

## **Students' perspectives on problem-based learning in a transitional Doctorate of Physical Therapy Program**

**Hélène M. Larin<sup>1</sup>, Kathleen M. Buccieri<sup>2</sup>, Jean Wessel<sup>3</sup>**

*Abstract: Doctor of physical therapy (DPT) graduates are expected to be competent in professional behaviors, communication, critical inquiry, clinical decision making, and evidence-based practice. The purpose of this qualitative study was to describe the experience of students enrolled in a single, problem-based learning (PBL) course within a conventional lecture-based transitional DPT (tDPT) program. Students wrote weekly entries in a reflective journal. Three investigators identified significant statements in the journal entries, clustered the statements, and developed themes. Five themes were identified: 1) accessing and applying information, 2) value of giving and receiving feedback, 3) value of and commitment to the group, 4) awareness and appreciation of the PBL process, and 5) personal and professional growth. A single PBL course within a tDPT conventional curriculum was well accepted by students in this study. Students appreciated the benefits of learning in a group, and gained knowledge, skills, and attitudes consistent with characteristics desired of DPT graduates.*

*Keywords: problem-based learning (PBL), transitional doctorate in Physical Therapy (tDPT), reflective journals, qualitative study*

### **I. Background and purpose.**

#### *A. Professional Competencies.*

A doctoral degree has been or is becoming the entry-level requirement for many health professions. In the field of physical therapy, the emphasis in the clinical doctorate programs has been on providing students with advanced knowledge, skills and attitudes to promote the development of reflective, evidence-based practitioners (American Physical Therapy Association, 2006). Although a specific method of education has not been recommended, several authors (Feingold, 2008; Foord-May, 2006; Kelly and Haidet, 2005; Savery, 2006; Springer, Stanne, and Donovan, 1999; van der Meer and Scott, 2008) have suggested that student-centered programs are more likely to produce the desired characteristics in the new graduate. Problem-based learning (PBL) is one student-centered method that has been utilized extensively in health science education, and may help students acquire the professional knowledge, skills and attitudes desired in doctoral education.

Health professionals must be able to reflect on their personal and professional development (Donaghy and Morss, 2007; Fraser and Greenhalgh, 2001). According to Boud, Keogh, and Walker (1985) reflection is “a generic term for those intellectual and affective

---

<sup>1</sup> Ithaca College, Department of Physical Therapy, 953 Danby Road, Ithaca, NY 14850, [hlarin@ithaca.edu](mailto:hlarin@ithaca.edu).

<sup>2</sup> Ithaca College, Department of Physical Therapy, Rochester Campus, NY, 14620, [kbuccieri@ithaca.edu](mailto:kbuccieri@ithaca.edu).

<sup>3</sup> McMaster University, School of Rehabilitation Science, Hamilton, Ontario, Canada, [wesselj@mcmaster.ca](mailto:wesselj@mcmaster.ca).

activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations” (p. 19). Kuiper and Pesut (2004) argue that both cognition (critical thinking, reasoning) and metacognition [reflection on one’s own cognitive and learning processes (Cheong, 2008)] are essential and integrated parts of clinical reasoning. Educators seek to incorporate instructional strategies that will help their students develop clinical reasoning and reflection.

### *B. The Problem-Based Learning Approach.*

Problem-based learning has been suggested as one of the educational methods that facilitate both cognition and metacognition skills (Foord-May, 2006; Lusardi, Levangie, and Fein, 2002; Uhlin, Johannesson, and Silén, 2007; Williams, 2001). In a PBL course, learning is structured around a realistic case scenario that provides context to facilitate reflection and critical thinking (Kuiper and Pesut, 2004). Students learn in groups with guidance from a tutor. They define individual and group learning needs, and search for and critically apply findings to the case scenario (Dolmans et al, 2005). Students must select and organize relevant information and communicate effectively with their peers. The ability to apply information clinically is dependent, in part, on how one organizes and accesses knowledge (Norman and Eva, 2003). In PBL courses, students are practicing organizational and retrieval skills that will be useful for making and applying clinical decisions, interacting with patients and colleagues, and becoming lifelong learners (Lusardi, Levangie, and Fein, 2002).

Self- and peer-assessments are components of PBL that may be particularly useful for promoting reflection in physical therapy students. In a PBL course, students are required to evaluate themselves, their peers and tutors during tutorial sessions. This weekly oral feedback may cover any of the expected tasks of PBL, e.g., defining learning objectives, accessing, organizing and applying relevant information, and professional behavior, such as punctuality, communication and respect for others. Students are expected to modify their behavior in response to feedback, and to note and suggest change in others. Williams (2001) articulates that the feedback component of a PBL course promotes students’ reflections on their actions and facilitates development of strategies for improved performance.

