor's preparation for their role. Preparation for the role of a tutor in a PBL program usually consists of attending one or more tutor training workshops, which may be only one day long (Neild, 2004). Knowledge of the

amount and kind of tutor training can provide an alternate lens to view the relationship between tutor background and facilitation comfort. In general, individuals with less training in a specialty area experience more challenges than those with more preparation. In order to explore the relationship between training (TT) and professional development interest in tutor training (PD) a cross-tabulation was undertaken following the creation of two new derived variables, TT2 and PD2. The creation of new variables was necessary to reduce the number of response categories to two each instead of four and five due to small sample size (frequency counts). Six participants who indicated they did not wish any PD were omitted from this analysis. This analysis allowed development of a 2 x 2 table with cell counts larger than five (see Table 4.11). As recommended by Hinton et al. (2005) and de Vaus (2002), the influencing variable (tutor training) was placed in the column position and interest in additional tutoring topics was placed in the horizontal position (the dependent variable). The small differences between the column percentages (within rows) between tutors with no training and those with some training show similar interest in professional development in communication and educational psychology within each group. The resulting Chi-Square statistic confirm no significant relationship between tutor training and professional development interest in tutoring, $\chi^2 = .002$, $df = 1$, $p > 0.05$ and the Fisher's Exact Test found $p = .613$.

Table 4:11 Tutor Training Interest Areas

	Tutor Training					
	No Training		Some Training			
	n	%	*n*	%	*n*	%
Communication	16	59.3	9	60.0	25	59.5
Educational Psychology	11	40.7	6	40.0	17	40.5
Total	27	100	15	100	41	100

Interview Findings

This section presents the findings from the interviews. Eleven survey participants, representing 21% of the survey participants volunteered for interviews. Demographically the interview sample consisted of 7 tutors from McMaster and 4 tutors from Dalhousie, 7 males and 4 females, and 7 medical (physicians) and 3 non-medical participants.

Interviewees' responses to the Interview guide questions and their commentary throughout interviews on their pedagogical beliefs, the challenges of tutors, and tutor background as it pertains to the tutor role are reported along with other major themes arising from the interviews. As outlined in Chapter 3, the interviews were coded using a priori and emerging codes. Although interview guide items were categorized by the researcher prior to the interviews as pertaining to beliefs, challenges or background, interviewees intermingled their pedagogical beliefs with their thoughts on comfort, challenges and background in reply to most questions.

The codes that fell within each category were tabulated to determine their prevalence in the sample. Codes with frequency counts over five were selected as indicative of areas of importance to participants – see Table 4:12. As illustrated in Table 4:12, interviewees most frequently commented on 11 topics in the Belief category, five topics in the Challenge category, and six topics in the Background category. In general, all participants were very positive about their tutor role and spoke more frequently about their beliefs than their challenges. A total of 126 belief comments, 54 challenge comments and 59 comments on background were collected from the interviews.

Table 4:12 Coding Counts

Beliefs	*n*	Challenges	*n*	Background	*n*
Student Role – Learner Autonomy	33	PBL Approach -Variance in PBL format	16	Facilitation technique knowledge - Unable to describe techniques	13
Tutor role - Facilitator	12	Tutor role -Intervention/Role fidelity	11	Similar Experiences - Nonclincial connection	12
Tutor role – Content expert	10	Tutor role- Intervention/ Evaluation	10	Similar Experiences - Clinical connection	11
PBL Approach -problem first	10	Student role - Maturity	9	Facilitation Style change - Role Improvement	11
PBL Approach - Inquiry	10	Tutor role- Intervention/Situation dependent	8	Similar Experiences - Therapeutic communication examples	7
PBL Approach - Exiting	9			Facilitation technique Knowledge - Defines and describes indirect facilitation	5
Tutor role – Enthusiasm PBL tutor role advocate	9				
Tutor role- Intervention situation dependent	9				
Tutor role- Intervention - role fidelity	9				
Tutor role - Student-centered	9				
Tutor role - intervention general	6				
Total	126		54		59

Tutors' Beliefs

Participants expressed more similarities than differences in their pedagogical beliefs. As illustrated in Table 4:12 Coding Counts, of the 11 types of beliefs coded, the most frequent concerned learner autonomy. Other frequently occurring beliefs were associated with the tutor role and with the PBL approach. From responses to question 2 (I'm interested in hearing about your thoughts about learning and your educational philosophy), 73%, (8) interviewees began their response by commenting on learner autonomy. The following 6 excerpts exemplify beliefs about the benefits of learner autonomy.

> Without interfering, help students to understand what they need to learn in this curriculum and also the diameter of the circle and the depth of the

> circle and that was mostly by letting them do the majority of the work in choosing their learning goals.
>
> I'm very flexible in how [students] get the knowledge they need. I find that they learn better from each other and I encourage students with expertise because of interests. And I find with this discussion format they pick up the knowledge very quickly. They feel that they have learnt it [knowledge], not that they have been taught it. I think that is a very big plus. If they feel that they were taught it they will forget it.
>
> I'm a fan of PBL and I think it's because of two things. One is because it engages the student and makes them actually do something, which I think is important and really helps them while telling them something is unhelpful generally.
>
> And the more you get them involved in the process the better its going to be. I also believe in this sort of constructivism that in a sense things are really not to be given.
>
> I tend to feel that there is no reason for the majority of students in a western affluent culture to not be able to put some of the pieces together. They just need to be reminded that they have had those [problem-solving] experiences.
>
> I think the tutorial system where they have to go and get their own learning even if they go straight to the Internet they still need to filter and say what is good and what is not so good

Although interviewees predominantly voiced beliefs about the learning benefits of learner autonomy, 3 interviewees offered their opinion on the relationship between autonomy and educational level or education in general.

> I would say it [learning approach] depends on the level of learning. So for undergraduates I believe very strongly that they need to have a certain basis of knowledge before they can um, make um, judgements on um, you know like, be very, be independent.
>
> It would be great if we could adjust the level of the didactic learning to the needs of students at particular levels.
>
> I'm a great defender of PBL not because it is new but because it's educational.

Many interviewees (60%) mentioned their belief about the tutors' role in learner autonomy in response to question 1 (What issues would you like to talk about concerning facilitating as a tutor in a program that uses a PBL approach). For example:

> The first thing that comes to mind is trying to engage individuals to identify their own needs. That is the first thing. The next thing is helping them identify the resources that help them meet their needs. What they learn from those resources. Not that it is not my problem or my issue but for them to learn what they can learn then I sometimes step in to help them focus or turn to a clinical usefulness from an experience they don't yet have.

A few interviewees included learning styles, teaching methods, and the opinion that PBL is not for everyone in response to question 2 (I'm interested in hearing your thoughts about learning and your education philosophy), as exemplified in the following three excerpts.

> I mean people can learn. There are learning styles. Some like to learn by example. ...Some like to learn from lectures and they underline it and highlight whatever, and some like to learn in a tutorial-based model.

> The kind of medical school that has lectures and every 6 weeks they have a test. If you pass that then you move on to the next step and promptly forget it. It's a bit facetious. They [students] probably remember 30-40% at the end of the day but they do it in mini cram pockets.

> I really feel that if PBL system is a major learning tool for students like medical students who already have an undergraduate degree. However, in earlier stages [levels of education] it has to be simply a kind of addition, or a mode of teaching but not the major mode of teaching.

When asked what comes to mind when they think of using a PBL-like approach (question 4), interviewees mentioned their view of the benefits and challenges of PBL.

> I guess it's [PBL] an orientation towards discovery rather than information transfer. You learn actively better if you are engaged.

> I don't think solving the problem is the essence of it. That is why they called it problem-based not problem solving. It is jut more interesting learning.

> [PBL students] learn how to learn. That is what tutorials teach. If I [the student] don't know what on earth to do I ask. Yes, they [students] have been educated to do two things, to ask the right questions, define what the right questions are and then to go and get answers.

> What comes to mind is the amount of time it takes to do a good job.

> The first think that comes to mind is trying to engage individuals to identify their own needs.

All interviewees also talked about the tutor role in their response to question 4. Nine of them emphasized their belief in the role of the tutor as facilitator, especially in regards to encouraging learner autonomy.

> The purpose of the leader is to divest a lot of responsibility. They monitor the results but don't get in there and micromanage. Given a chance, people will do a good job.

> The tutor role in PBL is different. You aren't there to impart knowledge. You are there to guide, to question and to challenge the group to come up with answers on their own.

When asked about the topic of tutor as expert (question 7), interviewees talked about the influence of tutor background and about facilitation skills. Approximately half of the participants felt it was preferable for the tutor in a medical education program to be a physician because the physician would be able to draw on their medical science knowledge and clinical experience. At the same time participants did not feel that the tutor needed to be a content expert or specialist. For example, if the problem being discussed pertained to the neurological system, participants didn't feel the tutor needed to be a neurologist. One participant expressed his thoughts this way:

> I know some tutors that are reading up on topics for the tutorial and I think, "what are you doing?" You have already gone through this once. You [the tutor] need to know enough that when they [students] are making stuff up you can call them on it.

> I think it's much easier to be a balanced facilitator if you are not a content expert.

In contrast to those interviewees who supported a clinician as tutor model, the 3 non-medical interviewees felt tutors in a professional program could be individuals without a medical background as long as the tutor had a sense of what the profession is about. One tutor expressed that the tutor should have an awareness of where information discussed in tutorial will have a practical application in students' future profession as a physician,

> I think you have to be an aware tutor rather than an expert one.

> I think that the tutor must have a certain awareness of where the students are coming from and the field in which they are going to go. And that I think is very crucial. ... So what are students, what are these students learning? What are they going to do with this knowledge? Where are they going to go? And the reason I had to do that [bring in practical applications of knowledge] was as a tutor as people [students] were

> discussing I could sense to see well, Is this really going to help them as they go along? I mean, where are they going to use this information?
>
> I think they should be comfortable with the material the student will be discussing. You don't have to be a content expert but you need to be anticipating the kinds of questions they [a content expert] would pose.

In conjunction with their views on content expertise several participants mentioned the importance of process expertise. The consensus by participants was that the tutor's role in PBL is process driven rather than content driven.

> I think they [tutors] have to be comfortable with the material the student will be discussing. You don't have to be a content expert but you need to be anticipating what they will need to know.

However, interviewees differed in their beliefs on process expertise being based solely upon PBL experience.

> I think someone who is attuned to personality style and can pick upon learning styles as opposed to learning the PBL process specifically. They will be good teachers no matter what way you make them.

The majority of participants also included examples of student-centered beliefs in their response to questions 2 and 4. For example, one participant revealed the following,

> I think it's very important for the tutor to have an awareness of where the students are and what the program is about. ... I tutored Unit 1, 3 and 5 so that I could see snapshots of development. And I not only got to know the program but I got to see different students going through it at different times. So then I could bring that information to the tutorial so when students were struggling with unit 1 I would have a sense of where the were going to be when they get to unit 3 and what kinds of challenges meeting them.
>
> Being sensitive to student needs... being sensitive to their [students] learning requirements and their personalities. So I think sensitivity is very important for the tutor and then flexibility.

In general, interviewees believed that the tutor in a medical education program should be a medical clinician with general medical knowledge (non-content expert), and facilitation process expertise, who holds beliefs consistent with the PBL approach. These findings were consistent with the recommendation of Barrows (1980) and others.

The belief that tutors should alter their facilitation technique as the situation required surfaced in the majority of the interviews. One participant expressed it this way,

> I think that's one of the things that tutors really need to, to recall or remember is that context drives a lot of things. You know you don't go there with a formula. I'm a tutor and therefore at this moment I do this.
>
> And it is awareness of the context of that moment... You have six pieces but they are arranged in different ways depending on the moment."
>
> I think that that [changing context] is the essential natural fluid of the process uh, that, that is very difficult footing to some people [tutors].

When asked about judging when to intervene in tutorial discussion (question 6) 90% (10) participants indicated that an important aspect of the tutor role was exercising self-restraint in order to maintain role fidelity.

> Judging when and when to not ask [questions] is one of the key facilitation skills.
>
> I make it very clear they have a responsibility for their education and this is not an easy ride through.

When asked to comment on changes in facilitation style over time (question 8), three-quarters of the interviewees reported an improvement in tutoring style, which they attributed to experience. For instance:

> Um, I've only done it for the last few years. It has changed from one year to the next.

When asked if acting as a tutor using a PBL approach changed their pedagogical beliefs (item 3), 5 interviewees indicated a change, four interviewees felt they hadn't changed and the remainder indicated that working as a PBL tutor had confirmed their suspicions about the effectiveness of learning methods. For example:

> Not much at all. Probably, the one change is that hopefully I am doing it more efficiently and a bit better.
>
> I graduated from a traditional medical school. I came to really appreciate how students evolved [using PBL] when I was involved as a clinical preceptor... And I can better appreciate how they can move their knowledge base along faster than grads from other traditional programs.
>
> Well it has changed. I mean it almost has taken me on the road to Damascus.... When I sat in on tutorials I was absolutely amazed at what was going on. ... That to me was an enormous transformation in my own profession. So I moved to becoming more and more interested in teaching and learning.
>
> Well I think it confirmed that the lecturing way of doing things is not the best way.

In summary, Interviewees were unanimous in their belief in PBL tutor principles and the tutor as a non-content expert. Their most prevalent belief related to supporting learning autonomy.

Challenges

When asked what they would like to talk about concerning facilitating in a program that uses a PBL approach (question 1), interviewees spoke about their role, the student role, and the PBL approach. All interviewees but one began by talking about the challenges of the role. One interviewee began by describing how much she enjoyed and valued the role before commenting on challenges. The first challenge that participants spoke about varied from interviewee to interviewee as illustrated in the following three examples.

> I guess I always bounce back to the content expert and the person who comes into the tutorial experience who is not an expert in that area like myself with a background in education but nothing in medicine. Ah, this is an area that I struggle with because I know obviously students are in medical school so they like clinical relevance and as someone who is not a clinician I can't give them that Even though there 's plenty of literature that says it does not matter, I know it does. The students tell us it does.

> It's a big time commitment. We have trouble staying within the allotted three hours twice per week. Then when you add in the extra time for evaluation, extra time to mark the CAAE's when they come in from Unit 1. It is much more of a time commitment then it appears on paper. So that is probably the biggest challenge of fitting that into the rest of my clinical responsibilities.

> I guess the major issues that I find tutors face in a PBL program is the variation group to group and tutor to tutor with the degree that the tutor is supposed to participate with the group, within groups of students <pause> how much they want the tutor to participate.

When asked about the challenges or discomfort they faced in facilitating tutorial groups (item 5) participants predominantly 64% (7) mentioned challenges related to variations in the PBL approach. Interviewees voiced concern over curriculum changes that vary the authentic nature of PBL, such as the codification and formulaic variations to the curriculum as it moves away from authentic PBL or the incorporation of a checklist of tutor actions. Other participants mentioned the challenge of the evaluation system. One participant views it this way,

> What are we learning and trying to test, marathoners on a sprint? PBL is preparing you for the long haul, and the evaluation systems, whatever fancy things we call them, are really testing sprinters.

Approximately one third of the participants mentioned the difficulty of increasing tutorial group sizes to more than 6 students that prevented tutors from interacting with students at the individual level. Participants put it this way:

> In the large class you don't know what's going on. It gives you the license to be actually a lot more distant so when it comes to evaluation.

> My concern is watching people stuff the spots with lecture and what not and gradually removing the active learning time.

> When you have got seven people it's difficult to remember who has done what when. It is a difficult task.

Further, the reintroduction of lectures in the curriculum and the expectation for tutors to provide lectures were mentioned as negative elements.

> One of the current problems I'm finding with the evolution of PBL at [XYZ university] is the challenge to actually know how much to facilitate the students articulating details when they have now reintroduced in to the system a lecture format. So as a tutor you are sitting there thinking, Well, should I be asking them or saying does everyone understand this when occasionally you get [from students], Well, we just had two lectures on this. Do you want us to rehash this so that you are aware that we know it? And this completely disempowers me as a tutor.

> Last year it was pretty unsatisfactory 'cause they had this expectation that tutors would deliver little mini lectures and that was problematic for two reasons. One, I hate lectures, and two, I'm not a content expert. That was stressful.

In general, participants disliked curriculum changes that varied the PBL approach. The following two excerpts exemplify interviewee opinions on this matter.

> We are diluting now. When [XYZ university] started there was this fervent belief system that was associated with it. I think we [teachers] are more secure when we stand up and speak to people than when we let them speak for themselves, and that is a continuing insecurity of faculty and designers.

> There is a real lack of understanding if you haven't gone through PBL. It means so many different things to different people. It's become just a buzzword. Right? Everyone wants to say they have PBL." If all the tutors just come in and lecture to groups of six or seven, then all you have is reduced class size.

Participants also voiced concern about lack of consistency in tutors. One participant said,

> It really worries me about what I think is a lack of consistency between tutors and the huge difference in expectations between what I insist my Unit 1 student do and what this Unit 2 group had come from in terms of their experiences in their previous groups.

In terms of tutor role challenges, using self-restraint in intervening, whether it be providing information, getting the group back on track with their inquiry, or asking questions, was mentioned frequently as an ongoing challenge that some saw as a balancing act necessary to maintain role fidelity. For example, tutors remarked:

> I really like it when you pull back a bit as a tutor and they [students] are solving their own problems, complementing each other, working with each other and asking each other questions.

> It [maintaining role fidelity] is a real skill. Because you don't want to – it's a balancing act all the time knowing when to intervene and when to let the conversation go. When to react to questions and you know it is really your gut and your faith in the process quite frankly. But it is always a point of reflection. I mean judging when and when not to ask questions is one of the key facilitation skills.

> [intervening] is always a challenge cause you are trying to find that fine balance.

> I don't think it is easy. Sometimes you can jump in too early then you get complaints from them. They [students] are a bit afraid to say, "This is enough. Let us struggle a bit longer" and sometimes if you leave them go too long you are then wasting valuable time and they may get so tied up and they say, "lets forget it." And they are not interested in the tutor saying have you considered and having them look in a different way.

In response to item 5 and throughout interviews, six interviewees mentioned student maturity as a challenge by many tutors. Interviewees explained that at times the challenge in maintaining their role was driven by student focus on learning in a traditional manner (having lectures or providing lectures) or a preference for learning particular parts of the curriculum and excluding others. Several tutors mentioned it is challenging when students focus primarily on pathophysiology without consideration of the impact the disease process has on the whole person.

When asked about the difficulties they experienced with this PBL nondirective facilitation (item 15), seven interviewees mentioned that it was not difficult for them; two replied by talking about other aspects of facilitation; and two described their discomfort with evaluation. For instance:

> I don't find it particularly difficult. I guess I am always second-guessing myself if I contributing enough or am I holding back enough.
>
> Telling them that they are not doing well. ... Especially when there are people that don't quite get the idea that they are not doing well. So, um, its you know, you have to hammer. I find that very uncomfortable.
>
> I find most difficult is evaluation. Sometimes trying to get people, to draw them out to be specific and giving constructive criticism is difficult. 'Cause you don't know how an individual is going to respond. If you can use an open-ended question then get them to say it so you don't have to say it and people have enough insight then it makes it a little bit easier and they offer it rather than you having to tell them when there is a weakness.