### *C. Problem-Based Learning Literature.*

Authors conducting reviews of the literature over the past 20 years (Norman and Schmidt, 1992; Albanese and Mitchell, 1993; Dochy et al, 2003; Koh et al, 2008), have reported that PBL sustained self-directed learning, and improved resource use, collaborative skills, retention of knowledge, knowledge application, and transfer of concepts to new problems. In their recent systematic review, Koh and colleagues (2008) reported positive effects of PBL on physician competencies after graduation especially in the social and cognitive areas. The authors indicated that there was strong evidence to support the positive effect of PBL on several observed competencies of medical graduates: diagnostic skills or accuracy, communication skills, appreciation of cultural, legal and ethical aspects of health care, coping with uncertainty, responsibility and reliability, and self- or peer appraisal. Ozturk et al (2008) reported evidence that PBL encouraged critical thinking in nursing students; and, Richards et al (1996) and Distlehorst and Robbs (1998) noted the superior clinical performance of PBL students. Finally,

from their meta-synthesis of meta-analyses, Strobel and van Barneveld (2009) concluded that “PBL is significantly more effective than traditional instruction to train competent and skilled practitioners and to promote long-term retention of knowledge and skills acquired during the learning experience or training session” (p. 55). These studies have provided evidence that PBL fosters many of the characteristics desired in doctoral level PT graduates.

Some authors (Colliver, 2000; Dochy et al, 2003; Albanese and Mitchell, 1993; Albanese, 2000; Saarinen-Rahiika and Binkley, 1998; Mann and Kaufman, 1999; Jefferson, 2001; Solomon, 2005; Rideout et al, 2002; Koh et al, 2008) have reported that PBL is not superior to conventional educational approaches in all aspects of learning. For example, students who studied in a PBL curriculum demonstrated lower levels of content-specific knowledge and basic sciences and scored the same or lower on examinations compared to students in conventional programs (Dochy et al, 2003; Albanese and Mitchell, 1993). Students in PBL also perceived themselves as having lower knowledge even when they had performed as well as students from conventional programs on board examinations (Koh et al, 2008; Mann and Kaufman, 1999). Jefferson (2001) concluded from his review that PBL did not improve students’ problem-solving skills and Colliver (2000) found no convincing evidence that PBL improves knowledge and clinical performance.

#### *D. Problem-Based Learning and Physical Therapy.*

Studies of physical therapy students have provided support for the suggested effects of PBL on professional skills and behaviors. These have included investigations on students in fully integrated PBL curricula, and those in stand-alone PBL courses. Van Langenberghe (1988) reported that students in PBL have more desirable personal study habits. Physical therapy students during the first term of a fully integrated PBL program described an improved ability to access appropriate information, an appreciation of giving and receiving feedback, and an increased awareness of group process and group methods of learning (Williams, MacDermid, and Wessel, 2003). Students in a first year PBL ethics course felt they improved their critical thinking and problem-solving skills and their ability to speak in front of others (Uhlir, Johannesson, and Silén, 2007). In an attempt to evaluate the effect of a PBL course on lifelong learning, Wiegand, Gillette, and Brosky (2005) surveyed physical therapists two to four years after graduation. Those that had taken a PBL course on professional issues felt more prepared to develop and implement continuing education courses than those who had covered the same curricular content in a conventional course.

A thorough review of the literature revealed only one study examining the reactions of students to a single, PBL course within a 3-year DPT program (Santasier and Plack, 2007). The Case Study I course was full time for one week, held between semesters of conventional curricula and incorporated cycles of action and reflection. The authors analyzed qualitative data from the individual, reflective essays of 25 students who answered the question on whether the course objectives addressing professional behaviors were met, and from graphic metaphors created by groups of 3 or 4 students to depict what the course was like for them. Students reported enhanced critical thinking, commitment to learning, interaction skills, stress management, and professional identity. The authors noted that the graphic metaphors “further supported the integration, synthesis, and personal growth in professional behaviors” (Santasier and Plack, 2007, p. 35).

Several authors (Dolmans et al., 2005; Lusardi, Levangie, and Fein, 2002) have called for further research to better understand the theoretical concepts underlying PBL, and the impact of PBL on students' transition to clinical practice and lifelong learning. No studies have reported the reactions of students to a single PBL course within a conventional, lecture-based curriculum designed for transition to a DPT. The response of students to a single PBL course near the end of their professional education may be different from that of students who participated in PBL style courses throughout their program. The purpose of this qualitative study was to describe physical therapy students' perceptions of their experience and learning during participation in a single PBL course within a transitional DPT (tDPT) lecture-based curriculum.

## **II. Methods.**

### *A. Design.*

This study followed a phenomenological, qualitative approach (Creswell, 2007). Researchers use this method when they wish to describe the lived experiences of people involved with the topic being studied. We chose this design to capture the PBL experience from the personal perspective of the students. Students wrote weekly reflections over the 10-week time period of a single PBL course. The three investigators read the journal entries and developed themes.

### *B. Participants.*

Sixty-three physical therapy students (15 male and 48 female, mean age 23.6 years, range 22.1-27.7 years) enrolled in a PBL Case Study Seminar course within a lecture-based tDPT curriculum were invited to participate in the study. All students had completed an entry-level Master of Science in Physical Therapy (MSPT) degree with 30 weeks of clinical education course work. Sixty-one of these students had not yet been employed as physical therapists. Two students were alumni who had graduated within the past 5 years and had been in clinical practice prior to enrolling in the course. The study was approved by the All College Review Board for Human Subjects Research of Ithaca College, and participants provided written informed consent.

### *C. Educational Program and PBL Course.*

The tDPT program was solely available to Ithaca College graduates holding a MSPT degree. The 10-week, on-site, tDPT curriculum consisted of 6 intensive courses, one of which was Case Study Seminar, the only PBL course offered in the entire physical therapy curriculum (MSPT and tDPT). The course was designed to help students integrate previous academic and clinical coursework, expand professional knowledge, develop skills in communication and reflection, and design treatments based on evidence. Groups of six to seven students, facilitated by a tutor, met for two hours weekly to discuss a series of written health care scenarios. Students were required to work together to identify weekly learning issues. They individually located, accessed, evaluated and organized evidence relevant to the case. Knowledge was discussed and applied to the client scenario during the next tutorial session. The cases covered a broad scope of physical therapy practice, were complex and multidisciplinary in nature, and included patients of various age groups and cultural backgrounds. Peer, tutor and self-assessments occurred orally at each tutorial session, and in written and oral format at midterm and at the end of the course.

All tutors attended eight hours of PBL training workshops, had a minimum of two years experience with the PBL approach, and had been involved in the tDPT program for the past three years. The course coordinator provided the course syllabus and a tutors' guide which included the learning objectives and relevant literature for each case scenario. Tutors attended weekly meetings with the course coordinator to discuss the progression of the course, student performance and facilitation strategies to enhance students' learning.

#### *D. Data Collection and Analysis.*

Reflective journal writing was used as a means of gathering students' perceptions on their first experience with PBL. Previous investigators have used this method to study the process of transitional adjustment of adult learners in their first year of higher education (Risque, Moore, and Morley, 2007-2008), and of physical therapy students entering a PBL curricular program (Uhlén, Johannesson, and Silén, 2007; Williams, MacDermid, and Wessel, 2003). Both students and faculty in previous studies have commented on the value of journal writing to better understand the students' experience with PBL (Uhlén, Johannesson, and Silén, 2007; Williams, MacDermid, and Wessel, 2003).

As part of the Case Study Seminar course, each student was required to complete and submit a reflective journal about their experience and their understanding of the process of problem-based, self-directed learning. They were to include observations, impressions, and reactions to what and how they were learning, and to relate these to previous learning and potential future behavior. Students were awarded 1% for each completed weekly journal entry for a total of 10% of the course grade. At mid-course and in the final week, the course coordinator reminded students to write in their reflective journals.

On the first day of the last week of the course, the principal investigator sent an e-mail to the students inviting their participation in the study. The students were assured that their decision to participate or not participate would have no impact on the course grade. The investigators would access the reflective journals for qualitative analysis of content only after the students' graduation date. Students received no incentives to participate and were offered a summary of the results at the end of the study upon request. At the end of the course, all students submitted their journals to an administrative assistant. To protect the anonymity of the students, a research assistant removed the names from the journals of all participants, replaced names with code numbers, and delivered the coded journals to the investigators.

Three investigators were involved in the qualitative analysis of the journals. One investigator was the Case Study Seminar course coordinator and a tutor, the second, a tutor in the course, and the third, a faculty member from another university with no involvement in this tDPT program. All three investigators were experienced educators and scholars in the profession of physical therapy. Their combined clinical and research expertise included pediatric neurology, orthopedics, rheumatology, moral judgment and clinical education. Two of the investigators had extensive experience in teaching in PBL curricula and had utilized reflective journals in previous research (Larin, Wessel, and Al-Shamlan, 2005; Williams, MacDermid and Wessel, 2003; Williams et al, 2002). Each investigator brought to the analysis of the reflective journals a different awareness based on their respective experiences in physical therapy.