In general, tutors indicated they face a number of challenges, many of which were situation dependent and varied from tutorial group to tutorial group.

Relationship between beliefs, comfort, and challenges

When asked about their thoughts on the relationship between their beliefs about learning and their comfort level with facilitation techniques (question 18), seven participants indicated a relationship exists between these two topics. The following excerpts of interviewee talk exemplify opinions on this matter.

> I think they are as much as they are congruent they are comfortable.
>
> When there's resonance, things work, and where there's dissonance it just does not work.
>
> Definitely. I think you know and this is the struggle at the medical school faces at times. In the shortage of tutors that we have, um, if you don't buy into the system, um, ... It will be really hard for you to be a facilitator cause you are going to always going to revert back to your belief system. If you believe in didactic is the way to go then you are going to say, Now, I know we are at [XYZ University] and blah, blah, blah. Here is how its going to go. Even if you [the tutor] make a good go of it you will always fall back on that initial belief system.

When asked if their facilitation style has changed (question 8) 5 interviewees felt they had changed while others felt they had remained the same.

> The problem based learning approach and my participation as a tutor in that completely transformed my life, and transformed my learning, transformed my teaching and transformed the was that I look at the world.
>
> I don't think so. Probably because I came in with some fairly extensive ideas on how to run a meeting, on how to run a working group. So I don't think I've changed that much.

> Yes, I've kind of incorporated pieces of PBL in my other teachings. And I think that's probably enhanced it very much. I don't think in a dramatic way but I'm definitely becoming more confident.

Some facilitators responded to question 3 (changes in beliefs) by indicating how their changed beliefs affected other aspects of their lives. For instance:

> It was very powerful. It [PBL] influenced the way I behave in clinic for instance.

Background

The most frequent comments concerning participant background fell into three categories: facilitation techniques, similar experiences and facilitation style change. Of these, the most frequent was tutor experience with nondirective facilitation techniques. Ten interviewees were unable to name the communication techniques they use although they were able to provide examples. Almost half of the participants understood the concepts of indirect and nondirective facilitation, while the remaining participants were unfamiliar with the terminology. Participants expressed their understanding of these concepts this way.

> Nondirective means or indirect means to me? This is sort of covert but subtly nudging the group along and that is how I see it.

> The indirect is more around a Socratic questioning summarizing style. That's where you are actually kind of trying to keep them on a path.

> The indirect approach would be having the group come up with the solution to the problem. Have the answer come from within. Framing the question, in that you put them at least in the ballpark.

> Indirect is what I was just describing. Give people as much leeway as you can. Guide the discussion within the bounds and keep the behaviour of the people in the tutorial in bounds and with this as context leave off as much as you can.

> I believe indirect means that you are not directly teaching. You're basically indicating where, you know, where student should reach.

> I think the nondirective is letting the student follow their areas of interest in a particular case.

When asked about the extent they felt their background influenced their facilitation and communication techniques (question 11) 9 interviewees talked about clinical and nonclinical experiences that influenced their facilitation skills and comfort.

Eight interviewees considered that their clinical background and patient-centered approach transferred into a student-centered approach and the communication techniques they used with students.

> I try to practice in a way that is patient-centered. It reinforces by ability to perhaps do a learner-centered thing. Kind of bringing the clinical world into the early PBL environment.

> A lot of the technique comes from having to deal with parents. You know when you deal with any situation you want to communicate the idea that it came from the individual himself. So, we know that if you are dealing with parents that if you give them the answer with regards to any problem the child is having they have a less likely chance or remembering it or acting on it whereas if they come up with the ideas themselves.

> I am constantly teaching the family about what has happened to the person in the bed. So I think that can't have not affected my teaching style with students.

> You have to pick up on what the patient is saying and sometimes go beyond that. In the same way you need to pick up on what students are saying. I think it is very much the same.

Almost three quarters of the participants described examples of their use of therapeutic communication in their work as a tutor even though the term therapeutic was not mentioned. It was the researcher's impression that participants were unaware of similarities between their facilitation techniques and therapeutic communication or counselling techniques. One participant provided an example of the delay technique this way.

> So do you inflict information, or do you wait for information to emerge? Do you direct people in a casual, thoughtful way, or do you say, well this is where you want to go?

In describing their dialogues with students, several participants described example of pinpointing, translation and reformulating information techniques.

> I don't have too much trouble intervening because I don't give information. I kind of do it by asking them and asking other people what was going on [to see] if they were paying attention. What did he just say, or something like that? And then the person has to repeat themselves, and before I know it someone else will be asking questions and then eventually, by the time they leave, someone will say that's important enough to look up.

Tutor Training

When asked about suggestions for the training of new tutors or facilitators (question 19) six interviewees recommended tutor training by observing an expert tutor with a tutorial group or co-tutoring with an expert. Four interviewees recommended that tutors participate in multiple tutor training workshops. Those favouring courses suggested strategies should be used such as video stimulated discussion such as the MacBloopers at McMaster. Some interviewees mentioned that they had not undertaken any tutor training; they felt that this was unnecessary, due to their experience with PBL as a medical student.

> Talk to experienced tutors. Go and watch experienced tutors run a tutorial group.
>
> It was helped by a couple of people who were very good at it who were co-tutoring with me.
>
> In a perfect utopia you wouldn't be allowed to tutor until you had completed three or four courses... The reality is that they are scrambling for tutors around the clock. ... The reality is there should be three full courses going through, what's the expectation, what is your belief system, and make it very clear that if you don't believe in this [PBL] and you don't want to buy in then here is how you can get your [academic] points in another way.

Two interviewees replied with suggestions for new tutors. For instance:

> Don't feed them information. Don't give them answers. Don't give them what they are supposed to learn.
>
> Recognize that this whole approach is really what learning is all about actually. I mean, you know, it's not really new. It's the way we always were. It just takes a little more education.

Unanticipated Themes

Interviewees spontaneously commented on two unexpected themes during the interviews: their application of self-responsibility for their effectiveness as tutors and their attitude as co-learner. Several interviewees offered examples of how they monitor the success of their tutor role by self-monitoring or through student feedback. Five participants indicated that they self-evaluate their role performance, and 4 participants indicated they use student evaluations. One participant remarked:

> I think a lot about it, I worry a lot about it. I go back and say well did I, was I fair, did I...?
>
> I'm always second-guessing myself, if I contributed enough or if I am holding back enough. I ask all my tutorial groups for regular feedback.

Several participants referred to themselves as co-learners with students during tutorials. Two participants mentioned that they clarify during tutorial that they (the students) likely are more conversant with textbook material than the tutor while another tutor conveyed that she reminds students that we are all co-learners.

Survey Instrument

When asked for comments on the survey instrument (questions 20 and 21) and its potential use in tutor development participants had mixed responses. Several interviewees mentioned that their recollection of the instrument had faded since completing the survey. Two interviewees commented that some of the items were unclear. Ten interviewees stated that the instrument would be helpful to individual and groups of tutors where it might be useful to stimulate reflection and discussion. Participants felt it would be useful in tutor development either in the early stages of PBL tutoring or as a midcareer review.

Interview Findings Summary

Interviewees provided a wealth of information about their pedagogical beliefs, comfort, and challenges with the tutor role, student role, and PBL approach. Interviews showed participants held pedagogical beliefs consistent with PBL and that the most important belief was in learner autonomy. In general, participants believed the tutor should be a non-expert (have general medical science knowledge), a medical clinician, be student-centered, and have process expertise. Interviewees indicated they had multiple challenges, the most prevalent being changes in the PBL curriculum and exercising self-restraint. All interviewees felt that pedagogical beliefs influenced facilitation comfort. Most interviewees indicated they didn't have any difficulty with PBL facilitation. Those that did spoke about discomfort in providing negative student evaluations. A variety of opinions were obtained on changes in beliefs and facilitation style. However, several of the individuals that indicated their pedagogical beliefs and

style changed subsequent to their PBL tutoring experience indicated the change was profound and carried into other aspects of their personal and professional life.

Throughout the interviews participants emphasized the importance of the tutors' questioning techniques. Ten interviewees were unfamiliar with labels for the facilitation and communication techniques they used and with the terms indirect or nondirective facilitation. At the same time most interviewees provided examples of typical nondirective facilitation during the interview. Most interviewees considered their background influenced their tutor role through either prior clinical or non-clinical experiences.

Interviewee responses were complex, often digressed from the question and mingled beliefs with challenges along with other topics. Beliefs often formed part of the explanation for challenges and vice versa.

Summary

This chapter presented survey and interview findings. Survey results were presented first, containing findings on pedagogical beliefs, facilitation comfort and challenges, and background. The relationship between beliefs, comfort, and challenges was presented along with the relationship between background, comfort and challenges.

A relationship between beliefs and facilitation comfort is suggested. In this sample, tutors with lower PBL beliefs scores reported more discomfort with facilitation techniques than those with higher PBL beliefs scores. At the same time less experienced tutors expressed more discomfort than more experienced tutors. Tutor background related to comfort and challenges showed that the medical specialty of the tutor had no relationship with the tutor's comfort and no relationship was found between counselling or psychology experience background and facilitation comfort.

Participants predominantly spoke during interview about their beliefs rather than their challenges or their background. Of the 11 belief areas frequently mentioned, developing learner autonomy was the most common. The findings indicate tutors face several challenges including restraining the amount and kind of information they provide students along with changes in PBL program curriculum. During the interviews, participants interwove statements about their beliefs with their comfort, their challenges, and their background.

CHAPTER 5: DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

In this chapter, the results of the study are discussed and conclusions are drawn. The chapter includes an overview of the study, findings as related to the research questions, characteristics of tutors in this sample, implications for practice, implications for further research, and conclusions.

Study Overview

This study investigated the relationship between tutors' pedagogical beliefs and their facilitation comfort and challenges when working in a medical education program that uses a PBL (PBL) approach. The mixed methods design consisted of an online survey followed by interview. The researcher created a survey consisting of descriptions of protypical PBL tutor pedagogical beliefs and nondirective facilitation techniques derived from the literature. Recommended procedures were followed to establish reliability and validity of the survey. Fifty-one experienced tutors responded to the survey. Follow-up interviews were conducted with 11 participants.

Research Question 1 – What is the relationship between tutors' pedagogical beliefs with their facilitation comfort, and challenges?

This section discusses the results of the survey and the interviews pertaining to the first research question. The discussion is arranged in three parts: pedagogical beliefs, comfort and challenges, and the relationship of beliefs, comfort and challenges.

Pedagogical Beliefs

In Part A of the FPS, tutors were asked to indicate the extent to which they agreed or disagreed with items representing beliefs consistent with PBL tutor principles (categorized as tutor role, student role, and PBL approach) and with behaviourist-like

beliefs similarly categorized. Frequency percentages revealed that participants agreed with most (18/19) belief items. The data indicated that the majority of tutors held beliefs in agreement with all three subtypes of PBL tutor principles measured in the survey. When responses to the items that represented PBL tutor principles were examined by belief type (tutor role, student role, and PBL approach), the data showed participants agreed more highly with beliefs associated with the student role and PBL approach than with the tutor role. Through correlation analysis the data also showed that participants' responses were consistent from one subtype to another. For instance, if participants believed tutors should communicate indirectly using open questions, they also believed learners should be able to formulate and defend an opinion or judgment, and believed the presentation of a problem first is the best way to initiate learning.

When belief responses from Part A of the survey were analyzed by strength of response, items with means greater than 4 and standard deviations less than 1, labelled here as High Belief items, also consisted of a mix of PBL principles belief subtypes. For instance, high belief items such as the tutor role in monitoring group dynamics (item 15) were congruent with PBL approach in the type of learning conditions (item 5T), and student role in inquiry and reasoning (items 3, 15, and 34). Further, all three data sources (survey closed-ended items, survey open-ended items and interview comments) consistently showed that all three PBL principle belief subtypes were important to PBL tutors.

While the survey findings suggested congruence existed between PBL tutor pedagogical beliefs about self, students, and context, interview data revealed reinforcement of one belief by another. Some interviewees spoke, for example, about not intervening during tutorial in order to both maintain their role fidelity and enhance learner autonomy.

> You aren't there to impart knowledge. You are there to guide, to question and to challenge the group to come up with answers on their own.

During interviews participants seamlessly integrated their beliefs in the tutor role, the student role and the PBL approach. As an interlocking set, beliefs from these three dimensions (tutor role, student role, and approach) appear to complement and, in doing so reinforce each other.

As no prior empirical research has measured tutor agreement with PBL tutor principles or subdivided them into the hypothetical types (tutor role, student role and PBL approach) used in this research, the prominence of one belief over another was not

anticipated. Therefore the finding that participants believed more highly in student role and PBL approach than in tutor role was unexpected. Nonetheless, the six strongest beliefs represent an equal number of beliefs from each of the three types. Of the top 6 beliefs two items represented PBL Approach: item 5T (Conditions which promote curiosity prompt questions and contain suspense are necessary for learning) at 88.2%, and item 3 (Learners need to use inquiry in their analysis and formulation of problems) at 76.5%. Two items represented student role: item 15 (Learners need to constantly evaluate the information they use) at 94.1% and item 34 (The learner ought to be able to formulate and defend an opinion or judgment) at 92.2%. Two items represented tutor role: item 18 (The tutor needs to regularly monitor group dynamics) at 94.1%, and item 13 (Tutors should communicate indirectly using open-ended questions) at 80.4%. It was unexpected to find that one of the belief items that had high belief scores pertained to the facilitation technique of the tutor, item 13 (The tutor should communicate indirectly using open-ended questions). This finding serves to underscore the relevance of this study's research into nondirective facilitation. Although little has been written about nondirective facilitation in the literature, the participants in this sample indicated it was of importance.

From the interview findings it appeared that tutors might draw selectively on various pedagogical beliefs types for different aspects of their role. Several interviewees indicated the tutor role requires adjustment in approach based upon the context. For example, one participant mentioned,

> You know you don't go there with a formula. I'm a tutor and therefore at this moment I do this. It is awareness of the context of the moment. You have six pieces but they are arranged in different ways depending on the moment. I think that the [changing context] is the essential natural fluid of the process uh, that is very difficult footing to some people [tutors].

The findings surrounding belief variation are consistent with Wilkie's (2004) observations of tutor approach adjustments and Hmelo-Silver et al.'s (2006) observations of facilitator strategy adjustments. Wilkie found PBL facilitators varied their approach based on factors associated with students, with the PBL material and with changes in themselves. Hmelo-Silver et al. found an expert facilitator juggled strategies in response to group discussion. Taken as a whole, the findings on belief adjustment suggest tutors hold another essential belief – a belief in flexibility to customize their techniques based upon circumstances.

Learner autonomy was the most consistent theme emerging from the survey open-ended items and the most frequently mentioned belief during the interviews. Clearly, enabling learner autonomy was an especially important belief of the tutors in this sample.

> It's more along having it come from within and from the self-directed approach as apposed to the didactic, "Here is how it is. Take my word for it."

The strong learner autonomy belief findings in this study parallel findings from earlier studies. Wilkerson and Maxwell (1988) in a qualitative study on tutors' values, background, goals and expectations at Harvard University's medical education PBL program found a third of their tutors believed in PBL because it gave students the opportunity to carry out independent learning. Wilkie (2004) found 18 PBL facilitators in a nursing education program held similar concepts about their role to encourage students to take responsibility for their learning.

As participants agreed with PBL tutor principles belief items, which also represented pedagogical beliefs embodied in the theories of Dewey and Rogers, it could be concluded that participants' beliefs were consistent with the theories of Dewey and Rogers identified in this study. While it was expected that tutors' beliefs would align with Dewian beliefs due to similarities noted in the literature, the alignment of PBL tutor beliefs with those of Rogers is uncommon and distinctive to the findings of this study, as the relationship has not been previously investigated to the author's knowledge.

In summary, participants in this study indicated they hold beliefs consistent with PBL principles and that they especially value learner autonomy. The strongest PBL tutor principles beliefs were those representative of Dewian and Rogerian beliefs about teaching and learning. Through survey and interview data, participants conveyed the importance of an additional belief, being flexible to adjust tutor approaches based upon context.

Comfort and Challenges with Facilitation

Participants' comfort and challenges with facilitation were investigated through Part B of the survey and through the interviews. Frequency analysis of responses to Part B of the survey showed comfort percentages exceeded discomfort percentages in 22 of 26 of the items. Further analysis showed participants were more comfortable with verbal nondirective facilitation rather than nonverbal nondirective techniques. Taken together

the analysis indicates that participants were comfortable with the majority of nondirective techniques but were most comfortable with verbal nondirective techniques.

Of the verbal nondirective techniques, participants were most comfortable with two techniques: 85.7% of participants were comfortable with item 16 (Stimulating learners to search for links between issues) and 91.8% of participants were comfortable with item 26 (Using probing questions to induce learners to volunteer information). Both techniques encourage learners to make knowledge connections by themselves. In using verbal nondirective techniques, tutors may engage in expected facilitation techniques. Participants indicated they were least comfortable with item 27 (Simulating self-reflection), item 9 (Verbalizing my interpretations), item 24 (Confronting learners), and item 11 (Responding with neutral language). These techniques may be a more complex variety of verbal nondirective facilitation techniques that require more facilitator skill to be done well. While the reasons participants found verbal nondirective facilitation techniques more comfortable than nonverbal nondirective facilitation techniques and some verbal nondirective facilitation more comfortable than others were not explored through survey items, interviewees mentioned that they were uncomfortable with confronting learners, for example.

> I don't like being aggressive and intervening. So if I do see a problem, I probably don't intervene immediately. I wait at least kind of one step and see whether the problem will solve itself.

In the same way that some verbal nondirective techniques were more comfortable than others, different comfort levels were found with the nonverbal nondirective facilitation techniques. For instance, participants' indicated they were most comfortable with two common self-restraint techniques that use silence, item 25 (Delaying responses with silence) and item 28 (Remaining silent during group discussions). They were least comfortable with nonverbal nondirective facilitation techniques that involved self-restraint such as item 32 (Avoiding intervening when a group storms and struggles), item 8 (Withholding suggestions for specific resources), item 20 (Refraining from providing information to stimulate learners to identify their learning goals and issues by themselves), item 6 (Avoiding expressing opinions), and item 7 (Utilizing self-restraint from offering important information unless asked during inquiry). On the whole, it appears tutors were less comfortable with verbal and nonverbal techniques that held negative connotations or maybe considered potentially stressful to themselves or learners.

Even though interviewees did not differentiate techniques into verbal or nonverbal categories, their comments revealed they were aware of using different types of techniques and sought a balance in the use of them, which created one of their greatest challenges.

> It's [type of techniques] always a difficult thing. It depends upon the moment. It also depends upon the group and where they are in relation to what they are getting at. So it is very challenging.

Most participants, (77%) were uncomfortable with Part B item 32 (Avoiding intervening) when the group storms and struggles, identified in this study as a nonverbal technique. While the reasons for this finding were unclear, interviewees' comments expanded upon this area of discomfort.