Initially, the three investigators independently read five randomly selected journals and highlighted significant statements representative of how the participants experienced the PBL course. They then began to group the statements into large units of information or categories and

met to revise and establish agreement on the categories. They then reread and searched for the agreed categories, and identified significant statements outside of these categories, in the same five journals and into two entries from each of six additional journals. For the latter six journals, the investigators were paired (3 possible pair combinations), so that each journal was read by two evaluators. This analysis was followed by a second meeting to further establish agreement on the categories. In case of disagreement between the paired investigators, the third evaluator participated in the discussion until the issue was clarified and a consensus reached. The remaining journals were randomly assigned to one of the three pairs of investigators. The three investigators met again to establish agreement on the interpretation of the categories of the weekly entries. Afterwards, they independently developed and organized clusters of meaning into themes that would lead to a composite description of the essence of the students' experience (Cresswell, 2007). They then met several times to refine and come to agreement on the final themes. All decisions made throughout the analytic process were recorded.

Member checking was performed to validate interpretation of the journals. Eight study participants volunteered to provide feedback on the themes developed by the authors. They were provided with descriptions of the themes and asked if information accurately represented their experience in the PBL course. They were to indicate any themes that did not reflect their experience, as well as experiences that were not reflected in the themes. The information was gathered through a research assistant to maintain the anonymity of the respondents.

### **III. Results.**

Fifty-one students (81% of the class, 11/15 male, 40/48 female, mean age 23.5 years, range 22.9-26.7 years) participated in the study. All participants completed 10 journal entries, each approximately one page in length. The first entry typically described the students' expectations for the course, and the last entry was generally a summary of their experience over the 10 weeks of the course. The remaining entries focused on the tutorial sessions or preparation for them. Some students provided recommendations for changes in the course.

Qualitative analysis revealed five themes: 1) Accessing and applying information, 2) Value of giving and receiving feedback, 3) Value of and commitment to the group, 4) Awareness and appreciation of the PBL process, and 5) Personal and professional growth. The themes are presented below and illustrated with quotes from the journals. Each quote is identified by participant number and week of entry in parentheses.

#### *A. Theme 1: Accessing and Applying Information.*

The students discussed their individual efforts and resultant learning in accessing and 'filtering' information that they shared with their peers and applied to the case during the tutorial sessions. Students learned that they needed to ask specific, focused research questions in order to narrow the search to a reasonable number of relevant articles and to have better group discussions. They began to use search engines more efficiently, and to critically appraise articles, selecting those with higher levels of evidence to limit the volume of information without compromising quality. In order to share the research findings with the group, students learned to organize their information for prompt access and to supplement, but not repeat, the contributions of others in the tutorial discussion. As the course progressed, they became more aware of communication skills, particularly the ability to present, listen, and facilitate. Students noted more effective participation

of all members as they became more comfortable with their group. The students recognized the value of ‘information management’ skills for clinical practice.

*“...I was able to focus my search this week to include only really relevant articles about the treatment approach. I think that this week I was finally able to get into a groove where I spent just enough time looking for articles so that I found all of the relevant ones that I could but I still had time to really read them and critically appraise them.” (18-9)*

*"This week I also tried a new organizational strategy. Before the group meeting I made a single document that contained the title of the article I found, a brief summary of the study design and results, the level of evidence, and the components of each model to which the evidence was applicable. I found that this method not only prepared me for the discussion more thoroughly, however it made me learn and pay attention to the material much more than I would have by just reading the articles alone." (41-7)*

*“I am putting more emphasis on evidence that is more current...by relying on more current data it will be easier to keep up with the rapid pace of healthcare discovery. If I continue to do this once I am in the clinic, hopefully I will be able to stay on top of current evidence.” (49-8)*

#### *B. Theme 2: Value of Giving and Receiving Feedback.*

A large focus of the journal entries was dedicated to the students’ feelings about feedback and their use of feedback to guide change in performance. Initially, most were concerned about the newness of giving feedback to their peers and tutors in a small group, face-to-face format. Students voiced various levels of comfort with giving and receiving feedback, and differed in their expressed opinions on the frequency of feedback needed. Some felt that frequent feedback became redundant, while others noted that ongoing feedback facilitated performance changes and led to the development of useful clinical skills. Students actively sought and utilized feedback to develop strategies to improve individually and as a group. They commented on the success of their new strategies and liked to have confirmation from others that a positive change in behavior had been observed. All acknowledged that the ability to give and receive feedback was an important skill for clinical practice.

*Providing constructive feedback to other members of the group was a challenge especially on the first day. I understand this will be useful when we get out into the professional world especially during staff meetings. It allows us to learn how to professionally and appropriately provide feedback. However, I do not feel that weekly constructive feedback is necessary...It will take time until I become more comfortable with the process. (12-1)*

*Providing feedback in past courses has always been private and quick...always positive. For me, feedback had always been something I did not take seriously or learn from...feedback in PBL is quite the opposite...Surprisingly, I actually enjoyed this aspect of our class...I now realize how valuable it is to receive and provide feedback and will now continue to take this process sincerely. (46-2)*

*I find the weekly feedback very beneficial. I feel that the advice I get from my peers on how I can contribute more to the group helps in my speaking skills, organizational skills, and improves my ability to be an effective team member... I try to take the feedback and apply it to the following week. (14-3)*

*When it came time to give constructive feedback, I felt good about myself and I think group members observed an improvement in myself as well... I am more excited for next week now that my enhanced performance has been acknowledged. (48-8)*

### *C. Theme 3: Value of and Commitment to the Group.*

The students noted many positive aspects of working in a group. Students described a greater breadth of learning because group members brought different resources, past experiences and perspectives to the cases. Students acknowledged that group discussions led to a better understanding of concepts and deeper learning than individual study. Students felt that as a result, they would provide more effective patient care. Individuals reflected on their ability to model the effective behaviors of other group members. The group provided support, allowing students to try new roles or voice their opinions in a safe environment. Quieter students might be encouraged to contribute, while more vocal students modified their involvement to a facilitatory role. The students revealed an acute consciousness of their individual responsibility towards the group. Students felt a strong need to be present and punctual at all tutorial sessions, to come well prepared, to contribute actively to the discussion, and to take on new roles to improve group function. The students appreciated working with classmates that they had not been involved with previously. They wanted the group and all its members to succeed, and they recognized the importance of their individual contributions to this end.

*Despite reading the same articles, we all picked out different information and were able to collaborate as a team to draw conclusions from our research. I believe that this shows that in the clinic if a team receives the same information you still need to collaborate because people get different things out of the same research. This emphasizes the need for communication and collaboration. (45-9)*

*The critical thinking and problem solving as a group helped me see beyond what I was thinking and directed me to what I was missing... I felt I had delved deeper in the case study with the group compared to as if I would have just looked at it alone. (48-1)*

*The conversation reached a new level of intensity. I don't think it would have been possible to have such a serious, deep-thinking conversation early on in the semester before our group had learned the ins and outs of group process and had become comfortable with each other. (19-9)*

*I would feel terrible if [a group member] failed the class...this class is a group effort and as a group we need to help each other achieve. (16-8)*



*I was a bit lost... I learned that it is not fun to miss a meeting. I felt really left out and lost leaving today and hope that I can get back on track. I will definitely not miss or be late to anymore group sessions....I will be understanding of others in the future as well. (48-5)*

*D. Theme 4: Awareness and Appreciation of the PBL Process.*

Throughout the weekly journal entries, the students discussed their interactions in the tutorial sessions. They noted whether the group functioned well or not in sharing information and applying it to the case. They analyzed what went right or wrong, and how they might improve the group process. They were aware of the different roles taken on by themselves, by other group members and by the tutor, and whether these were effective in helping the group. Early on students were more tentative in their participation, particularly feeling discomfort if they moved away from traditional, comfortable behaviors. They progressed to being interactively engaged in an enjoyable, smooth and balanced flow of group discussion. They were pleased when their group ran like an effective health team discussing the needs and treatment of a patient. Students realized that when the group functioned well, they learned more. Some students noted each week that the group improved from the previous week. Others reported ups and downs, and described what the group or individual was going to do to improve performance.

Several students enjoyed the high level of self-directed learning in the PBL-based course. They provided various examples of situations where independent learning and logistical decisions were made by the group members (with little or no influence from the tutor). Students developed individual as well as group goals to enhance their learning and improve group function. Some students acknowledged the relevance of self-directed learning to future professional practice and lifelong learning.

All students commented on the value of the course and the PBL method of learning. Several students noted and agreed with the gradual increase in demands as the course progressed. While acknowledging that the course was more challenging than expected, the majority of the students felt PBL should have been introduced earlier in their physical therapy studies.

*Our meeting was more of a discussion and we asked each other questions about our articles. We gave our own opinion on what we would do based on the articles and we gave ideas from past experiences on our clinical affiliations. I think we listened to each other better and didn't shift through our notes as much when other people were talking. I also felt like I learned a lot more this session than any other session because of how well we discussed. (27-7)*

*I really don't know why this regression in group dynamics and group process occurred... I think that we were doing so well over the past weeks that we slacked on what we were trying to achieve... I'm personally going to really try to facilitate next week. Hopefully I can improve my facilitation role if I actively listen to others and then challenge the more quiet people in the group to talk more. (16-7)*

*This week marked a transformation in comfort zone. I felt much more free to express my evidence and my clinical opinions this week. I have no idea what caused this sudden shift in attitude. I guess I am really becoming comfortable with problem-based learning and discussing case information with my peers as if they were colleagues and/or fellow*

*clinicians...Our weekly meetings are becoming more efficient and less about spurting out random fragments of evidence. (41-6)*

*Prior to this doctorate program I always disliked group work...finding the quickest and most efficient way to complete the task. PBL seems so different than that. We all actually spent time to teach each other. I know I learned things about myself through the feedback sessions...now I feel I can be a strong member within a group. This course has changed my view on group work. I now know how valuable it is to meet with colleagues especially in the healthcare setting. There is always something to learn even as an expert. (12-10)*