> I don't like being aggressive and intervening. So if I do see a problem I probably don't intervene immediately. I wait at least kind of one step and see whether the problem will solve itself.

These findings echo Spaulding's (1991) advice that managing group dynamics might be an unanticipated challenge for tutors. This might be understandable considering some tutors, as part-time faculty, might not have experience managing classroom groups of learners.

Next to discomfort with intervening in group dynamics, participants indicated discomfort in withholding information and suggestions. Sixty-three percent of participants were uncomfortable with item 8 (Withholding suggestions for specific resources), a nonverbal technique. This finding suggests participants find it uncomfortable to hold back when they anticipate their restraint may negatively impact student learning. Interviewees indicated it was hard not to behave as teachers often do. Interview data showed that tutors were aware of the challenges of keeping their tendency to intervene in check and recognized this was critical to maintain role fidelity.

> That is a real skill because you don't want to [intervene]. It's a real balancing act all the time knowing when to intervene and when to let the conversation go....It is always a point of reflection.

> That's [using self-restraint] tough. It really is. Now there are times when if after discussion of 10 min going round and round then yes, I'll step in but I try to dampen that down as much as possible.

> I don't want them to chase canaries. What is the stuff they need to learn and in what depth and where it links up to the other things rather than let them stumble upon them.

Essentially, this means power sharing. When a tutor allows students to take the lead, to chart the course of problem analysis, the tutor divests power to the group. For example,

> That [telling students to stop the tutor from providing information] tells them I am giving them authority, and that is very healthy.

When interviewees talked about tutor restraint, they consistently mentioned learner autonomy. Tutor restraint appears to act as a key facilitation behaviour that provides the fulcrum upon which learner autonomy resides. The findings regarding the interplay between tutors' beliefs in learner autonomy with their comfort using nondirective facilitation techniques and challenges of the role to encourage independence are consistent with those of Wilkerson (1995). Wilkerson, who also looked at tutors' facilitation process, found that allowing student control was one of the most difficult aspects of the PBL tutor role. It is evident from the findings of this research that tutors' beliefs about learner autonomy go hand-in-hand with exercising self-restraint. Tutors committed to encouraging learner autonomy reported they refrained from intervening during tutorials, although it was not without internal conflict. This finding suggests these tutors may find more role satisfaction by building independent, self-directed learners than in exercising control and displaying their skills and knowledge. For example,

> When you [a student] are speaking about something unless it is a clinical question, you should know more about that topic than me.

Although the literature reveals that teachers in many fields and levels of education support the idea of learner autonomy, the primacy of learner autonomy in professional programs in general and especially in medical education programs may exceed its importance in other educational programs due to expected student outcomes as independent practitioners. For example, medical education programs aim to graduate independent learners with advanced clinical reasoning and inquiry skills. Education programs without similar goals for graduate outcomes embedded within the curriculum and in tutor development programs may also differ in tutor expectations and tutor

challenges. In situations where the tutor is expected to provide direct instruction in their role, discomfort with utilizing self-restraint will be nonexistent. Hence, variation in the relationship between tutor beliefs and challenges may be at least partly explained by context of application.

Individuals who have been socialized to the teacher role in traditional teaching environments or cultures where intervening, directing, and controlling learning is expected and rewarded may find giving control to students in a PBL context especially challenging. Charlin, Mann, & Hansen, (1998) found differing university cultures affected the application of PBL. Hoy and Jalovick (1979) found that teachers' role expectations were shaped by conventions that arose from the "norms, role expectations and rules," of the educational environment (p. 47). In order to help individuals new to PBL assess the suitability for PBL to their teaching style and circumstances, valuing and encouraging learner autonomy should take a more prominent place in the PBL literature as a critical component for effective PBL curriculum design and tutoring. In this way, programs considering using PBL may be able to determine the suitability of PBL for their students, faculty and program outcomes.

Much like participants in Levin's (2003) research on tutor struggles, some of the tutors interviewed indicated self-evaluation helped them recognize their facilitation challenges. Interviewees in the present study indicated they continually self-evaluate their performance.

> I'm always second-guessing myself, if I contributed enough or if I'm holding back enough. I ask all my tutorial groups for regular feedback on that.

These findings suggest some tutors have integrated beliefs surrounding self-reflection, which it is speculated that they model for their students.

Although interviewees were, in general, unaware of the nondirective facilitation terminology and could not provide theoretical links to the process in the course of the interviews, they talked about being gentle, and some used examples of therapeutic dialect type manoeuvres.

> What does the group think about this?

This finding suggests tutors may automatically apply a variety of verbal and nonverbal nondirective facilitation techniques absorbed through their clinical background and transferred to the PBL tutorial context.

While survey findings revealed the most uncomfortable nondirective facilitation techniques, the interviews showed the most frequent challenges. Interviewees spoke more about the challenge of variations of PBL approach than about tutor role or student role challenges. It appears variations in PBL should be expected with the natural evolution of curriculum design. However, sometimes PBL is adversely affected because the dominant values in the particular values are inconsitent with PBL tutor principles. The participants in this study, who were largely supportive of PBL, viewed incorporating more lectures and increasing class sizes as negative developments that impacted their tutor role. Participants in this study who have had experience with a PBL curriculum more emblematic of authentic PBL are critical of changes from this format.

Relationship between pedagogical beliefs, comfort and challenges

This research showed positive relationships between pedagogical beliefs and, comfort and challenges with facilitation. Survey data showed participants with lower belief scores in PBL principles (Part A) had higher discomfort scores with PBL facilitation (Part B) than tutors with higher belief scores in PBL principles. All interviewees indicated that their pedagogical beliefs influenced their facilitation comfort/challenges.

> If I did not believe in the PBL system I would not be a tutor.
>
> I think they [my beliefs influence my facilitation comfort] are. As much as they are congruent they are comfortable.

Interviewees also mentioned that tutors who did not believe in PBL would likely vary the PBL approach to suit their pedagogical beliefs and that these individuals would have difficulty facilitating using PBL nondirective facilitation techniques. In particular, interviewees considered individuals who felt the tutor should tell students what they needed to learn exemplified the antithesis of the PBL tutor. Others mentioned the reciprocal relationship between tutoring and beliefs and how PBL tutoring has influenced other aspects of their lives.

> My participation as a tutor has transformed my life, transformed my learning, transformed my teaching, and transformed the way I look at the world now.

The findings were consistent with the literature on client-centered theory and therapeutic communication. The data from this study demonstrate Rogers's (1951) expectation that an individual's belief in an approach will influence their success implementing the approach. In particular, participants' responses regarding their belief in learner autonomy and their comfort with nondirective facilitation are consistent with Rogers's description of the non-directive counsellor. Neither the tutor nor the nondirective counsellor takes over the development of topics. Instead they leave topic (problem) development to the student or client. The comparison of the techniques of therapeutic communication with PBL tutor principles also showed similarities. In talking about what they say to students, some interviewees provided examples of therapeutic techniques, such as pinpointing, interpreting, clarifying, translating, to name a few. Interviewees were unaware of the facilitation techniques they used. It appears that new tutors copy facilitation techniques from expert tutors. In this way they learn key phrases and why certain phrases are effective. However, it was not clear from this research that tutors differentiated facilitation techniques in detail. Most of the tutors were aware they were facilitating, but only a few were familiar with the facilitation kind as nondirective facilitation. These findings suggest discussion on the relationship between beliefs and challenges and nondirective techniques may be worthwhile for tutors individually and/or in groups.

Research Question 2 – What is the relationship between tutors' background, comfort, and challenges?

This analysis consisted of identifying aspects of tutors' background expected to influence comfort with facilitation in a PBL context. It included identifying multiple dimensions of tutors' background including professional specialty, tutor training, and experience with counselling and psychotherapeutic techniques.

Survey data did not confirm a positive relationship between tutor background and facilitation comfort. The study expected to show that less experienced tutors (measured by the number of times they facilitated a tutorial group) felt less comfortable with PBL facilitation than their more experienced colleagues. Even though the cross-tabulation

indicated a positive relationship, the correlation statistic $x^2 = 3.04$, $p > .05$ was not statistically significant.

The findings of this study regarding the relationship between role comfort and experience differed from Gilkison's (2004) research that found past experience influenced tutor behaviour. Like Wilkie's (2004) findings, some interviewees in the present study indicated tutoring experience was a key factor in altering their tutoring behaviour to be more in line with a nondirective style. For example,

> I've started doing it better than I used to. I'm actually facilitating and not taking over. Before I would have more of a tendency to stop them and say "You're all wrong. This is what it is." Whereas now I'm kind of like, "OK. Does anybody see."? Or " Does everybody agree with what has just been said?"

At the same time both studies found medical tutors recognized ideal types of tutor behaviours–even though they did not always use them. Gilkison's (2004) research revealed tutors were aware that directive behaviours conflicted with the expected tutor role and the present study showed tutors were aware and challenged by not intervening to provide directions, information, and so on.

In the present study, survey findings showed that discomfort with the PBL tutor role was not confined to just junior tutors. The data revealed that 60% of junior tutors (less than 3 years experience), 64% of intermediate tutors (less than 5 years experience) and 37% of senior tutors (more than 6 years experience) indicated discomfort with some aspects of the PBL tutor role. This suggests that tutoring experience alone does not necessarily result in higher comfort with all aspects of facilitation.

Although the survey data were inconclusive on the relationship between facilitation comfort and expertise, interviewee data supported a positive relationship between the two. Interviewees felt that facilitation challenges were reduced by prior experience using a patient-centered approach often acquired via a clinical or participatory leadership role. As noted earlier, similarities exist between the use of nondirective facilitation techniques in a patient-centered approach characteristic of health care professionals, the client-centered role of counsellors or psychologists, and principles of tutors in a PBL context. Survey data indicated the majority of the sample (80%) were physicians, who it was assumed had experience with the patient-centered approach during medical training and clinical experience and hence with some nondirective facilitation techniques in a clinical context. Survey data also indicated that

the majority (80%) of the participants did not have any specialized training in counselling or psychotherapeutic techniques. Interview data showed that interviewees were unfamiliar with the terminology of nondirective facilitation and indicated a lack of knowledge of the theoretical origins or the justification for the facilitation techniques used by the PBL tutor. Interviewees had difficulty describing nondirective facilitation.

> I don't know any official terms for this sort of stuff.
>
> I don't know the names for these things. I just do them.
>
> It's hard, because I don't think about what I'm using. It's not a conscious strategy.
>
> I haven't heard of them [indirect and nondirective facilitation]. I've heard of facilitative but haven't heard of anything that sort of breaks it down.

The data suggest that although medical program tutors may have had exposure to nondirective facilitation techniques through clinical experience this experience alone was not enough to ensure familiarity with types of nondirective facilitation or comfort with nondirective facilitation in the tutorial setting. Further, this analysis suggests that training in nondirective facilitation may be worthwhile for tutors without prior experience in these techniques regardless of whether they are clinical health care practitioners or not. Since interviewee and survey data also revealed that tutor training background was minimal (64% had no training, 16% had basic training and 8% had advanced training), it may be safely assumed that most tutors have not had exposure to nondirective facilitation training and may benefit from tutor development in this area.

Characteristics of Tutors in this Study

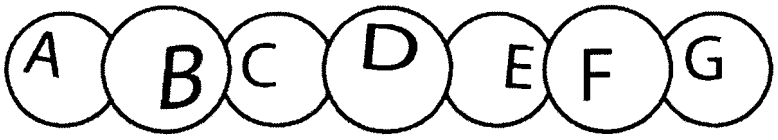
The similarities and differences in participants' beliefs, facilitation comfort challenges and backgrounds from the data collected in this study suggest some general characteristics of PBL tutors in this study. The typical PBL tutor in this study can be pictured as an individual with the following characteristics:

- Holds pedagogical beliefs that are consistent with PBL tutor principles and the theories of Dewey and Rogers;
- Is comfortable with verbal and nonverbal nondirective facilitation techniques that are similar to therapeutic communication
- Considers pedagogical beliefs and professional background to influence facilitation comfort;

- Adjusts facilitation technique to context;
- Maintains role fidelity through self-restraint despite challenges resulting from content expertise, variations in PBL approach and student goals;
- Highly values learner autonomy; and
- Has little or no tutor training.

By subdividing tutors' pedagogical beliefs and nondirective facilitation techniques into subtypes a clearer view of their characteristics was possible. Although participants' beliefs were consistent with PBL principles, when analyzed by the subtypes used in this study (tutor role, student role and PBL approach), the results showed participants believed more highly in student role beliefs and PBL approach beliefs than in tutor role beliefs. Although participants were comfortable with verbal and nonverbal nondirective facilitation techniques, they were more comfortable with verbal nondirective techniques than with nonverbal nondirective techniques. These findings contribute to understanding differences in tutor satisfaction and success. As illustrated in Figure 5-1 the characteristics of the tutor identified in this study interconnect.

Figure 5-1: Tutor Characteristics



Each tutor characteristic simultaneously draws on and influences others. For instance, tutors reported that while their beliefs in PBL and PBL tutor principles influenced their facilitation comfort, positive facilitation experiences had a reciprocal effect on their beliefs and behaviour outside of the tutorial. Tutors draw selectively on their interrelated beliefs and techniques repertoire as the context demands. As an interlocking set, beliefs and facilitation techniques complement and reinforce each other.

Limitations of this study

The study was limited by sampling, instrumentation and analysis; hence the findings from the study are limited. Even though tutors in the sample, based on the researcher's knowledge represented the demographic profile of tutors in these programs, the small sample size and 18% response rate limit representativeness.

Although there is little reason to suspect that the sample was atypical, the researcher could not verify this – calling into question the generalizability of the findings. This scarcity of demographics limited statistical analysis to verify if distribution of tutor respondents was significantly different from the entire population of tutors at McMaster and Dalhousie Universities.

The small sample size may have resulted from a number of issues. The timing of the survey in early September is a busy time for faculty with the start of the fall term. It is known that some participants had technical problems accessing the online survey, which may have deterred a number of potential participants. It is also possible that the high non-response rate resulted from some individuals not receiving the email invitation even though two reminders were sent. Indirect delivery of the invitation by university staff meant that the researcher was unable to verify the number of tutors that were sent email invitations or cross-check email invitation recipients with responses. As the researcher was unable to contact potential participants directly, she was unable to troubleshoot technical problems promptly. Indirect invitations resulted in a delayed response to technical issues when individuals contacted the email sender rather than the researcher. Unfortunately, this unanticipated complication increased survey implementation complexity and no doubt had a detrimental impact on response rate.

As well as survey timing and technical issues, the large number of nonresponses could also have resulted from survey length or disinterest in the topics. The individuals who participated in this study were volunteers who may have different pedagogical beliefs and comfort with nondirective facilitation than those tutors who did not respond to the survey invitation. In addition, tutors who also volunteered to be interviewed might represent a different group again, as many of them were overtly enthusiastic about PBL. The participants in this study represent tutors who were willing to participate in the research and it is of this group that the characteristics of tutors applies.

Sample size also limited analysis. For instance, factor analysis customarily requires over 200 participants and cross-tabulations need a higher number of responses than those expected in the population. The lower number of responses in each category on the Likert scale in Parts A and B of the survey meant responses to items in these sections had to be transformed to dichotomous variables with two response categories rather than the original five response options resulting in a loss of detail. Additional information was also lost from analysis due to reliability testing, which reduced the number of survey items in Parts A and B of the survey. With a higher sample size the

reliability for those items deleted due to low inter-item correlations may have been avoided.

The study suffered from the limitations inherent in the use of a custom, designed survey that had not been standardized through previous research. Even though the survey showed high reliability and validity, it needs repeated testing to ensure consistency of interpretation.

In spite of the fact that interview transcripts were co-coded by two individuals, the addition of a third coder, a member check of the transcribed interviews to confirm coder interpretation, would enhance interview credibility.

Implications for Future Research

Results of the study support the need for further investigation of a number of aspects. Additional testing with a larger sample is required to both further develop the FPS and to enhance survey findings from this study. Revision of the instrument should be considered to reduce the current 66 items. Further analysis of construct validity data may provide indications for reducing the number of survey items in such a way that the completion task is easier but still produces valid findings. The study has already shown that the number of items in Parts A and B can be reduced as demonstrated through reliability and correlation analysis without losing construct validity. A smaller item pool would tighten the tool, reduce repetition, and increase ease of completion.

A self-scoring form needs to be developed to accompany the FPS and so increase the usability for individuals. The form would classify belief items and nondirective facilitation items so individuals can total their scores in each section and also sum each subcategory. For example, verbal and nonverbal items would be flagged on the scoring form, allowing individuals to obtain an overall picture of their comfort level with each type of facilitation technique. Automatic electronic scoring would simplify score summing, achieving efficiencies in tool use. Possible delivery options for an open access version of the FPS including automatic scoring could be achieved through repackaging the tool as a learning object mounted on an Internet database such as Merlot or MedEdPortal.

Test-retest data should be obtained and analyzed from a larger population accomplished through a longitudinal study. This design would allow reliability testing from data gathered on multiple occasions with the goal to further tighten the item inventory.

The study found significant differences in the types of pedagogical beliefs with which participants agreed and types of facilitation techniques with which participants were comfortable. Participants did not believe in the tutor role belief items as highly as they believed in the student role belief items and PBL approach belief items. The reasons for differences in their pedagogical beliefs were not explored in this study. This study also found that participants found verbal nondirective facilitation techniques more comfortable than nonverbal nondirective facilitation techniques. Future research should explore the reasons for different pedagogical beliefs and comfort levels.

The data sources selected for this research (survey and interview) fulfilled the expectation to capture participants' beliefs, comfort, and challenges with PBL tutoring. The online survey allowed the presentation of a large number of items while the follow-up interviews provided depth, insight, and an additional perspective on the issues. There were some issues with the online administration of the survey that need to be avoided in future research. Extensive pretesting should be conducted with the online survey. Ideally the survey should be developed and delivered through an experienced and reliable online survey provider to avoid technical issues in survey completion.

The addition of objective measures of a tutor's actual behaviour in a tutorial group (i.e. through observation) which can be compared with the tutor's perception of how he/she behaves or acts based on stated beliefs would be a worthwhile addition in future research. The survey is subject to the limitations inherent in any self-report instrument. The researcher acknowledges that tutors' beliefs (espoused theories of action) and their theories in use may differ. The observation method would be especially applicable to further research on similarities in facilitation techniques between the therapist and the tutor, such as classifying tutor communication using Ruesch's (1961) therapeutic communication techniques.

In addition to further testing, revision, and extended application of the survey, there is the potential to use the instrument to study and compare different populations, (i.e., tutors in different professional programs, tutors in professional programs with tutors in nonprofessional programs, and those functioning in different types of institutions fulfilling tutoring roles using a PBL or integrated curriculum approach). The survey could be modified to answer similar research questions in other professional programs using a PBL approach such as law, engineering, and education. Using the FPS, future studies may gain empirical evidence that clarification of beliefs underlying tutor actions leads to improved role satisfaction and less variation in program implementation.