*I now realize the critical balance between sharing, active listening and facilitating, amongst other roles... I have strengthened my active listening skills and skills of facilitation... The process of PBL has reinforced and further strengthened my abilities to accept and provide concrete constructive feedback....made me more of a motivated self-directed learner...I look forward to returning to the workplace and starting a weekly review of research with my team. (17-10)*

*During the beginning of the course I fostered negative feelings towards my tutor. I realize now that [he/she] has pushed us continuously to the next level and at the time I did not feel appreciated for my personal, as well as my group's accomplishments. Our tutor brought a different... perspective to our group that raised multiple questions that we otherwise would not have considered. (13-10)*

#### *E. Theme 5: Personal and Professional Growth.*

Personal and professional growth was noted in the change in the weekly comments of the students and in their final summaries. Students discussed their emerging ability to take on different group roles, to be more (or less) outspoken, to use their communication and active listening skills to facilitate others, and to be more efficient and effective in managing information. They began to 'internalize' these skills, allowing effective group functioning without having to concentrate on group process. Individuals were proud of their own improvements and happy when they could contribute to the growth of the group or its members. The students noted that the skills they gained from the PBL course would be valuable in communicating with patients and healthcare teams, in finding information pertinent to 'best practice', and providing and responding to feedback in a clinical setting.

*I think this course taught me that you can work as a team, even though they may be people that you do not know very well. I also learned the importance of being respectful of others in a working communication setting. If you want people to listen, you also have to listen to what others have to say and interact appropriately with them. In summary, I head into the clinic as a stronger team member with new invaluable skills. (45-10)*

*This course had a huge impact on focusing my skills.... Really made me use the knowledge I have gained from the past two research courses solidifying my ability to search for high levels of evidence....I am more confident in my ability to research specific patient characteristics and justify my decisions using evidence from the research. (49-10)*

*I really enjoyed the problem based learning approach to this class. I think it helped us to become familiar with some harder case studies and researching for these patients with evidence-based practice. I also believe it helped us to learn how to work efficiently in group process... and enable us to defend our positions on the different subjects. In the future, I think that this skill will help us to defend our research and opinion when approaching doctors of medicine or other health care professionals regarding treatment and advocacy for our patients. (30-10)*

*Overall, this class was extremely beneficial to me. Going in I was very nervous and doubted the benefits of learning group process. I think this class really made a difference in my life. I learned strategies that would benefit me throughout life, not only inside the classroom. I think I took away lessons that will help me in clinical practice, as well as everyday life. I really learned lessons on how to improve communication with others as well as how to accept constructive criticism well. The feedback portion was difficult to come to terms with at first, but toward the end I really saw the benefit of delivering as well as receiving it. (19-10)*

All eight tDPT graduates who participated in member checking indicated that the themes were accurate representations of their experience in the PBL course. They did not suggest the addition or omission of any themes. Two individuals emphasized the clinical relevance of the skills gained in the PBL groups. Another would have liked more direction with providing feedback in the tutorial sessions.

#### **IV. Discussion.**

This qualitative study demonstrated that students in a discrete PBL course within a tDPT conventional curriculum valued the PBL method of learning, gained knowledge and skills relevant to future practice, and were committed to the tutorial group and improving the group process. By the end of the course, all students reported that their learning in the course had been a positive experience. Many of the skills that the students gained were those that the profession considers necessary for its members, particularly for graduates at the doctoral level. Students described improved skills in professional behavior, communication, critical inquiry, clinical decision making, reflection, and evidence-based practice. Students wrote in their reflective journals that they had learned how to access, evaluate and apply appropriate information to practice, communicate effectively with colleagues and clients, and reflect on their actions and decisions. These skills are consistent with the American Physical Therapy Association (APTA) Vision 2020 statement and the APTA document on the competencies of the tDPT graduate (American Physical Therapy Association, 2000; Brosky and Scott, 2007; American Physical Therapy Association, *Coalition for consensus*.).

An exceptional finding was that all students found the PBL course to be a positive experience, even though it was the only PBL course the students experienced in their physical therapy education. Several characteristics of the Case Study Seminar course may have contributed to this positive response and should be considered when attempting to implement a unique PBL course in a conventional curriculum. First, tutors and students were well prepared by the course coordinator's orientation sessions. The process, objectives, and outcomes for the

course were clearly outlined for students and tutors. Second, all tutors were committed to the PBL process evidenced by their repeated involvement in the course over three years. Foord-May (2006) emphasized the need for compatibility between the teaching philosophy of the faculty and the educational approach in order for PBL to be successfully implemented. Tutors attended a workshop prior to the beginning of the course and regular meetings during the course. Third, the tutors pushed the students for higher performance in increments. For example, when a student began to feel comfortable in one role, the tutor might suggest he/she try another role. Tutors might help students develop research questions early in the course, and emphasize use of levels of evidence or application of theoretical models later in the course. As the groups progressed, tutors provided less facilitation and encouraged individual and group problem solving.