This study differed from previous research on PBL tutors in the classification system used for facilitation techniques. Much of the prior research on PBL tutors has differentiated tutor behaviour into either content or process experts. Within process expertise research, little attention has been paid to the predominance of nondirective facilitation techniques or the extent to which the PBL tutor is comfortable using these techniques. The separation of nondirective facilitation into the psychological terminology of verbal and nonverbal types is unique to PBL tutor research. Although this differentiation was appropriate for the purposes of this research these types need to be explored further to gain acceptance and serviceability in the field.

Theoretical Implications

The findings of this research have implications for our theoretical understanding of the tutor role and in particular their pedagogical beliefs and comfort with nondirective facilitation. By comparing the nondirective facilitation techniques of the PBL tutor with those of the therapist, the study took a controversial view. It uncovered an unexamined process aspect of the tutor role and in doing so used terminology and a theoretical framework typically reserved for clinical psychology. This will likely ignite arguments. Some will argue against a comparison between tutor and therapist on the grounds that tutoring is not therapy. Others will find the classification of tutor techniques in an atypical way (verbal and nonverbal nondirective facilitation) objectionable as it breaks with convention and standard tutor classification (e.g., content expert versus process expert or directive versus facilitative). However, in doing so, this research will promote closer examination of beliefs, purposes, and techniques that the two professional groups share in common and where they differ. To the researcher's knowledge this is the first time such a comparison has been made.

This therapeutic view of nondirective facilitation prompts tutors to consider the transferability of their clinical skills to the PBL tutor role. Participants in this study felt that nondirective communication techniques used in a patient-centred approach in working with patients and their families influenced their comfort as a tutor with the nondirective facilitation with students. The therapeutic communication literature is more copious than the PBL literature on the actual techniques. For instance, the comparisons made in this study between 14 therapeutic communication techniques described by Reusch's (1961) with PBL principles exposed the similarities of the techniques recommended for

counsellors and tutors. Tutors might find that discussion of the application of these therapeutic communication techniques in the tutor role augments their understanding of the PBL tutor role from theoretical and practical perspectives.

Most PBL literature compares the tutor to the traditional teacher and how traditional teaching is not adequate for learning, whereas consideration of the therapeutic role might be a better fit and is therefore more robust in helping people consider PBL tutoring. In terms of tutor development instead of focusing attention on what traditional teaching behaviours tutors should leave behind, training developers might want to encourage tutors to think about the nondirective facilitation skills they can bring to tutoring from their clinical role.

Implications for Practice

The Facilitation Perception Survey (FPS) has been shown to be, in this study, valid and reliable instrument that may assist tutors to reflect on their pedagogical beliefs, their facilitation comfort, and challenges. In this way it contributes to the fields of medical education and educational settings using a PBL approach. It is applicable to new tutors, practicing tutors, individuals considering PBL tutoring, and researchers.

Peacock (2002) suggested that the addition of a reflective element during training could cause shifts in teachers' beliefs. Pre-PBL tutoring tutors and tutor training workshop developers may find the instrument useful in this regard. The FPS might be used as a vehicle to stimulate consideration of the influence of beliefs on practice. A tool such as the FPS that engages individuals to consider their beliefs and challenges through personal exploration has the potential to heighten self-awareness of commitment to the PBL model that may benefit programs and individuals.

Barrows (1994) argued that the training of the PBL tutor impacts the success or failure of PBL. Rogers (1951) claimed that attitudes of facilitators towards client independence also influenced the success of helping relationships. Such knowledge would be useful to PBL tutor training program developers. By examining differences in tutors' beliefs about the rights of learners to self-manage their learning issues, the role of the tutor and the role of the student, and beliefs in the PBL approach, the results of the study would be useful to individuals designing learning experiences for tutor training workshops. It seems that the PBL training program would be an important time for beginning PBL tutors to gain an awareness of their teaching beliefs in tandem with the

principles and techniques underlying nondirective facilitation. In the absence of such knowledge, the relationship of pedagogical beliefs and facilitation comfort and challenges cannot be accurately understood or evaluated.

For many individuals, completion of the survey may be their only venture into exploring underlying beliefs and challenges related to their role as a tutor. Asking tutors to consider their beliefs and challenges gives them the opportunity to reflect upon their work activities and decide which tutor techniques are particularly challenging. At the same time it allows the tutor to maintain ownership of the evaluation and development process.

The FPS and the findings of this research have practical application for faculty developers involved with tutor development in medical education. Both junior and experienced tutors in this study indicated professional development interest in applied educational psychology concepts, nondirective communication techniques, and group dynamics. This finding is consistent with Egan Lee et al. (2006), who found enhancing communication skills was of interest to tutors. This study found similarities exist between psychotherapeutic techniques and the nondirective facilitation techniques of the PBL tutor. The majority (80%) of the respondents indicated they had not had any specific training in the use of psychotherapeutic or supportive counselling. Interviewees expressed their feelings about tutor training requirements this way.

> The reality is there should be three full courses going through, what's the expectation, what is your belief system, and make it very clear that if you don't believe in this and you don't want to buy in [to PBL], then here is how you can get your points in another way.

The FPS may serve as an engaging tool for workshop activities and to stimulate discussion on PBL issues. Use of the FPS requires reflection on pedagogical beliefs and awareness of comfort with a range of facilitation techniques. This is important works that might benefit tutors' who have not reflected upon their tutor role. Typically, such individual reflection in a group setting leads to discussion on a range of views on teaching and learning, which serves to build communication and growth within a PBL community. Upon further testing, if the FPS shows a high test-retest stability, it may also be a useful tool to track change in tutors' beliefs or challenges from time to time. For example, an instrument such as the FPS may provide assistance for new tutors. When the instrument is used again at some later date (i.e., a year later), the information can be

compared. Application of the findings of this research and the FPS tool in this way holds potential benefits for tutor training programs and to assist tutor growth.

In this study the challenges tutors expressed about altering the PBL curriculum by, for example, using larger tutorial groups or inserting lectures should be of interest to curriculum designers in any program that has used a more authentic form of PBL. Participants in this study expressed how such curriculum alterations erode their satisfaction.

> I'm just so disappointed that they decided to insert all the lectures, because I feel PBL is being cheated on.

Curriculum changes, research, creativity, and affordability are just a few of the many factors that impact program design and operation. Veteran tutors or those who have experienced earlier versions of PBL may experience challenges with curriculum change. Curriculum designers may wish to anticipate and track changes, such as those mentioned here, and the impact such changes have on tutor satisfaction.

With minor modifications, the background section of the survey is applicable to tutors in other health sciences programs such as nursing, dentistry, occupational therapy, social work, or in other professional programs. At the same time the instrument has potential benefit to individuals who may not identify themselves as tutors but whose professional role clearly involves facilitating learning. For example, post-secondary educators and others who work with adults in informal learning settings may find the tool informative.

The results of this study suggest that the creation of a discussion and information format (e.g., web site, list serve, conference theme) on the techniques of nondirective facilitation, the challenge of tutor self-restraint, and the impact these issues have on supporting learner autonomy would be useful to tutors. For example, one participant remarked about the need for a discussion forum for tutors.

> I think that maybe tutors need to get together, not to be told what to do but to discuss the pros and cons of how much to push students and what kind of depth to expect.

All three areas (techniques of nondirective facilitation, challenges of tutor self-restraint, and the impact of these issues on supporting learner autonomy) have been shown to be of importance to PBL tutors in this study, yet a discussion of the relationship of these aspects has not been formally addressed in the literature. Such open discussion may remedy tutor temptations to intervene with content expertise. This researcher

speculates that if tutors understand the impact their interventions have on student learning, there is the possibility they will intervene less.

The findings that interviewees were unfamiliar with educational and psychological theories of Dewey and Rogers may be useful to researchers, educators, and tutors seeking a theoretical anchor for PBL. For example,

> I don't have much background in terms of the theories that are driving PBL.

Individuals conversant with constructivism are likely aware of attributions of cognitive constructivism with Dewey but may be unaware of Rogers or the similarities between both theoretical positions and PBL tutor principles. The examination of the commonalities between Dewey's and Rogers's theories and PBL tutor principles in this research may bridge an understanding from the familiar teacher's role in constructivism to the tutor role in PBL.

Dewey (1918) indicated the purpose of philosophy is to provide a framework within which assumptions about educational approaches can be articulated. By involving tutors in this research, this study gave tutors the opportunity to express their beliefs in conjunction with critically reflecting on their facilitation challenges. In this instance, the tutor's critical reflection referred to their assessments of their presumptions and their examinations of PBL facilitation. According to Collier (1977), giving individuals the opportunity to describe their experience results in causing the individual to reference the motives for their actions, which are seen as explaining those actions. By asking tutors to express their pedagogical beliefs and facilitation challenges, the study served to stimulate tutors' awareness of the relationship between the two concepts.

Conclusions

Shulman (1988) recommended teaching effectiveness assessments benefit from a variety of instruments. The FPS is one of mix of tools useful for tutor development. The tool will be useful in future research and tutor training programs where results are statistically analyzed to show tutor pedagogical beliefs, comfort, and challenges and relationships between tutors' beliefs and practice. The survey provides a practical tool that supplements the field of PBL and in particular of tutor development.

Interviews were a worthwhile accompaniment to the survey in supporting and expanding the concepts measured by the research questions. Interviewees were positive about their role and had more to say about their beliefs than their challenges.

Results from both data sources revealed tutors hold beliefs consistent with PBL tutor principles, are comfortable with most nondirective facilitation techniques, and face challenges in their facilitation role concerning self-restraint. In this study, like others earlier, beliefs and behaviours appear to be related. The findings are consistent with and expand upon previous research of the role of the tutor in a PBL context. In doing so they contribute knowledge on the facilitation process and help explain forces underlying variations in tutor behaviour that in turn contribute to curriculum implementation.

PBL tutors appear to hold beliefs consistent with Dewey and Rogers and use facilitation techniques that resemble those used in client-centered therapy and in therapeutic communication. This analysis contributes new knowledge of theoretical links with PBL.

The challenge to uncover the relationship between tutors' pedagogical beliefs, comfort, and challenges with facilitation continues. This study sheds light on a piece of this complex puzzle.

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APPENDICES

Appendix A: Empirical research concerning PBL tutors

Authors	Title	Purpose	Question	Method	Analysis
Cottrell, S, Wimmer, M., Linger, B, Shumway, J, & Hones, E. (2004)	Using PBL evaluations to improve facilitator performance and student learning	To identify relationships between course and faculty evaluations Identify students' reflections of PBL and facilitator behaviours	What is the underlying structure of facilitator and course evaluations? Is there a relationship between PBL facilitator evaluations and student reflections about learning?	Questionnaire Nine items on Facilitator questionnaire, Six items on Course evaluation Facilitator performance scores (IV) student observations of their learning (DV) N= 28 tutors N = 360 students	All nine questions in the facilitator questionnaire revealed one factor, facilitation skills Student questionnaire revealed two factors, Collaboration skills, and Independent learning skills. Findings- facilitation skills relate to student learning factors. Two questions in facilitator questionnaire related generally to directiveness of tutor's behaviour
Dahlgren, M A Castensson, R, Dahlgren, L (1998)	PBL from the teachers' perspective	Evaluate the implementation of PBL in environmental education from the teachers' perspective	Experience and planning and implementing PBL, ways in experiencing the meaning of PBL, Ways of experiencing the teachers' role in PBL	Interview end of course – two years teaching PBL N = 7 teachers	Two different perspectives on the teacher role as a PBL tutor, supportive and directive. Supportive= integrative emphasis on student responsibilities and the learning process Directive = restricted view on, or uncertainty about the teachers' role in PBL Saw themselves as resources, no emphasis on group process, role provides structure, give instructions on how to plan PBL tutors need to reflect on their conceptions of knowledge and learning.
Dolmans, D, De Grave, W, Wolfhagen, I & Van der Vleuten, C. (2005)	PBL: future challenges for educational practice and research	Demonstrate PBL prepares students more effectively for future learning because of its basis in four modern insights into learning: constructive, self-directed, collaborative and contextual (CSCC)	Argument: PBL based on four modern learning principles (constructs): constructive, self-directed, collaborative, contextual		PBL tutors too directive in manner, dominates leading to tension and conflict in groups, hindering the learning process and ensures learning is not self-directed

Authors	Title	Purpose	Question	Method	Analysis
Dolmans, D & Ginns, P (2005)	A short questionnaire to evaluate the effectiveness of tutors in PBL: validity and reliability	To evaluate the psychometric properties of a short questionnaire representing five underlying factors		Questionnaire – 11 items, five factors Constructive/active learning Self-directed learning Contextual learning Collaborative learning Intra-personal behaviour Motivation to tutor N = 281 tutors rated by students	A shorter questionnaire proved to be valid, reliable and captured the five areas of interest of tutor behaviours
Dornan, T, Scherpbier, A, King, N, Boshuizen, K (2005)	Clinical teachers and PBL: a phenomenological study	Explore how clinicians perceive their roles in PBL and how closely those perceptions link to the curriculum they teach	Concern that PBL tutor provides little outlet for content mastery Clinicians reaction to PBL, Does PBL permeate the clinician's teaching?	Interviews – semi structured questions Regarding directed clinical learning versus outpatient learning N= 14 General physicians Third year clinical teachers	Subjects weren't PBL tutors
Gilkerson, Andrea (2003)	Techniques used by expert and non-expert tutors to facilitate PBL tutorials in an undergraduate medical curriculum	Explore PBL facilitation in medical education and approaches used by tutors in PBL tutorials	What techniques do PBL tutors use and what effects do their interventions have, How do students interpret PBL tutor interventions How do PBL tutors interpret their use of verbal intervention in a PBL tutorial	Case study – two cases one non-medical (humanities) and one medical Tutor talk, student talk, silence N = 2	Medical tutor spent more time raising critical awareness, and directing learning, whereas the non-medical tutor spent more time on facilitating group process (expecting students to challenge each other)
Groves, M, Rego, P., O'Rourke, P. (2005)	Tutoring in PBL medical curricula:	Relationship between tutor effectiveness, tutor behaviours,		Questionnaire – to measure tutoring technique related to	Compared clinical with non-clinical tutors and staff with non-staff tutors

Authors	Title	Purpose	Question	Method	Analysis
		clinical qualifications and academic appointment		subject-matter knowledge or to process facilitation skill, as well as overall effectiveness Moust Instrument Students, first year	
Hmelo-Silver, C. & Barrows, H.S (2006)	Goals and Strategies of a Problem-based Learning Facilitator	Understand the goals and strategies of an expert facilitator in support of collaborative learning	How specific strategies were used to support the PBL goals (helping students construct causal explanations, reason effectively, become self-directed learners)	Interactive analysis of video data and stimulated recall of two PBL group meetings. Five third-year medical students experienced in PB L and a master facilitator (H.S. Barrows)	Facilitator had five goals for students and four performance goals for himself Expert facilitator modelled ways of thinking about patient illnesses (cognitive apprenticeship to the thinking practice s of medicine), selected strategies on the fly, juggled in response to group discussion.. Overall strategy – open-ended questions Use of modelling, scaffolding and fading away. Use of student-centred discourse as an instructional strategy
Jung, B, Tryssenaar, J & Wilkins, S (2005)	Becoming a Tutor: exploring the learning experiences and needs of novice tutors in a PBL programme	To study the beliefs and perspectives of PBL new tutors in an occupational therapy program that were trained through a mentoring model		Qualitative ethnographic approach, interviews face-to-face or by telephone, semi-structured Describe experience, relationship with student group and effectiveness N = 13 novice tutors N= 10 tutor guides of available supports	Data collected within 18 mo of first tutoring experience. New tutors coming from a more traditional educational approach had more challenges in transitioning to the PBL tutor role. Tutoring is stressful. Need understanding of the philosophy of working things through in a group
Kaufman, D. & Holmes, B. (1998)	The relationship of tutors' content expertise to interventions and perceptions in a		1. Do content expert tutors differ from non-expert tutors in the extent to which they present/explain case	Two questionnaires, one for faculty and one for students. Faculty questionnaire	Content expertise defined by tutors Compares outcomes with frequency of use of case explanations/presentation. In this study less interventionalist means less use of content expertise versus interventionalist, that refers to

Authors	Title	Purpose	Question	Method	Analysis
	PBL medical curriculum		content? 2. Do tutors who present/explain case content differ from those who almost never do in their ratings of various outcomes of a PBL curriculum? 3. Are tutors who present/explain case content rated differently by students from tutors who almost never do?	contained 39 items from Vernon's questionnaire plus additional questions pertaining to self-rating of content expertise and satisfaction with the tutoring experience N=88 tutors N=168 students First two years PBL medical curriculum Students assess tutors at end of each unit, tutors complete questionnaire at end of year	occasional, frequent use of expertise to present/explain case content. Provides a way to gauge non-directive intervention.
King, S (1999)	Changing to PBL	Examination of shift in teaching satisfaction when changing to PBL			Changing to PBL represented a changed in beliefs in teaching and learning
Lai, P,& Tang C (1999)	Constraints affecting the implementation of a PBL (PBL) Strategy in University Courses	Evaluate the effect of the implementation of PBL on a change in teaching orientations of tertiary teachers focusing on their espoused beliefs and belief-in-use in PBL	Identify the teaching orientation of the participants, problems encountered during the implementation of PBL and the participants evaluation of the effectives of the main PBL project	Semi-structured interviews Health science faculty participating in PBL sub-projects and Tutors Number of participants not reported. Number of similar responses not reported	Philosophy of PBL highlights an exploratory, constructivist approach to learning Tutors identified constraints (university reward system, teaching evaluation mechanism, resource allocation and students' responses to PBL
Maxwell, J & Wilkerson, L (1990)	A study of Non-volunteer Faculty in a Problem-based Curriculum	Investigation of the effect of PBL experience on sceptical faculty		Interviews about attitudes and expectations before tutoring then again	Faculty who volunteer to teach in PBL may differ from others Early adopters more venturesome Eight of 14 were originally quite sceptical

Authors	Title	Purpose	Question	Method	Analysis
				when course was over Open-ended interviews - qualitative N = 14 faculty new to PBL as tutors	Demonstrates the power of PBL to persuade initially sceptical faculty of its value and practicability Positive experience with a sense of personal growth
Moust, J & Schmidt, H.G. (1995)	Facilitating small-group learning: a comparison of student and staff tutor's behaviours	Compare student tutors' behaviours versus staff tutors' behaviour (Research in this area (effect on student achievement) has been inconclusive- see de Volder, de grave & Gijselaers (1985); Moust (1993)	In what ways student tutors differ from staff tutors	Questionnaire – 39 item (6 subscales) Examined six major factors in tutors' behaviour (performance) Subject-matter component Expertise, Cognitive congruency Test orientation Process-facilitation component: Authority, Role congruence Cooperative orientation Interviews with a sample of students (Law, first year) N=352	
Olmesdahl, PF & Manning, DM (1999)	Impact of training on PBL tutors			Questionnaire -15 items, 9 about directiveness and knowledge giving N = 15	Changes found in the perceptions of half of the participants with the problems with using an indirect method. Before tutoring 2 tutors indicated they expected problems with the indirect method. After tutoring, 7 tutors indicated they had problems with the indirect method. Even though this item showed the largest number of changes in opinions before and after tutoring, it was not commented on in

Authors	Title	Purpose	Question	Method	Analysis
					the data analysis or discussion by the researchers. Instead the lesser change in opinions on dispensing knowledge was highlighted.
Schmidt, HG, Moust, HC (1995)	What Makes a Tutor Effective?	To test and develop a causal model of tutor behaviours on student achievement		Questionnaire – not published in article N=3792	Propose a theory of the effective tutor. Students equally value a tutor with both personal qualities and subject-matter knowledge Uses terms "role congruence and cognitive congruence, and social congruence Similarities to Rogerian theories
Steele, D. Medder, J & Turner, P. (2000)	A comparison of learning outcomes and attitudes in student-versus faculty-led PBL: an experimental study	To compare learning outcomes and perceptions of facilitator behaviours and small-group process led by students and those led by faculty		End of term exams Questionnaire end-of each case (developed by Mayo et al.) Focus groups	No difference in student performance on tests. Focus groups indicate students prefer peer tutors due to time efficiency, attributed to short-cuts in the process
Tremblay, M, Tryssenaar, J & Jung, B (2001)	PBL in occupational therapy: why do health professional choose to tutor?	To survey all PBL tutors in the last 20 years	Why do tutors continue to tutor, why did they stop, what did they like or not like, and identify future activities to support their role as tutors	Questionnaire, 5 items, open-ended questions with 6 sub questions on views on tutoring N= 91	Tutors motivated by being an educator and being a learner. Met needs for ongoing PD Requesting PD on interpersonal skills, providing feedback
VanHanen, H, Pitkala, K, Puolakkainen, P, Strandber, t & Lonka, K. (???)	The PBL tutorial laboratory - method for training medical educators	Staff development in PBL due to a curriculum change	Four Goals Internalize modern concepts of learning and knowledge in harmony with PBL, Reflect on role of the tutor, Understand small group dynamics Gain tools and confidence to apply PBL	Questionnaire – semi-structured 6 general items N =40 Biomedical teachers and clinical teachers	Biomedical teachers more resistant to new learning of PBL than clinical teachers in all dimensions but especially so in communication skills

Authors	Title	Purpose	Question	Method	Analysis
Wetzel, M. (1996)	Developing the role of the tutor/facilitator	Description of the Harvard medical school program of faculty development for PBL			Tutors with resistant attitudes to PBL become ardent supporters through the tutoring experience
Vernon, D & Hosokawa, M. (1996)	Faculty Attitudes and Opinions about PBL	Investigate the attitudes of non-PBL tutors in a school that uses a new PBL curriculum Analyze variations in attitudes		Questionnaire – 32 items Questions about student behaviours in PBL groups and faculty interest and enthusiasm Questionnaire not published with article N = 211 faculty mixture of teaching roles lecturer, lab instructors, PBL tutors, standardized patient facilitators, small group facilitators	PBL faculty responded than non PBL faculty PBL faculty held more positive attitudes Differences in attitudes between tutors and basic science lecturers re student-directedness and student-faculty relationships
Wilkerson, L. (1995)	Identification of skills for the problem-based tutor: student and faculty perspectives	Compare perceptions and values for a range of tutoring skills between students and tutors	What do students indicate as specific skills used by effective tutors, and most helpful tutors What skills do faculty see as most important	Quantitative and Qualitative 8 items, 7 specific skills and 1item on overall tutor performance Ratings at end of each of four human biology courses One item on encouraging student direction N = 82 Experienced PBL faculty trained as new PBL tutors for	Looks at the facilitation process rather than subject-expertise Students indicate the most important tutoring skill is #1 encouraging student-student discussion of information Described as "passive force" Rated more important than #2 basic science, or clinical knowledge, or #3 Creating a pleasant environment, or #4 stimulating critical evaluation by asking probing questions Claims allowing student control is the most difficult aspect for new PBL tutors

Authors	Title	Purpose	Question	Method	Analysis
				human biology courses N = 155 first year students	
Wilkerson, L. Hafler, JP, Liu P (1991)	A case study of student-directed discussion in four problem-based tutorial groups			Case study	Five qualities to distinguish student-oriented from faculty-oriented tutors Style and pattern to tutors talk, use of questions, pattern of student-tutor interaction, silences and interruptions Later condensed to 2 general skills, (a) Guiding the work of the group (b) Promoting interaction (group dynamics) Similar to Rogerian characteristics - uses student-oriented similar to client-centered Allowed students to initiate and sustain discussion, Questions infrequently to guide process, probes for understanding, encourages listening to each other, toleration of silence and postponing suggestions, Accede to students selection of objectives, Fostering a feeling of cooperation rather than competition

Appendix B: Survey Item Classification

Table B 1 Survey Part A Beliefs Final Version

	Item	PBL principles	Dewey	Rogers	Behaviourist
1.	Learning resources	SR - LA		x	
2.	Problem first	A	x	x	
3.	Inquiry	A	x	x	
4.	Justify	SR	x		
5.	Learning Conditions	A	x		
6.	Contextual Learning	A	x		
7.	Self-management	SR- LA	x	x	
8.	Information Supply	TR		x	
9.	Volunteer	TR			X -T
10.	Verbalize thinking	A		x	
11.	Beliefs & PBL conflict	TR		x	
12.	Learning process	SR			X -T
13.	Indirect	TR		x	
14.	Group work	A	x	x	
15.	Self-evaluation	SR - LA	x	x	
16.	How and why	SR	x		
17.	Learning diagnosis	TR			
18.	Group dynamics	TR			
19.	Problem	SR-LA		x	
20.	Redirect	TR		x	X*
21.	Structured	A			X -T
22.	Tutorial content	TR			X*
23.	Tutorial control	TR-LA			X - T
24.	Tutor content expert	TR			X -T
25.	Continual	TR			X*
26.	Subject expertise	TR			X*
27.	Tutor learn issue	TR-LA			X -T
28.	Reasoning	SR	x	x	
29.	Learning	TR			X -T
30.	Model inquiry	TR			
31.	Immediate Feedback	TR			X -T
32.	Expertise				X
33.	Real life	A	x		X -T
34.	Opinion	SR	x	x	
35.	Tutor summary	TR-LA			X - T
36.	Tutor solution	TR-LA			X - T
	Total	36	12	14	11

* Behaviours common to PBL and Behaviourist approaches
SR= Student Role
TR= Tutor Role
A = PBL Approach
LA = Learner Autonomy

Table B 2 Survey Part B Facilitation Techniques Final Version

		Source				Type	
		PBL	CCT	TC	B	A	P
1.	Probing learners to think about how they think	x	x			x	
2.	Guiding learners through the inquiry/reflection process	x	x			x	
3.	Indirectly stimulating learners' to deeply explore their understanding of underlying mechanisms/theories by using phrases such as "It is not clear to me from our discussion how ... leads to ...."	x	x	x		x	
4.	Asking learners to confirm their thoughts by clarifying their comments out loud	x	x	x		x	
5.	Asking primarily open-ended questions to open up discussion	x	x	x		x	
6.	Avoiding expressing opinions (approval or disapproval) concerning correctness or quality of learner contributions	x	x				x
7.	Utilizing self-restraint from offering important information unless asked for during inquiry	x	x				x
8.	Withholding suggestions for specific resources (articles, texts or media)	x	x				x
9.	Verbalizing my interpretation of learner's expressed feelings and ideas	x	x	x		X	
10.	Eliciting learners' identification and explanation of lapses in their reasoning	x	x	x		X	
11.	Responding with neutral language when asked for information e.g."It sounds like you find this issue challenging"	x	x	x		x	
12.	Summarizing with learner's their reasoning about a problem	x	x	x		X	
13.	Drawing out learners' attitudes and feelings using indirect communication phrases such as "You seem puzzled over this issue."	x	x	x		X	
14.	Encouraging learners' to express their thoughts and feelings	x	x			X	
15.	Letting learners decide on issues to be explored	x	x				x
16.	Stimulating learners to search for links between issues	x	x			x	
17.	Using closed questions, such as "Do you understand?"(*transformed for analysis)				x	x	
18.	Prompting learners to express their understanding using phrases such as "It sounds like you may have more to say about this topic"	x	x	x		x	
19.	Informing learners with information, explanations and directions to investigate or solve problems				x	x	
20.	Refraining from providing information to stimulating learners to identify their learning goals and issues by themselves	x	x				x
21.	Rewording what a learner has said for confirmation eg." It sounds like you mean .... "	x	x	x		x	
22.	Asking probing questions to stimulate learners to elaborate their statements with additional information	x	x	x		x	
23.	Comparing learner comments out loud without drawing conclusions. E.g."Jane, earlier you said that the problem was caused by XYZ, yet you also say that ABC was going on. Can you explain?"	x	x			x	
24.	Confronting a learner with the need to provide more reasoning about the information they offered during tutorial without offering an opinion on their reasoning or the quality of their information	x	x	x		x	
25.	Delaying my responses with silence to allow learners to search for answers	x	x	x			x
26.	Using probing questions to induce learners to volunteer information	x	x			x	
27.	Stimulating learners to consider the negative aspects of their	x				x	

	performance in tutorial						
28.	Remaining silent during group discussions	x	x	x			x
29.	Handling disruptive behaviour such as inappropriate side talking during tutorial in ways that prompts group members to take ownership for group functioning	x				x	
30.	Exploring group dynamics with the group by stimulating learners to evaluate group function regularly	x				x	
31.	Lecturing during tutorial (* transformed for analysis)				x		x
32.	Avoiding intervening when the group storms and struggles	x					X
33.	Passively stimulating learner-to-learner discussion	x					x
	Total	32	25	14	3	23	10

Legend
PBS= PBL
CCT= Client-centered therapy
TD = Therapeutic dialect
B = Behaviourist
A = VerbalB = Nonverbal

Appendix C: Survey Cover Letter

Dear tutor:
This research survey asks you to share your perspectives on teaching and learning related to learning situations that require inquiry and the challenges you find facilitating in a medical education program that uses a PBL approach. Your participation in this research is important as it extends understanding of tutors and will be useful for tutor training. The survey should take approximately 15 min.

To participate in this research, please confirm your consent by reading the information below then selecting the "I agree" button at the bottom of this page. Electronic return of this consent form will automatically forward the survey questionnaire. This consent form is not attached to the actual survey.

Consent Information
All information you provide is considered confidential; your name will not be included or, in any other way, associated with the data collected in the study. Furthermore, because our interest is in the average responses of the entire group of participants, you will not be identified individually in any way in written reports of this research. Respondent type and institutions will be identified but not individual respondents. Discrete data sets will be identified by institutional codes. The information you provide will be kept confidential. Your name will not appear in any report resulting from this study; however anonymous quotations may be used. Data collected during this study will be stored in a locked filing cabinet in the principal researcher's home. Data will be kept for three years after completion of the study after which time all paper data will be shredded. Access to this data will be restricted to the researcher.

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled. Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available at the end of the study approximately in December 2007 and a summary will be available upon request from the researcher.

If you have any questions about this study or require further information, please contact the Principal Investigator) using the contact information provided. This study has been reviewed and received ethics clearance through the Research Ethics Boards (REB) at Simon Fraser University, File 38118 and McMaster University, HHS/FHS, File 07-224 and at Dalhousie. If you have any comments or concerns about your rights as a research participant, please contact Dr. Hal Weinberg, Director, Office of Research Ethics, SFU at 778-782-6593 or the Office of the REB Chair at McMaster at 905-521-2100, ext. 42013. There are no known or anticipated risks or benefits associated with participation in this study.

Thank you for your assistance in this project.

Principal Investigator:
Kareen McCaughan, PhD (candidate)
Simon Fraser University
kmccauga@sfu.ca
905-634-3977

Consent
By selecting I agree I am indicating that I have read the consent form and agree to participate in this study.

I Agree	I Disagree

Appendix D: Expert Review Form

Facilitation Perceptions Survey

Expert Review Form

I would like to ask for your feedback about how well the statements in my Facilitation Perceptions Survey (FPS) cover the content of an area in which you have substantial expertise. This survey has been developed as part of my PhD research and will be sent to a sample of Problem based learning (PBL) tutors. My research explores the relationship between PBL tutors' beliefs about learning experiences that involve problem-solving and their comfort level with nondirective facilitation. Part A of the survey collects tutors' beliefs about learning experiences related to problem-solving. Part B collects their reports of their level of comfort with using nondirective facilitation behaviours. Your feedback is a step in the further content validation of the FPS as a suitable measurement instrument for my research. Please comment on the part(s) of this survey in which you feel you have expertise. Below, I briefly review the development thus far of the survey.

The survey statements were developed from three sources: Dewey's educational philosophies, Rogers's client-centered approach in psychotherapy and Barrows's principles for PBL tutors. Following my review of the work of these sources, two cross-classification tables were created that are attached as Appendix B. These tables have been included to provide you with background information on statement development.

Table A lists 19 belief statements about the tutor's and learners' roles in learning experiences that involve problem solving. The belief statements have been classified into those that relate to self-direction, those that pertain to the cognitive processes of problem-solving, those that pertain to the emotional aspects of problem solving, those that relate to problem solving in general, and those that relate to communication. In addition, the chart identifies beliefs as related to the perspectives of Dewey, Rogers or PBL. Table A is the basis of Part A of the survey.

Table B lists 38 statements representative of the nondirective facilitation behaviours used by PBL tutors. These statements were derived from Barrows's principles of PBL tutor behaviour, Rogers's client-centered approach, and those commonly used in therapeutic discourse. Table B is the basis for Part B of the survey.
As well, your opinion on other aspects of the survey such as wording and sequencing of question statements would be appreciated.

Instructions
Please, complete this form electronically and email as an attachment to Kareen McCaughan at kmccaugh@brocku.ca by May 10, 2007 if possible.

Please indicate your area of expertise:
☐ PBL
☐ Dewey
☐ Client-centered therapeutic approaches

Part A: Beliefs about learning experiences

Please indicate the degree to which you agree or disagree the statements that follow describe beliefs about learning experiences that involve problem-solving.
Note: In the survey respondents are asked to indicate their thoughts on the statements.

1	2	3	4
Highly disagree	Disagree	Agree	Highly agree

Statement Content

	1	2	3	4
1. The learner should self-discover learning resources				
2. Students should engage in inquiry and problem-solving to develop problem-solving skills				
3. Learners need to use a scientific method of inquiry in their analysis of problems				
4. Learners should provide evidence in their reasoning				
5. Learning occurs under conditions which promote curiosity, prompt questions and contain suspense				
6. The tutor shouldn't act as expert and information source				
7. Learners benefit more by self managing their learning than by having the teacher manage it				
8. Learners should actively engage in authentic learning experience which extends their knowledge				
9. Learners should control/manage their learning				
10. It is in the student's best learning interest for the teacher to withhold case information				
11. Solution finding to problems involves interacting with others				
12. Problem identification and solution finding rests within the individual learner				
13. The learner needs to verbalize their thinking during problem-solving				
14. Individuals experience dilemmas when confronted with the conflict and challenge of shifting their beliefs about the learning process				
15. The tutor should use indirect techniques self-expression of reasoning and feelings				
16. The tutor's dialogue influences learning experiences				
17. Reflection influences the learning experience				
18. The experience of knowing is as important as that which is known				
19. The quality of the learning experience influences learning				

Question Format

	Yes	No
1. Was the language clear?		
2. Were the statements easily comprehensible?		
3. Has the proper order for the statements been selected?		

Comments

Part B: Nondirective facilitation behaviours

Please indicate the degree to which you agree or disagree that the following statements represent nondirective facilitation behaviours used by PBL tutors.

Note: In the FBS survey respondents will be asked to indicate their comfort level with these PBL tutor behaviours using the 1 – 4 scale, where 1 represents uncomfortable and 4 represents comfortable.

1	2	3	4
Disagree			Agree

Statement Content

	1	2	3	4
1. Interacting with students at the metacognitive level				
2. Guiding students through all stages of the inquiry/reflection process				
3. Pushing students to deeper levels of understanding				
4. Asking for confirmation through clarification of comments and opinions				
5. Asking primarily open-ended questions				
6. Avoiding expressing opinions (approval or disapproval) concerning correctness or quality of student contributions				
7. Utilizing self-restraint from offering important case information				
8. Giving directions to problem-solving				
9. Stimulating students to take responsibility for learning				
10. Displaying unconditional positive regard				
11. Displaying empathy				
12. Enabling student direction of content by withholding directions				
13. Responding to expressions of feelings				
14. Expressing your interpretation of student's expressed feelings and ideas				
15. Eliciting and drawing out thinking problems				
16. Responding with neutral language e.g."I don't' think I understand"				
17. Summarizing with the student his or her thought patterns				
18. Using counselling techniques to assist expression of thoughts and feelings				
19. Permitting and encouraging free expression of thoughts and feelings				
20. Encouraging self-initiated actions				
21. Building student independence				
22. Using techniques that guide the student to become aware of his/her attitudes and feelings				
23. Stimulating students to develop concepts				
24. Minimizing closed questions				
25. Letting students know that I care about their learning				
26. Using indirect probes to prompt students to express their understanding				
27. Occasionally giving information and explanations				
28. Requiring students to select their own learning goals and issues				

29. Demonstrating the right of the student to be psychologically independent				
30. Translating what the student has said for confirmation				
31. Reformulating student statements (obscure into clear)				
32. Asking probing questions to amplify statements with additional information				
33. Stimulating deductive thinking				
34. Comparing student comments out loud without drawing conclusions				
35. Pinpointing contradictions in statements to force unconsidered alternatives				
36. Confronting the student with facts without offering an opinion				
37. Delaying my responses with silence to allow students to search for answers				
38. Inducing learners to volunteer information through probing questions				
39. Allowing leadership to gravitate to learners				

Question Format

1. **Was the language clear**?
2. Were the statements easily comprehensible?
3. Has the proper order for the statements been selected?

Comments on Part B

Part C: Survey statements in general

Please rate following aspects of the Parts A and B of the survey

Response
Yes No

1. Does the survey allow for sufficient range of responses?
2. Was this survey difficulty to complete?
3. Does the form take too long to complete?
4. Did completing this survey arouse any feelings of anxiety? If so, please indicate which statements caused this reaction.