While some students enjoyed all interactions with their tutor, other students critically evaluated their tutors' performance. The students who wrote critical reflections about their tutor expressed a positive outcome by the end of the course. It would appear that the friction between students and tutor was 'constructive' as described by Vermunt and Verloop (1999). These authors suggested that constructive friction between students and teachers will result in a gradual transfer of the regulation of learning from the tutor to the student group and an improvement in the group process.

Finally, both the reflective journals and the feedback structure of the course allowed the students to continually be aware of their progress. As found by Williams, MacDermid and Wessel (2003), and Cole and Wessel (2008), physical therapy students in a PBL course need confirmation of their change in behavior following the feedback they receive from their peers or tutors. The act of writing in their journals may have facilitated the students' reflection on what they learned, their ability to plan for change, and their adaptation to new situations.

The academic level of the students likely had an influence on their acceptance of PBL. Participants in our study had already completed entry-level academic and clinical education course work. Students noted how the collective clinical experience of the group members contributed to their learning and the clinical decisions about the patient case scenarios. There has been no study examining the effect of students' clinical experience on their acceptance of PBL. However, the participants in this study frequently commented on the clinical relevance of the skills gained in this PBL course.

The findings in this study have similarities to previous studies with physical therapy students. Santasier and Plack (2007) studied DPT students in a PBL course and reported themes of: critical thinking, commitment to learning, interaction skills, stress management, and professional identity. During their first experience with PBL, Canadian (Williams, MacDermid and Wessel, 2003) and Swedish (Uhlén, Johannesson and Silén, 2007) physical therapy students described changes in their approach to learning, their study strategies, and their method of finding and using information. They commented on their increased critical thinking and problem solving skills, use of theories, awareness of learning and group process, self-confidence in group interactions, and personal growth. They also addressed the difficulty and value of feedback.

Our results have some differences from those of Williams, MacDermid, and Wessel (2003) who reported more comments about aspects of the program other than the tutorial, for example, examinations and assignments. The students in their study spent more time discussing stress and time management, and the need to develop a different study/learning framework to cope with the demands of the entire PBL program. Students in our study focused on preparing for and participating in the tutorial sessions and did not expand on other course assignments in their journals. These differences could be related to the curricular structure and the stage the

students were at in their respective programs. Our study addressed one PBL course within a tDPT conventional curriculum whereas Williams and colleagues (2003) studied reactions of students commencing a fully integrated PBL physical therapy program.

The students perceived that they had developed or improved many of the skills outlined by the APTA as being desirable for the graduates of tDPT programs (American Physical Therapy Association, *Coalition for consensus*). These included abilities in communication, peer assessment, critical evaluation and application of information from studies, and use of models and evidence to guide assessment and treatment. The APTA suggests that physical therapists should have a plan for their own professional development and contribute to activities that advance practice. The students in the study reflected on the way their new skills would help them and their colleagues continue their learning in the work environment. In their tutorial groups, the students practiced 'ongoing assessment, goal setting and implementation', competencies described by the APTA for professional development of the tDPT graduate (American Physical Therapy Association, *Coalition for consensus*). Students also developed their clinical reasoning skills through their discussion of the case scenarios.

There are some limitations to this study. Not all students in the PBL course participated in the study, and therefore it is possible that non-participants may have provided different perceptions. However, the number of participants represented 73% of the male and 83% of the female in the sample class, and reflections were very similar across journals. The method of collecting data from journals has limitations. As noted previously, journal writing, itself, can affect the reflections of students. In addition, because the journal was a course requirement, some students might have written what they thought the instructors wanted to read. On the other hand, students knew their grade was based on completion of the journal rather than its content, and that the journals were anonymous. Because of the pairing of the readers, one third of the journals were read only by two investigators who may have been biased because they were tutors in the Case Study Seminar course. However, all three investigators were involved in regular, detailed discussions concerning the qualitative data analysis. Based on this analysis and member checking, we are reasonably confident that the themes are representative of these students' perceptions of PBL.

We did not evaluate the skills that the students perceived as improved nor can we predict, from their level of satisfaction with PBL, that they will demonstrate these skills in their clinical practice. For example, students felt they developed their communication, research and analysis skills, but we did not actually measure whether these had changed. Previous studies have not generally shown an advantage of PBL in terms of gaining knowledge (Albanese, 2000; Saarinen-Rahiika and Binkley, 1998; Solomon, 2005). However, it is possible that particular skills and attitudes might be better developed in a PBL format, particularly at this advanced level of education.