Comments

Appendix E: Pilot Test Form

Your participation in this research study extends the understanding of the perspectives and experiences of the PBL tutor. If you are completing this survey in print format, please complete return in the self-addressed stamped envelope to Kareen McCaughan by **May 30, 2007.**

Part A
Please describe your thoughts about learning experiences that involve problem-solving

1	2	3	4
Highly disagree	Disagree	Agree	Highly agree

	1	2	3	4
1. The learner should self-discover learning resources				
2. Students should engage in inquiry and problem-solving to develop problem-solving skills				
3. Learners need to use a scientific method of inquiry in their analysis of problems				
4. Learners should provide evidence in their reasoning				
5. Learning occurs under conditions which promote curiosity, prompt questions and contain suspense				
6. The tutor shouldn't act as expert and information source				
7. Learners benefit more by self managing their learning than by having the teacher manage it				
8. Learners should actively engage in authentic learning experience which extends their knowledge				
9. Learners should control/manage their learning				
10. It is in the student's best learning interest for the teacher to withhold case information until it is requested during inquiry				
11. Solution finding to problems involves interacting with others				
12. Problem identification and solution finding rests within the individual learner				
13. The learner needs to verbalize his or her thinking during problem-solving				
14. Individuals experience dilemmas when confronted with the conflict and challenge of shifting their beliefs about the learning process				
15. The tutor should use indirect techniques to stimulate self-expression of reasoning and feelings				
16. The tutor's dialogue influences learning experiences				
17. Reflection influences the learning experience				
18. The experience of knowing is as important as that which is known				
19. The quality of the learning experience influences learning				

20. Please comment on any other aspects of your beliefs about teaching and learning as a PBL tutor.

Part B

Please indicate how you feel about the following aspects of facilitation.

1	2	3	4
Very uncomfortable	Uncomfortable	Comfortable	Very comfortable

	1	2	3	4
1. Interacting with students at the metacognitive level				
2. Guiding students through all stages of the inquiry/reflection process				
3. Pushing students to deeper levels of understanding				
4. Asking for confirmation through clarification of comments and opinions				
5. Asking primarily open-ended questions				
6. Avoiding expressing opinions (approval or disapproval) concerning correctness or quality of student contributions				
7. Utilizing self-restraint from offering important case information unless asked for through inquiry				
8. Giving directions to problem-solving				
9. Stimulating students to take responsibility for learning				
10. Displaying unconditional positive regard				
11. Displaying empathy				
12. Enabling student direction of content acquisition by withholding directions				
13. Responding to expressions of feelings				
14. Expressing your interpretation of student's expressed feelings and ideas				
15. Eliciting and drawing out thinking problems				
16. Responding with neutral language e.g."I don't' think I understand"				
17. Summarizing with the student his or her thought patterns				
18. Using counselling techniques to assist expression of thoughts and feelings				
19. Permitting and encouraging free expression of thoughts and feelings				
20. Encouraging self-initiated actions				
21. Building student independence				
22. Using techniques that guide the student to become aware of his/her attitudes and feelings				
23. Stimulating students to develop concepts				
24. Minimizing closed questions				
25. Letting students know that I care about their learning				
26. Using indirect probes to prompt students to express their understanding				
27. Occasionally giving information and explanations				
28. Requiring students to identify their own learning goals and issues				
29. Demonstrating the right of the student to be psychologically independent				
30. Translating what the student has said for confirmation				
31. Reformulating student statements (obscure into clear)				
32. Asking probing questions to amplify statements with additional information				
33. Stimulating deductive thinking				
34. Comparing student comments out loud without drawing conclusions				
35. Pinpointing contradictions in statements to force unconsidered alternatives				
36. Confronting the student with facts without offering an opinion				
37. Delaying my responses with silence to allow students to search for answers				
38. Inducing learners to volunteer information through probing questions				
39. Encouraging leadership to gravitate to learners				

40. Please comment on the areas of facilitation that you find the most challenging.

Part C:

This section asks questions about your background as a PBL tutor. Please indicate your response by placing an X in the box adjacent to your response.

1. Which of the following categories best describes your discipline?
    A. Health Sciences (medicine, nursing, OT, PT, dentistry, pharmacology)
    B. Other professional programs (education, engineering, architecture, social work, law)
    C. Other programs (arts, agriculture)

2. Which best describes the subjects you teach?
    A. Foundation courses
    B. Special topics, please describe

3. Does your background include the use of psychotherapeutic approaches?

    1. Yes
    2. No

4. What is your gender?
    A. Male
    B. Female

4. What is your university affiliation?
    A. McMaster University
    B. UBC
    C. University X

5. What is your faculty position?
    1. Professor
    2. Associate professor
    3. Assistant professor
    4. Adjunct professor
    5. Other, please specify

6. Which of the following categories best describes the number of times you have been a PBL tutor?
    1. None (0)
    2. 1- 2 years
    3. 3 -5 years
    4. 6-8 years
    5. Greater than nine years

7. What level of students do you tutor?
    A. First year
    B. Second year
    C. Third year
    D. Fourth year
    E. Other, please specify

8. What is the number of years you have been teaching?

A. Less than one year
B. Two to five years
C. Six to nine years
D. Greater than ten years

9. \What is the highest level of formal education you have obtained?
   A. Master's degree
   B. M.D.
   C. PhD
   D. Other

10. How old were you on your last birthday? _____

11. Other comments:

    Please feel free to comment on any other aspect of teaching and learning as a PBL tutor.

Thank you for your assistance

Appendix F: Facilitation Perception Survey

Part A: Learning Beliefs

Using the scale below please indicate the extent you think that the following items are of relevance or importance for learning that involves inquiry and problem-solving in tutorials.

Tech Tips: Avoid using the Back button on your Internet browser to return to the previous page as you will be disconnected from the survey. Should you become disconnected while completing the survey you may start again at the information/consent page located at www.

1	2	3	4	5
Highly disagree	Disagree	No opinion	Agree	Highly agree

	1	2	3	4	5
1. Learners should be able to identify suitable learning resources by themselves					
2. The presentation of a problem first is the best way to initiate learning					
3. Learners need to use inquiry in their analysis and formulation of problems					
4. Learners must be able to justify that they have reasoned correctly					
5. Conditions which promote curiosity, prompt questions and contain suspense are unnecessary for learning					
6. Knowledge and skills are best acquired within the context of what the learner intends to do with them					
7. Learners should have the opportunity to control/manage their learning by determining essential topics for discussion and how they want to learn the topics					
8. The tutor should provide information only when learners demand it.					
9. The tutor volunteers information such as explaining underlying mechanisms and theories					
10. Learning is enhanced when learners verbalize their thinking as they work through a problem					
11. Tutors experience dilemmas when their teaching and learning beliefs conflict with PBL principles					
12. Learners do not need to know how learning occurs in order to learn					
13. Tutors should communicate indirectly using open questions such as "It sounds like you have some concerns about this issue " to encourage self-expression of reasoning and feelings					
14. Interacting with others in a group increases the likelihood of finding solutions to problems					
15. Learners need to constantly evaluate the information they use					
16. How you learn is as important as what you learn					
17. The tutor should be able to diagnose difficulties in reasoning					
18. The tutor needs to regularly monitor group dynamics					
19. Learners are capable of identifying and explaining problems by themselves					
20. The tutor needs to redirect problem discussion when it is off target					
21. The best learning occurs when learning activities are clearly structured and provide for practice and repetition.					
22. Decisions about what to include in a tutorial should be based on what learners know and what the tutor believes they should know					
23. The tutor should control the tutorial to attract and hold the learners, moving then systematically towards the objectives					
24. The tutor should clarify the content, concepts, and/or theoretical principles to be learned					
25. Continual feedback should be provided by the tutor so learners can adjust their performance accordingly					

26. Effective tutors are subject experts of the problems discussed during tutorials					
27. The tutor should generate learning issues for learners					
28. The tutor helps learners develop more complex ways of reasoning					
29. Tutors should make it very clear what learners need to learn					
30. Tutors should model inquiry and problem solving skills during tutorials					
31. Learners need immediate feedback from the tutor when they are off base					
32. The tutor should be an authority on the information being learned					
33. Learners do not need to apply knowledge to real life situations in order to learn					
34. The learner ought to be able to formulate and defend an opinion or judgment					
35. The tutor summarizes the discussion for learners					
36. The tutor should raise all possible solutions to the problem					

37. Please comment on other teaching and learning beliefs that you feel are important as a PBL tutor.

Part B: Facilitation

Using the scale please indicate your comfort level with the following aspects of facilitation.

1	2	3	4	5
Very uncomfortable				Very comfortable

	1	2	3	4	5
1. Probing learners to think about how they think					
2. Guiding learners through the inquiry/reflection process					
3. Indirectly stimulating learners' to deeply explore their understanding of underlying mechanisms/theories by using phrases such as "It is not clear to me from our discussion how ... leads to ...."					
4. Asking learners to confirm their thoughts by clarifying their comments out loud					
5. Asking primarily open-ended questions to open up discussion					
6. Avoiding expressing opinions (approval or disapproval) concerning correctness or quality of learner contributions					
7. Utilizing self-restraint from offering important information unless asked for during inquiry					
8. Withholding suggestions for specific resources (articles, texts or media)					
9. Verbalizing my interpretation of learner's expressed feelings and ideas					
10. Eliciting learners' identification and explanation of lapses in their reasoning					
11. Responding with neutral language when asked for information e.g."It sounds like you find this issue challenging"					
12. Summarizing with learner's their reasoning about a problem					
13. Drawing out learners' attitudes and feelings using indirect communication phrases such as "You seem puzzled over this issue."					
14. Encouraging learners' to express their thoughts and feelings					
15. Letting learners decide on issues to be explored					
16. Stimulating learners to search for links between issues					
17. Using closed questions, such as "Do you understand?"					
18. Prompting learners to express their understanding using phrases such as "It sounds like you may have more to say about this topic"					
19. Informing learners with information, explanations and directions to investigate or solve problems					
20. Refraining from providing information to stimulating learners to identify their					

learning goals and issues by themselves					
21. Rewording what a learner has said for confirmation eg." It sounds like you mean .... "					
22. Asking probing questions to stimulate learners to elaborate their statements with additional information					
23. Comparing learner comments out loud without drawing conclusions. E.g."Jane, earlier you said that the problem was caused by XYZ, yet you also say that ABC was going on. Can you explain?"					
24. Confronting a learner with the need to provide more reasoning about the information they offered during tutorial without offering an opinion on their reasoning or the quality of their information					
25. Delaying my responses with silence to allow learners to search for answers					
26. Using probing questions to induce learners to volunteer information					
27. Stimulating learners to consider the negative aspects of their performance in tutorial					
28. Remaining silent during group discussions					
29. Handling disruptive behaviour such as inappropriate side talking during tutorial in ways that prompts group members to take ownership for group functioning					
30. Exploring group dynamics with the group by stimulating learners to evaluate group function regularly					
31. Lecturing during tutorial					
32. Avoiding intervening when the group storms and struggles					
33. Passively stimulating learner-to-learner discussion					

34. Please comment on the areas of facilitation that you find the most challenging.

Part C :

This section asks a few questions about your background.

1. Which of the following categories best describes your discipline?
   A. Medicine
   B. Other, such as Respirology, Oncology, Anatomy, Biochemistry, please describe

2. Which best describes the level you tutor?
   A. Pre-clerkship - Year 1 (McMaster MF 1-4, Dalhousie Med 1)
   B. Pre-clerkship – Year 2 (McMaster MF5, Dalhousie Med 11)
   C. Special topics, please describe

3. Number of years you have been a PBL tutor
   A. less than one year
   B. 1-2 years
   C. 3-5 years
   D. 6-10 years
   E. 11-15 years
   F. more than 16 years

4. When did you last actively tutor?
   ☐ A. Less than six months ago
   ☐ B. More than six months ago
   ☐ C. More than one year ago
   ☐ D. More than two years ago

5. Your PBL tutor training
   A. I participated in a basic PBL tutor training workshop
   B. I have not attended a formal PBL tutor training workshop
   C. I've attended advanced PBL tutor training workshops
   D. I facilitate PBL tutor training workshops

6. In which of the following areas would you like additional tutor training?
   A. Nondirective communication techniques
   B. How students' learn (educational psychology)
   C. Group dynamics
   D. Other, please describe

7. Does your background include training in the use of psychotherapeutic approaches or supportive counselling?

   3. Yes
   4. No

8. If you answered yes to above please describe your background in this area.

9. What is your gender?
   C. Male
   D. Female

10. What is your institutional affiliation?
    D. McMaster University
    E. Dalhousie University

11. What is your faculty position?
    A. Full time faculty – Clinical Educator
    B. Full time faculty – Research Educator
    C. Full time – Basic Scientist
    D. Part time faculty – Clinical Educator
    E. Other, please specify

12. Approximately what percentage of your normal work routine involves medical education tutoring?
    F. Less than 10 %
    G. Between 10 and 20 %
    H. Between 20 and 30 %

I. Greater than 30 %

13. Approximately how many years you have been teaching?
    E. Less than one year
    F. Two to five years
    G. Six to nine years
    H. Greater than ten years

14. \What is the highest academic degree?
    E. PhD – please indicate discipline
    F. Masters degree – please indicate discipline
    G. Masters degree in education
    H. M.D.
    I. Other

15. Age (years)
    a. < 40
    b. 40 – 49
    c. 50

16. Other comments:

We would like to contact some respondents for a short (20 min) telephone interview to enhance our understanding of the tutor experience. If you are interested in participating select the "Interview" box below. This box links to a separate file where you will be asked to submit your email address. In this way the anonymity of your questionnaire responses are preserved and disconnected from your email address.

Gift Certificate **Interview**

We would like to send you a Tim Horton's gift certificate as a token of appreciation for completing the survey. Please fill in your mailing address by selecting the "Gift Certificate" box which links to a separate file. In this way your anonymous questionnaire responses are disconnected from your contact information to preserve your anonymity.

Thank you very much for your assistance

Appendix G: Survey Responses Part A and B

Table G 1: Part A - Reliable Items

	1		2		3		4		5			
Item	Highly Disagree		Disagree		No Opinion		Agree		Highly Agree		Mean	SD
	Cnt	%	Cnt	%	Cnt	%	Cnt	%	Cnt	%		
2	2	3.9	4	7.8	8	15.7	28	54.9	9	17.6	3.8	0.977
3	0	0.0	2	3.9	4	7.8	31	60.8	14	27.5	4.1	0.711
4	2	3.9	2	3.9	8	15.7	25	49.0	14	27.5	3.9	0.977
5T	2	3.9	1	2.0	3	5.9	19	37.3	26	51.0	4.3	0.965
6	2	3.9	4	7.8	5	9.8	0	58.8	10	19.6	3.8	0.974
10	0	0.0	2	3.9	4	7.8	29	56.9	16	31.4	4.2	0.731
13	1	2.0	2	3.9	7	13.7	29	56.9	12	23.5	4.0	0.848
14	1	2.0	1	2.0	5	9.8	25	49.0	19	37.3	4.2	0.842
15	1	2.0	1	2.0	1	2.0	31	60.8	17	33.3	4.3	0.757
16	2	3.9	11	21.6	10	19.6	19	37.3	9	17.6	3.4	1.136
17	1	2.0	1	3.9	8	15.7	32	62.7	8	15.7	3.9	0.800
18	2	3.9	0	0.0	1	2.0	28	54.9	20	39.2	4.3	0.845
20	2	3.9	1	2.0	3	5.9	26	51.0	19	37.3	4.2	0.925
23T	3	5.9	8	15.7	6	11.8	20	39.2	14	27.5	3.7	1.211
27T	1	2.0	8	15.7	6	11.8	5	9.0	11	21.6	3.7	1.041
32	19	37.3	21	41.2	2	3.9	8	15.7	1	2.0	2.0	1.113
33T	3	5.9	8	15.7	11	21.6	17	33.3	12	23.5	3.5	1.189
34	0	0.0	3	5.9	1	2.0	36	70.6	11	21.6	4.1	0.688
35T	1	2.	4	7.8	10	19.6	24	47.1	12	23.5	3.8	0.953

Table G 2: Part B - Reliable Items

Item	Very Uncomfortable		Uncomfortable		In between		Comfortable		Very Comfortable		Mean	SD
	Cnt	%	Cnt	%	Cnt	Valid %	Cnt	%	Cnt	%		
1	0	0.0	3	5.9	12	23.5	25	49.0	9	17.6	3.8	0.808
2	0	0.0	2	3.9	9	17.6	27	52.9	11	21.6	4.0	0.763
3	0	0.0	2	3.9	11	21.6	26	51.0	10	19.6	3.9	0.770
5	0	0.0	0	0.0	4	4.8	31	60.8	14	27.5	4.2	0.577
6	3	5.9	9	17.6	6	11.8	22	43.1	9	17.6	3.5	1.175
7	1	2.0	9	17.6	12	23.5	15	29.4	12	23.5	3.6	1.118
8	10	19.6	9	17.6	12	23.5	15	29.4	3	5.9	2.8	1.247
9	0	0.0	6	11.8	16	31.4	22	43.1	5	9.8	3.5	0.844
10	0	0.0	5	9.8	13	25.5	23	45.1	8	15.7	3.7	0.871
11	2	3.9	6	11.8	10	19.6	24	47.1	7	13.7	3.6	0.048
12	0	0.0	4	7.8	14	27.5	26	51.0	6	11.8	3.7	0.779
13	0	0.0	2	3.9	13	25.5	25	49.0	9	17.6	3.8	0.773
14	0	0.0	2	3.9	8	15.7	22	43.1	17	33.3	4.1	0.823
16	0	0.0	1	2.0	6	11.8	23	45.1	19	37.3	4.2	0.743
18	0	0.0	3	5.9	11	21.6	26	51.0	9	17.6	3.8	0.800
20	2	3.9	12	23.5	13	25.5	16	31.4	6	11.8	3.2	1.090
21	0	.00	2	3.9	11	21.6	29	56.9	7	13.7	3.8	0.717
23	1	2.0	2	3.9	7	13.7	30	58.8	9	17.6	3.9	0.823
24	0	0.0	7	13.7	16	31.4	20	39.2	6	11.8	3.5	0.893
25	1	2.0	3	5.9	4	7.8	22	43.1	19	37.3	4.1	0.949
26	0	0.0	0	0.0	4	7.8	30	58.8	15	29.4	4.2	0.587
27	3	5.9	11	21.6	15	29.4	16	31.4	4	7.8	3.1	1.061
28	2	3.9	2	3.9	9	17.6	21	41.2	15	29.4	3.9	1.017
29	3	5.9	4	7.8	8	15.7	25	49.0	9	17.6	3.7	1.068
30	0	0.0	4	7.8	11	21.6	25	49.0	9	17.6	3.8	0.841
32	5	9.8	16	31.4	17	33.3	9	17.6	2	3.9	2.7	1.016

Appendix H: Survey Reliability Statistics

Table H 1 Part A Item-Total Statistics (N = 51) Alpha 0.7

		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	Learning resources	124.41	105.087	.126*	.688
2	Problem first	124.25	97.194	.532	.661
3	Inquiry	123.88	99.666	.579	.665
4	Justify	124.08	99.394	.414	.669
5T	Learning Conditions	123.71	100.212	.375	.672
6	Contextual learning	124.18	99.188	.426	.668
7	Self-management	124.69	104.740	.123*	.688
8	Information supply	125.63	108.878	-.077*	.705
9T	Volunteer Information 2	124.84	107.055	.002*	.698
10	Verbalize thinking	123.84	100.135	.528	.667
11	Beliefs and PBL conflict	124.43	104.450	.159*	.686
12T	Learning Process	124.69	105.140	.087*	.692
13	Indirect communication	124.04	100.358	.431	.670
14	Group work	123.82	97.748	.598	.660
15	Self-evaluation	123.78	98.013	.655	.660
16	How and why	124.57	99.450	.338	.673
17	Learning diagnosis	124.14	100.521	.451	.670
18	Group dynamics	123.75	98.034	.577	.661
19	Problem identification	124.75	104.314	.157*	.686
20	Redirect discussion	123.84	99.855	.416	.670
21T	Structured Learning	124.76	108.104	-.039*	.700
22	Tutorial content	124.90	108.490	-.053*	.700
23T	Tutorial control restraint	124.33	98.347	.357	.670
24T	Tutor content restraint	125.16	108.895	-.075*	.704
25	Continual Feedback	124.37	103.558	.208*	.683
26	Subject expertise	125.59	113.767	-.263*	.719
27T	Tutor learn issue restraint	124.27	100.643	.320	.675
28	Reasoning	124.35	106.353	.068*	.691
29T	Learning Clarification 2	124.61	107.323	-.004*	.698
30	Model inquiry	124.61	105.483	.070*	.693
31T	Immediate Feedback 2	125.16	110.095	-.126*	.706
32	Expertise	125.96	116.918	-.405	.725
33T	Real life application	124.47	98.654	.353	.671
34	Opinion formulation	123.92	103.594	.309	.679
35T	Tutor summary restraint	124.18	98.588	.470	.665
36T	Tutor solution restraint	124.04	103.118	.247*	.680

Table H 2 Part A Reliable Items

		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
2	Problem first	69.24	71.464	.485	.545	.822
3	Inquiry	68.86	72.201	.638	.545	.818
4	Justify	69.06	72.136	.442	.348	.825
5T	Learning Conditions	68.69	71.540	.487	.536	.822
6	Contextual learning	69.16	71.175	.505	.630	.821
10	Verbalize thinking	68.82	72.228	.616	.556	.819
13	Indirect communication	69.02	72.620	.490	.647	.823
14	Group work	68.80	70.801	.629	.704	.817
15	Self-evaluation	68.76	70.544	.732	.664	.814
16	How and why	69.55	74.693	.226	.545	.837
17	Learning diagnosis	69.12	71.466	.614	.650	.818
18	Group dynamics	68.73	69.283	.741	.818	.811
20	Redirect discussion	68.82	69.708	.638	.745	.815
23T	Tutorial control restraint	69.31	74.580	.209	.267	.840
27T	Tutor learn issue restraint	69.25	75.714	.200	.323	.837
32	Expertise	70.94	84.376	-.254	.537	.862
33T	Real life application	69.45	72.973	.297	.466	.834
34	Opinion formulation	68.90	73.930	.508	.527	.823
35T	Tutor summary restraint	69.16	72.615	.425	.387	.825

[a] Cronbach's Alpha = 0.83 [b] $N = 51$

Table H 3 Part B Item-Total Statistics (N= 49)

		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	Probing	118.10	146.260	.303	.835
2	Guiding	117.96	144.748	.409	.833
3	Indirect stimulation	118.02	142.604	.523	.830
4	Asking for confirmation	117.73	151.866	.028	.841
5	Asking open-ended questions	117.71	147.333	.369	.834
6	Avoid expressing opinions	118.41	136.622	.540	.827
7	Restrain offering key info	118.35	140.648	.412	.832
8	Withholding suggestions	119.08	142.118	.308	.836
9	Verbalizing my interpretations	118.39	144.492	.376	.833
10	Eliciting reasoning lapses	118.22	143.719	.400	.832
11	Neutral responses	118.35	138.731	.543	.827
12	Summarizing learner's reasoning	118.27	146.032	.329	.834
13	Indirect communication	118.08	140.243	.655	.826
14	Encouraging self-expression	117.82	144.861	.368	.833
15	Letting learners decide	118.18	145.611	.217	.839
16	Stimulating link searches	117.69	144.175	.454	.832
17	Avoid close questions	119.06	153.684	-.078	.850
18	Prompting expression of understanding	118.08	142.368	.515	.830
19	Informing	118.86	151.625	-.001	.846
20	Withholding information	118.67	143.433	.314	.835
21	Rewording learner dialogue	118.08	146.410	.340	.834
22	Probing questions	117.71	147.667	.258	.836
23	Comparing learner comments	118.02	145.812	.319	.835
24	Confronting learners	118.41	145.372	.309	.835
25	Allowing learners time to respond	117.80	140.791	.494	.829
26	Probe to induce information sharing	117.69	144.842	.541	.831
27	Stimulate self-reflection	118.78	144.136	.297	.836
28	Use silence in group discussions	118.00	138.208	.568	.826
29	Promoting group self-management	118.24	142.772	.349	.834
30	Stimulate learns to explore group dynamics	118.12	145.776	.312	.835
31	Avoid lecturing	117.78	148.803	.090	.844
32	Avoiding intervening during group struggles	119.18	137.945	.580	.826
33	Passively stimulate discussion	118.53	146.504	.268	.836

[a] Alpha = 0.838 [b] *N*=49

Table H 4 Part B Reliable Items

		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1	Probing	92.53	121.088	.292	.671	.863
2	Guiding	92.39	119.784	.394	.768	.861
3	Indirect stimulation	92.45	118.169	.488	.590	.858
5	Asking open-ended questions	92.14	122.042	.358	.553	.862
6	Avoid expressing opinions	92.84	111.223	.579	.814	.854
7	Restrain offering key info	92.78	115.719	.414	.774	.860
8	Withholding suggestions	93.51	116.797	.318	.759	.865
9	Verbalizing my interpretations	92.82	119.570	.361	.676	.861
10	Eliciting reasoning lapses	92.65	118.690	.395	.705	.861
11	Neutral responses	92.78	114.303	.531	.831	.856
12	Summarizing learner's reasoning	92.69	121.592	.276	.614	.864
13	Indirect communication	92.51	115.255	.668	.834	.854
14	Encouraging self-expression	92.24	119.897	.353	.739	.862
16	Stimulating link searches	92.12	119.276	.438	.778	.860
18	Prompting expression of understanding	92.51	117.588	.502	.762	.858
20	Withholding information	93.10	118.385	.310	.829	.864
21	Rewording learner dialogue	92.51	120.588	.371	.657	.861
23	Comparing learner comments	92.45	120.003	.347	.727	.862
24	Confronting learners	92.84	119.764	.326	.577	.862
25	Allowing learners time to respond	92.22	115.303	.527	.758	.857
26	Probe to induce information sharing	92.12	120.068	.508	.742	.859
27	Stimulate self-reflection	93.20	118.749	.306	.505	.864
28	Use silence in group discussions	92.43	112.708	.611	.781	.853
29	Promoting group self-management	92.67	117.224	.371	.586	.862
30	Stimulate learners to explore group dynamics	92.55	120.086	.333	.620	.862
32	Avoiding intervening during group struggles	93.61	114.076	.545	.671	.856

[a]Apha = 0.860 [b]*N* = 49

Appendix I: Relationship between beliefs and comfort

Table I: 1 Comfort & Belief Crosstabulation

			Total Beliefs 3		
			1	2	Total
Total Comfort 2 a	1	Count	18	9	27
		% within Total Beliefs 3	69.2%	36.0%	52.9%
	2	Count	8	16	24
		% within Total Beliefs 3	30.8%	64.0%	47.1%
	Total	Count	26	25	51
		% within Total Beliefs 3	100.0%	100.0%	100.0%

Table I 2 Belief/Comfort Chi-square statistics

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.649[a]	1	.017		
Continuity Correction[b]	4.394	1	.036		
Likelihood Ratio	5.757	1	.016		
Fisher's Exact Test				.025	.018
Linear-by-Linear Association	5.538	1	.019		
N of Valid Cases	51				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.76.

b. Computed only for a 2x2 table

Appendix J: Intercorrelations of Survey Items

Table J.1: Part A Correlations

Item	2	3	4	5T	6	10	13	14	15	16	17	18	20	22	27T	32	33	34	36
2	1.00	0.48	0.36	0.06	0.33	0.28	0.25	0.27	0.37	0.299	0.261	0.298	0.200	0.366	0.127	-0.193	0.394	0.09	0.23
3	0.476	1.000	0.301	0.415	0.377	0.348	0.439	0.432	0.509	0.183	0.450	0.448	0.488	0.232	0.261	-0.082	0.161	0.348	0.238
4	0.356	0.301	1.000	0.258	0.238	0.326	0.334	0.358	0.321	-0.041	0.293	0.364	0.346	0.147	0.037	-0.144	0.329	0.247	0.221
5T	0.060	0.415	0.258	1.000	0.078	0.415	0.405	0.550	0.459	0.119	0.416	0.397	0.351	-0.034	0.201	-0.011	0.245	0.296	0.21
6	0.330	0.377	0.238	0.078	1.000	0.208	0.331	0.210	0.460	0.197	0.533	0.639	0.520	0.204	-0.009	-0.123	0.100	0.409	0.246
10	0.281	0.348	0.326	0.415	0.208	1.000	0.462	0.474	0.516	0.206	0.482	0.581	0.407	0.128	0.084	-0.081	0.271	0.492	0.327
13	0.253	0.439	0.334	0.405	0.331	0.462	1.000	0.543	0.481	-0.044	0.316	0.517	0.340	0.065	0.124	-0.316	0.180	0.314	0.189
14	0.275	0.432	0.358	0.550	0.210	0.474	0.543	1.000	0.630	0.170	0.334	0.442	0.555	0.078	0.193	-0.307	0.364	0.355	0.389
15	0.374	0.509	0.321	0.459	0.460	0.516	0.481	0.630	1.000	0.146	0.512	0.694	0.608	0.080	0.178	-0.081	0.293	0.428	0.359
16	0.299	0.183	-0.041	0.119	0.197	0.206	-0.044	0.170	0.146	1.000	0.154	0.217	-0.066	0.252	0.119	-0.346	0.198	0.033	0.367
17	0.261	0.450	0.293	0.416	0.533	0.482	0.316	0.334	0.512	0.154	1.000	0.703	0.489	0.158	-0.046	0.141	0.015	0.528	0.23
18	0.298	0.448	0.364	0.397	0.639	0.581	0.517	0.442	0.694	0.217	0.703	1.000	0.665	0.143	0.013	-0.011	0.182	0.481	0.305
20	0.200	0.488	0.346	0.351	0.520	0.407	0.340	0.555	0.608	-0.066	0.489	0.665	1.000	0.048	0.191	0.072	0.196	0.546	0.282
22	0.366	0.232	0.147	-0.034	0.204	0.128	0.065	0.078	0.080	0.252	0.158	0.143	0.048	1.00	0.196	-0.168	0.028	-0.016	0.207

Item	2	3	4	5T	6	10	13	14	15	16	17	18	20	22	27T	32	33	34	36
																			087
27T	0.127	0.261	0.037	0.201	-0.009	0.084	0.124	0.193	0.178	0.119	-0.046	0.013	0.191	0.196	1.00	-0.198	0.136	-0.025	0.313
32	-0.193	-0.082	-0.144	-0.011	-0.123	-0.081	-0.316	-0.307	-0.081	-0.346	-0.141	-0.011	0.072	-0.168	-0.198	1.00	-0.379	-0.153	-0.201
33	0.394	0.161	0.329	0.245	0.100	0.271	0.180	0.364	0.293	0.198	0.015	0.182	0.196	0.028	0.136	-0.379	1.00	0.144	0.084
34	0.090	0.348	0.247	0.296	0.409	0.492	0.314	0.355	0.428	0.033	0.528	0.481	0.546	-0.016	-0.025	0.153	0.144	1	0.204
36	0.230	0.238	0.221	0.210	0.246	0.327	0.189	0.389	0.359	0.367	0.230	0.305	0.282	0.087	0.313	-0.201	0.084	0.204	1
2		0.000	0.005	0.338	0.009	0.023	0.036	0.025	0.003	0.016	0.032	0.017	0.079	0.004	0.188	0.087	0.002	0.265	0.052
3	0.000		0.016	0.001	0.003	0.006	0.001	0.001	0.000	0.099	0.000	0.000	0.000	0.051	0.032	0.284	0.129	0.006	0.046
4	0.005	0.016		0.034	0.047	0.010	0.008	0.005	0.011	0.388	0.018	0.004	0.006	0.152	0.397	0.156	0.009	0.04	0.059
5T	0.338	0.001	0.034		0.294	0.001	0.002	0.000	0.000	0.203	0.001	0.002	0.006	0.406	0.078	0.470	0.042	0.018	0.07
6	0.009	0.003	0.047	0.294		0.071	0.009	0.070	0.000	0.083	0.000	0.000	0.000	0.076	0.474	0.196	0.243	0.001	0.041
10	0.023	0.006	0.010	0.001	0.071		0.000	0.000	0.000	0.074	0.000	0.000	0.002	0.185	0.279	0.285	0.027	0	0.009
13	0.036	0.001	0.008	0.002	0.009	0.000		0.000	0.000	0.379	0.012	0.000	0.007	0.325	0.194	0.012	0.103	0.012	0.092
14	0.025	0.001	0.005	0.000	0.070	0.000	0.000		0.000	0.117	0.008	0.001	0.000	0.292	0.087	0.014	0.004	0.005	0.002
15	0.003	0.000	0.011	0.000	0.000	0.000	0.000	0.000		0.154	0.000	0.000	0.000	0.288	0.105	0.285	0.019	0.001	0.005
16	0.016	0.099	0.388	0.203	0.083	0.074	0.379	0.117	0.154		0.140	0.063	0.323	0.037	0.203	0.006	0.082	0.41	0.004
17	0.032	0.000	0.018	0.001	0.000	0.000	0.012	0.008	0.000	0.140		0.000	0.000	0.134	0.374	0.162	0.459	0	0.052
18	0.017	0.000	0.004	0.002	0.000	0.000	0.000	0.001	0.000	0.063	0.000		0.000	0.158	0.464	0.470	0.101	0	0.015
20	0.079	0.000	0.006	0.006	0.000	0.002	0.007	0.000	0.000	0.323	0.000	0.000		0.370	0.090	0.309	0.084	0	0.023
22	0.004	0.051	0.152	0.406	0.076	0.185	0.325	0.292	0.288	0.037	0.134	0.158	0.370		0.084	0.119	0.423	0.456	0.273
27T	0.188	0.032	0.397	0.078	0.474	0.279	0.194	0.087	0.105	0.203	0.374	0.464	0.090	0.084		0.082	0.171	0.43	0.013
32	0.087	0.284	0.156	0.470	0.196	0.285	0.012	0.014	0.285	0.006	0.162	0.470	0.309	0.119	0.082		0.003	0.143	0.079
33	0.002	0.129	0.009	0.042	0.243	0.027	0.103	0.004	0.019	0.082	0.459	0.101	0.084	0.423	0.171	0.003		0.157	0.279
34	0.265	0.006	0.040	0.018	0.001	0.000	0.012	0.005	0.001	0.410	0.000	0.000	0.000	0.456	0.430	0.143	0.157		0.075
36	0.052	0.046	0.059	0.070	0.041	0.009	0.092	0.002	0.005	0.004	0.052	0.015	0.023	0.273	0.013	0.079	0.279	0.075	

[a] Grey cells = significant correlations $p < 0.05$, 1- tailed

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Table J.2: Part B Correlations

Item	1	2	3	5	6	7	8	9	10	11	12	13	14	16	18	20	21	23	24	25	26	27	28	29	30	32
1	1	.495	.337	-.141	.123	.026	.011	-.007	.214	.433	.261	.418	.342	.209	.211	-.184	-.053	.097	.075	.220	.221	.201	.108	.074	.036	.041
2		1	.241	.209	-.023	-.021	-.051	.196	.169	.352	.291	.448	.438	.457	.057	-.313	.254	.159	.307	.266	.533	.213	.210	.188	.182	.120
3			1	.189	.197	.166	.177	.245	.263	.367	.252	.496	.148	.259	.277	.080	.459	.180	.229	.388	.374	.222	.175	.111	.000	.284
5				1	.243	.203	-.069	.244	.003	.116	.115	.170	.219	.231	.209	.051	.334	.220	.239	.258	.354	.122	.136	.246	.345	.308
6					1	.630	.485	.247	.217	.464	-.030	.346	.053	.009	.379	.453	.101	.292	.124	.298	.102	.107	.524	.335	.276	.447
7						1	.546	.091	.034	.365	.041	.255	.162	-.032	.246	.327	-.037	-.049	.057	.109	.023	-.035	.500	.177	.193	.485
8							1	.064	.164	.238	-.017	.145	-.126	-.207	.035	.428	-.077	.085	.020	.316	-.034	.175	.350	.115	.107	.343
9								1	.339	.245	.159	.359	.220	.437	.347	-.008	.318	.140	.214	.047	.217	.123	.051	.034	.097	.265
10									1	.271	.455	.141	.132	.269	.316	.037	.252	.304	.419	.223	.137	.139	.300	-.065	.112	.095
11										1	.176	.622	.078	.184	.576	.059	.187	-.004	.291	.249	.129	.096	.307	.194	.139	.230
12											1	.215	.382	.173	.074	-.021	.120	.204	.290	.143	.311	.137	.069	-.114	-.015	.092
13												1	.420	.355	.596	.221	.439	.235	.184	.397	.312	.258	.327	.312	.140	.288
14													1	.302	.311	-.028	.064	.077	.155	.144	.340	.126	.334	.039	.272	.158
16														1	.203	.008	.266	.311	.358	.137	.598	.276	.273	.278	.275	.246
18															1	.310	.243	.132	.148	.219	.169	.028	.316	.229	.166	.253
20																1	.052	.052	-.088	.091	.043	.275	.432	.177	.260	.511
21																	1	.324	.198	.397	.237	.113	.238	.282	.013	.139
23																		1	.328	.470	.437	.089	.214	.175	-.091	.116
24																			1	.048	.214	.340	.093	.004	.003	.060
25																				1	.436	.106	.485	.472	.241	.272
26																					1	.182	.276	.352	.179	.416
27																						1	.088	-.013	.220	.268
28																							1	.358	.321	.483
29																								1	.365	.245
30																									1	.130
32																										1
1		.000	.009	.166	.200	.429	.470	.481	.069	.001	.035	.001	.008	.075	.073	.102	.359	.255	0.305	0.064	0.064	0.083	0.23	0.307	0.404	0.39
2	.000		.048	.075	.438	.443	.364	.088	.123	.007	.021	.001	.001	.000	.348	.014	.039	.137	0.016	0.032	0	0.07	0.073	0.098	0.106	0.205
3	.009	.048		.097	.088	.127	.111	.045	.034	.005	.040	.000	.155	.036	.027	.292	.000	.107	0.057	0.003	0.004	0.062	0.114	0.225	0.498	0.024
5	.166	.075	.097		.046	.081	.320	.046	.493	.213	.217	.122	.066	.055	.074	.363	.009	.064	0.049	0.037	0.006	0.203	0.177	0.044	0.008	0.016
6	.200	.438	.088	.046		.000	.000	.044	.067	.000	.418	.007	.359	.475	.004	.001	.245	.021	0.198	0.019	0.242	0.231	0	0.009	0.027	0.001
7	.429	.443	.127	.081	.000		.000	.266	.409	.005	.390	.039	.133	.413	.044	.011	.400	.370	0.349	0.227	0.439	0.405	0	0.112	0.092	0
8	.470	.364	.111	.320	.000	.000		.331	.130	.049	.455	.161	.195	.077	.405	.001	.300	.281	0.445	0.013	0.408	0.114	0.007	0.215	0.233	0.008
9	.481	.088	.045	.046	.044	.266	.331		.009	.045	.137	.006	.064	.001	.007	.477	.013	.169	0.07	0.374	0.067	0.2	0.363	0.407	0.254	0.033
10	.069	.123	.034	.493	.067	.409	.130	.009		.030	.001	.167	.183	.031	.014	.401	.040	.017	0.001	0.062	0.173	0.171	0.018	0.329	0.222	0.259
11	.001	.007	.005	.213	.000	.005	.049	.045	.030		.113	.000	.297	.102	.000	.344	.099	.490	0.021	0.042	0.188	0.255	0.016	0.091	0.171	0.056
12	.035	.021	.040	.217	.418	.390	.455	.137	.001	.113		.069	.003	.117	.306	.444	.205	.080	0.022	0.163	0.015	0.174	0.32	0.218	0.459	0.265
13	.001	.001	.000	.122	.007	.039	.161	.006	.167	.000	.069		.001	.006	.000	.063	.001	.052	0.103	0.002	0.015	0.037	0.011	0.014	0.169	0.022
14	.008	.001	.155	.066	.359	.133	.195	.064	.183	.297	.003	.001		.017	.015	.423	.331	.299	0.144	0.162	0.008	0.194	0.01	0.396	0.03	0.14
16	.075	.000	.036	.055	.475	.413	.077	.001	.031	.102	.117	.006	.017		.081	.479	.033	.015	0.006	0.173	0	0.028	0.029	0.027	0.028	0.044

Item	1	2	3	5	6	7	8	9	10	11	12	13	14	16	18	20	21	23	24	25	26	27	28	29	30	32
18	.073	.348	.027	.074	.004	.044	.405	.007	.014	.000	.306	.000	.015	.081		.015	.046	.182	0.155	0.065	0.124	0.424	0.013	0.057	0.127	0.04
20	.102	.014	.292	.363	.001	.011	.001	.477	.401	.344	.444	.063	.423	.479	.015		.361	.362	0.273	0.267	0.386	0.028	0.001	0.111	0.036	0
21	.359	.039	.000	.009	.245	.400	.300	.013	.040	.099	.205	.001	.331	.033	.046	.361		.012	0.086	0.002	0.05	0.219	0.05	0.025	0.466	0.17
23	.255	.137	.107	.064	.021	.370	.281	.169	.017	.490	.080	.052	.299	.015	.182	.362	.012		.011	.000	.001	.272	.070	.115	.267	.213
24	.305	.016	.057	.049	.198	.349	.445	.070	.001	.021	.022	.103	.144	.006	.155	.273	.086	.011		.373	.070	.009	.263	.490	.492	.340
25	.064	.032	.003	.037	.019	.227	.013	.374	.062	.042	.163	.002	.162	.173	.065	.267	.002	.000	.373		.001	.233	.000	.000	.048	.029
26	.064	.000	.004	.006	.242	.439	.408	.067	.173	.188	.015	.015	.008	.000	.124	.386	.050	.001	.070	.001		.106	.028	.007	.109	.001
27	.083	.070	.062	.203	.231	.405	.114	.200	.171	.255	.174	.037	.194	.028	.424	.028	.219	.272	.009	.233	.106		.273	.464	.064	.031
28	.230	.073	.114	.177	.000	.000	.007	.363	.018	.016	.320	.011	.010	.029	.013	.001	.050	.070	.263	.000	.028	.273		.006	.012	.000
29	.307	.098	.225	.044	.009	.112	.215	.407	.329	.091	.218	.014	.396	.027	.057	.111	.025	.115	.490	.000	.007	.464	.006		.005	.045
30	.404	.106	.498	.008	.027	.092	.233	.254	.222	.171	.459	.169	.030	.028	.127	.036	.466	.267	.492	.048	.109	.064	.012	.005		.186
32	.390	.205	.024	.016	.001	.000	.008	.033	.259	.056	.265	.022	.140	.044	.040	.000	.170	.213	.340	.029	.001	.031	.000	.045	.186	

[a] Grey cells = significant correlations $p < 0.05$, 1- tailed

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Appendix K: Interview Guide

Introduction
Thank you for agreeing to be interviewed in follow up to completing the Facilitation Perceptions Survey. Your comments as an experienced tutor are valuable and vital to providing a deeper understanding of tutors' perspectives. This interview will provide you with an opportunity to express in your own words in a more conversational style, your views on tutoring in a medical education program that uses a PBL approach.

During this interview we will focus on issues that are of a concern to you as a tutor, the topics of the research survey and issues that emerged from the survey. As you may recall the survey concerned facilitation in a program that uses a PBL approach with specific focus on teaching and learning beliefs concerning problem-solving and inquiry and comfort level with nondirective facilitation strategies.

Let us start with Facilitation

1. What issues would you like to talk about concerning facilitating as a tutor in a program that uses a PBL approach?

2. I'm interested in hearing your thoughts about learning and your educational philosophy.

3. How, if at all, has acting as a tutor in a program that uses a PBL approach changed your beliefs about teaching and learning? If so how?

4. What comes to mind when you think of using a PBL like approach?

5. What challenges or discomfort have you faced in facilitating tutorial groups?

6. In the survey, several respondents indicated that judging when to withhold intervening in discussion, redirecting discussion and not offering information was challenging. Can you comment on this?

7. Also from the survey responses, the topic of the tutor as expert emerged from the open ended comments about tutors' beliefs about teaching and learning. I am interested in hearing your comments on this topic.

8. Tutors sometimes remark that their facilitation style changes over time. Thinking back on how you facilitate, I would be interested in hearing your thoughts on your facilitation style and if it has changed since beginning to tutor in a program using a PBL approach.

    a. How has it changed?
    b. What do you attribute the changes to?

Communication
As part of your role as tutor you likely use various communication strategies. In this research I am aiming to gather deeper insight into tutors' communication strategies and techniques.

9. How would you describe the type of communication strategies and techniques that you use as a tutor?

10. How would you describe how this type of facilitation differs from other forms of facilitation, other forms of teaching?

11. To what extent, if any, do you feel your background has influenced your facilitation and communication techniques?

12. Do you perceive these techniques them as having any similarity to the type of communication techniques that you use with patients in your role as a health care professional?

13. Some researchers differentiate the type of facilitation and the type of communication used by tutors' in a PBL environment and refer to it as indirect or nondirective facilitation. Can you tell me about what these terms mean to you?

14. What techniques do you consider especially critical the type of communication used by the tutor in a PBL environment?

15. Can you outline any difficulties if any you have experienced using this type of facilitation?

16. What is the most uncomfortable communication technique for you? What technique if any causes you the most

17. What is the easiest aspect of nondirective facilitation for you?

18. I am interested in hearing your thoughts on the relationship between your beliefs about learning and your comfort level with facilitation communication techniques. Do you think that your beliefs about learning relate in any way to your comfort with the type of communication techniques you use as a tutor?

Recommendations

19. What suggestions would you have for new tutors/facilitators?

Survey Instrument – FPS

20. I am interested in any comments about the survey instrument.

21. To what extent do you think it may have value as a self-assessment tool or useful in training for beginning tutors?

Appendix L: Code Schedule and Definitions

Table L 1: Code Schedule

Level 1	Level 2	Level 3
T and L Beliefs (EP)	PBL Approach (PBL)	1. Inquiry 2. Problem first (constructivism, real world relevance) 3. Content review 4. Context dependent 5. Exciting (great, exhilarating)
	Tutor role	1. Facilitator (guide, probe, encourage, prompt, evaluate) 2. Group dynamics mediator 3. Indirect communication (indirectly direct, participatory leadership) 4. Mentor 5. Student-centered attitude 6. Enthusiasm (belief buy in, advocate for PBL, role model) 7. Intervention a. Situation dependent b. Maintain role fidelity 8. Expertise to: a. Ensure clinical relevance/clinical background (Physician (general medicine, Non medical, Awareness of profession) b. Ensure content expertise c. Facilitation expertise
	Student role (SR)	1. Learner autonomy (self-direction, self-evaluation) 2. Group dynamics (collaboration)
	Belief change (BC)	1. Yes 2. No 3. Ways a. Attitude: eg. Sensitive to individual differences
	Tutor Training (TT)	1. Courses 2. Tutorial observations 3. Facilitation expectations
Challenges		
	PBL Approach	1. Time 1. PBL Variance (teaching methods variance)
	Tutor Role (TR)	2. Facilitation 3. Evaluation 4. Group dynamics mediator 5. Indirect communication 6. Mentoring 7. Variance (Role fidelity) 8. Intervention a. Situation dependent b. Maintain role fidelity c. Provide minor facts d. Provide major answers 9. Expertise to: a. Ensure clinical relevance/clinical background (Physician (general medicine, Non medical, Awareness of profession

Level 1	Level 2	Level 3
		b. Content expertise
		c. Facilitation expertise
	Student Behaviour (S)	1. Group dynamics (Collaboration)
		2. Autonomy (Self-evaluation, self-direction)
		3. Dependency (related to conditioning)
		4. Maturity
Facilitation Background	Facilitation technique knowledge	1. Unable to identify techniques by name
		2. Able to describe direct facilitation
		3. Able to describe indirect facilitation
		4. Able to describe nondirective facilitation
		5. Describes other facilitation techniques
	Student PBL Experience (SE)	1. PBL student experience
		2. No PBL student experience
	Similar Experience Connections (SEC)	1. Clinical connected
		2. Clinical disconnected
		3. Nonclinical connected
		4. Nonclinical disconnected
		5. Medicine connected
		6. Medicine disconnected
		7. Therapeutic communication connection
	Therapeutic Communication	1. Present
		2. Absent
	Facilitation style change (SC)	1. Improvement
		2. No change
		3. Regress
Survey Instrument	1. Yes	
	2. No	
Tutor Evaluation	1. Self	
	2. Students	
Co learner	1. Present	
	2. Absent	

Table L 2: Code Categories, focus and examples

Variable/Code	Focus or Function	Example
Teaching and learning beliefs (EP)	The participant refers to beliefs about teaching and learning (educational philosophy)	
PBL Approach (PBL)	The participant describes what PBL means to them including how they distinguish learning in a PBL approach from other learning strategies and is coded as: 1. Inquiry 2. Problem first (collaboration, authentic) 3. Content review 4. Context dependent 5. Exciting	"Collaboration, interaction, different viewpoints, and different opinions" (EP/PBL- problem first) " I really think the problem solving of going to a problem cold is important." (EP/PBL – problem first) "I believe in constructivism that in a sense things aren't to be given. so learning is showing them that everything is constructed. (EP/PBL/Problem first/constructivism)
Tutor Role (TR)	The participant describes what PBL tutoring means to them including differences with other forms of facilitation or of teaching coded as: 1. Facilitator 2. Group mediator 3. Indirect communication 4. Mentor 5. Student-centered attitude 6. Enthusiasm (belief buy in) 7. Intervention 8. Expertise	"You are more of a facilitator. You are more of an evaluator. You are more of a mediator." (EP/TR/Facilitator) "You are not only a tutor but a role model.... Not just guiding them through the content but mentoring them ..."(EP/TR/Mentor) "I'm actually facilitating and I'm not taking over." (EP/TR/Facilitator) " I think you have to be direct in an indirect way" (EP/TR/Indirect communication) "I really like it when you pull back a bit as a tutor and they are solving their own problems, complementing each other, working with each other and asking each other questions." (EP/TR/Intervention)
Student role (SR)	The participant describes what PBL tutors means to them in terms of the role and rights of students 1. Learner autonomy 2. Group dynamics and collaboratioin	"Its more along having it come from within and from the self-directed approach as opposed to the didactic." (EP/SR/ Learner Autonomy) "I think the program does a good job of having more accountability for knowledge."(EP/SR/Learner Autonomy) "Its about the questions, how to generate questions and how to find resources and putting that responsibility on the individual student themselves..." (EP/SR/ L Autonomy) "To challenge the group to come up with the answer on their own." (EP/SR/LA) "Having people come up with their own idea as to why something didn't work as well as their own ideas as to why some. works" (EP/SR/LA)
Belief change	The participant describes modifications to educational beliefs associated with tutoring and is coded as:	"I don't know if it has changed them. It has certainly modified them." (EP/belief change - yes)

Variable/Code	Focus or Function	Example
	1. Yes 2. No	
Tutor Training (TT)	The participant describes recommendations for tutor training and is coded as: 1. Courses 2. Tutorial observations 3. Facilitation expectations	"I think were the discussion needs to be is not so much how to tutor or how to facilitate but maybe a little more on the expectations of content"(EP/TT – facilitation expectations) "The reality is there should be three full courses going through"(EP/TT – courses) "Tutors need to have buy in" "Watching Alan Neville's Mac Bloopers" "watching one or two real tutorials..." (EP/TT- observations)

Variable/Code	Focus or Function	Example and Codes
Challenges (C)	The participant refers to the challenges faced as a tutor.	
PBL Approach	The participant describes PBL challenges coded as: 1. Time 1. PBL Variance (teaching methods variance)	" ...the amount of time it takes to do a good job." (C/PBL/Time) "It's a concern. I'm doing a community health type unit. When I did it last year it was pretty unsatisfactory cause they had this expectation that tutors would deliver mini lectures and that was problematic for two reasons. One, I hate lectures, and two I'm not a content expert and I generally supported the nonexpert tutor modes. They have changed it so this year they are going with giving the lectures in large groups. That is probably an example of going form PBL to sort of fitting in the defactoid stuff which didn't fit into the tutorial session, so it has now regressed. " (C/PBL/Variance)
Tutor Role (TR)	The participant describes the relevance of tutor role coded as: 10. Facilitation 11. Evaluation 12. Group dynamics mediator 13. Indirect communication 14. Mentoring 15. Variance (Role fidelity) 16. Intervention a. Situation dependent b. Maintain role fidelity c. Provide minor facts d. Provide major answers 17. Expertise to: a. Ensure clinical relevance/clinical background (Physician (general medicine, Non medical, Awareness of profession b. Content	" You need to know enough that when they are making stuff up you can call them on it:"(C/TR) "The think that I find the most uncomfortable and the most challenging component is uh, this evaluation and I firmly believe anyone who comes and tells me they know how to do it is either ignorant or lying, really. I mean I've been doing it for a long time and I'm still very uncomfortable. And, I mean can convert it into a formula, we can convert it into all sorts of stuff but really, on a moment to moment basis it is very tough. (C/TR/E) "Id agree whole heartedly. That is a real skill. Um. Because you don't want to. It's a balancing act all the time knowing when to intervene and when to let the conversation go. When to react to questions and you know it is really your gut and your faith in the process quite frankly." (C/TR/Variance) "it also depends on how much you know. If you are an expert tutor in an area then you may share a bit more information than if you ar not. And I don't think there is anything wrong with that as long as you don't take over the group and that in the biggest sense is the challenge. Not taking over the group." (C/TR/Expertise)

Variable/Code	Focus or Function	Example and Codes
	expertise 1. Facilitation expertise	
Students (S)	The participant describes conditions and challenges concerning students and is coded as: 1. Group dynamics 2. Autonomy 3. Maturity	"I've struggled with group members who seem to lack the desire to function within a group." (C/S/Group dynamics - collaboration) "managing the group dynamics cause again you are used to being an expert in imparting knowledge." (C/S/group dynamics) "It's a challenge for me to make then see that [clinical relevance] (C/ S/maturity)

Variable/Code	Focus or Function	Examples and Codes
Facilitation Background (FB)		
The participant refers to their knowledge and experience with facilitation/communication techniques		
Facilitation technique knowledge (FTK)	The participant's description of facilitation and communication techniques coded as: 1. Unable to identify techniques by name 2. Able to describe direct facilitation 3. Able to describe indirect facilitation 4. Able to describe nondirective facilitation 5. Describes other facilitation techniques	"I don't know any official terms of this sort of stuff..." (FB/K/1) "To me an indirect approach would be again having the group come up with the solution to the problem" (FB/K/3) ".. that is how I facilitate. I don't have any specific techniques that where I will ask them what thy mean by a question and then I'll identify parts of their answer and ask them to expand on those specific parts and perhaps my bias is I feel they need to appreciate,,. I think in many ways that can be termed indirect facilitation" (FB/FTK/1)
Student PBL Experience (SE)	The participant refers to prior PBL facilitation experience as a medical student or resident clinical or non clinical facilitation experiences Coded as: 1. PBL student experience 2. No PBL student experience	I went through the medical program here (FB/SE/1) "I was a Mac grad." (FB/SE/1)
Similar experience connections (SEC)	The participant refers to connections between similar facilitation experiences. Similar experience connections are coded as: 1. Clinical connected 2. Clinical disconnected 3. Nonclinical connected 4. Nonclinical disconnected 5. Medicine connected 6. Medicine disconnected 7. Therapeutic communication connection	"The technique comes from having to deal with the parents. Were you want it to come from the individual himself." (FB/SEC/clinical - connected) "If you come from a discipline where you interact with other people where you have an almost a management responsibility ... you are OK." (FB/SEC/nonclinical connected) "Oh absolutely... So much of everything is multi-disciplinary in facilitating communication [in the clinical area]..." (FB/SEC/clinical connected) "Oh sure, the clinical method is easily mirrored in the learner-centered approach: (FB/SEC/1)
Therapeutic communication	The participant refers to the application of therapeutic communication techniques in tutoring examples e.g. allowing the student to take direction of the conversation. Coded as: 1. Present 2. Absent	
Facilitation style change (SC)	The participant refers to change in facilitation style and associated factors coded as: 1. Improvement 2. No change 3. Regress	"To me my style has changed in that I am getting a bit better at it." (FB/SC/Improvement)
Beliefs and behaviour (BB)	The participant refers to relationships between teaching and learning beliefs comfort or	"Even if you make a good go of it then you will always fall back on that initial belief system." (BB - Yes)

Variable/Code	Focus or Function	Examples and Codes
	challenges and is coded 1. Yes 2. No	"In a perfect utopia you wouldn't be allowed to tutor until you had three or four courses.... And if you don't have buy in you shouldn't be teaching." (BB - yes)
Survey Instrument (SI)	Participants refer to the use of the FPS in tutor training coded as: 1. Yes 2. No	"Yea, I can definitely see it being useful. Cause it is, its almost a reminder...." (SI – yes)
Codes Emerging from Interviews		
Tutor evaluation	The participant refers to the evaluation of their effectiveness coded as: 1. by students 2. by self	"I ask them to evaluate my participation just like their own." (TE- by students)
Co learner	The participant refers to co learning with students coded as: 1. Present 2. Absent	"We all have to learn this together." (CL/present)