Based on the findings of this study, educators following conventional curricula should consider including at least one PBL course in a tDPT program. PBL is perceived by the students in this study to enhance many skills desired by physical therapists to deliver effective evidence-based patient care.

## V. Conclusions.

This study adds to the existing literature on PBL for health professional programs. A single PBL course within a conventional curriculum was well accepted by the tDPT students in this study.

Students perceived that they had gained skills in accessing and utilizing information, and giving, receiving and acting on feedback. They were aware of group dynamics and their individual contributions to the success of the group. Students appreciated the value of learning from others and noted positive changes in personal and professional growth. Students noted that the communication, critical inquiry, clinical decision-making, reflection, and evidence-based practice skills they gained in this PBL course would be very valuable in clinical practice.

### Acknowledgements

The authors wish to thank the students of the tDPT program for their voluntary participation in the study. The study was supported in part by a Small Grant for Faculty Research from the Office of the Provost at Ithaca College.

### References

- Albanese, M. (2000). Problem-based learning: Why curricula are likely to show little effect on knowledge and clinical skills. *Medical Education*, 34 (9), 729-738.
- Albanese, M. and Mitchell, S. (1993). Problem-based learning: A review of literature on its outcomes and implementation issues. *Academic Medicine*, 68 (1), 52-81.
- American Physical Therapy Association. *Coalition for consensus. A plan in support of the "transition" clinical doctorate (T-DPT) APTA education division. competencies of the T-DPT graduate*. Retrieved April 7, 2009, from [http://www.apta.org/AM/Template.cfm?Section=Post\\_Professional\\_Degree&CONTENTID=21013&TEMPLATE=/CM/ContentDisplay.cfm](http://www.apta.org/AM/Template.cfm?Section=Post_Professional_Degree&CONTENTID=21013&TEMPLATE=/CM/ContentDisplay.cfm)
- American Physical Therapy Association (2006). *Evaluative criteria for accreditation of educational programs for the preparation of physical therapists*. (2006). Retrieved April 1, 2009, from [http://www.apta.org/AM/Template.cfm?Section=Accreditation\\_Handbook&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=19980](http://www.apta.org/AM/Template.cfm?Section=Accreditation_Handbook&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=19980)
- American Physical Therapy Association (2000). *Vision 2020*. Retrieved April 7, 2009, from [http://www.apta.org/AM/Template.cfm?Section=Vision\\_20201&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=285&ContentID=32061](http://www.apta.org/AM/Template.cfm?Section=Vision_20201&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=285&ContentID=32061)
- Boud, D., Keogh, R., and Walker, D. (1985). Promoting reflection in learning: A model. In D. Boud, R. Keogh and D. Walker (Eds.), *Reflection: Turning experience into learning* (pp. 18-40). London: Kogan Page.
- Brosky, J. A. and Scott, R. (2007). Professional competence in physical therapy. *Journal of Allied Health*, 36 (2), 113-118.
- Cheong, F. (2008). Using a problem-based learning approach to teach an intelligent systems course. *Journal of Information Technology Education*, 7, 47-60.

Cole, B. and Wessel, J. (2008). How clinical instructors can enhance the learning experience of physical therapy students in an introductory clinical placement. *Advances in Health Sciences Education*, 13 (2), 163-179.

Colliver, J.A. (2000). Effectiveness of problem-learning curricula: research and theory. *Academic Medicine*, 75 (3), 259-266.

Creswell, J.W. (2007). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

Distlehorst, L.H. and Robbs, R.S. (1998). A comparison of problem-based learning and standard curriculum students: Three years of retrospective data. *Teaching and Learning in Medicine*, 10 (3), 131-137.

Dochy, F., Segers, M., Van den Bossche, P., and Gijbels, D. (2003). Effects of problem-based learning: a meta-analysis. *Learning and Instruction*, 13 (5), 533-568.

Dolmans, D. H., de Grave, W., Wolfhagen, I. H., and van der Vleuten, C. P. (2005). Problem-based learning: Future challenges for educational practice and research. *Medical Education*, 39 (7), 732-741.

Donaghy, M. and Morss, K. (2007). An evaluation of a framework for facilitating and assessing physiotherapy students' reflection on practice. *Physiotherapy Theory and Practice*, 23 (2), 83-94.

Feingold, C. E. (2008). Student perceptions of team learning in nursing education. *Journal of Nursing Education*, 47 (5), 214-222.

Foord-May, L. (2006). A faculty's experience in changing instructional methods in a professional physical therapist education program. *Physical Therapy*, 86 (2), 223-235.

Fraser, S. W. and Greenhalgh, T. (2001). Coping with complexity: Educating for capability. *British Medical Journal*, 323 (7316), 799-803.

Jefferson, J. R. (2001). Problem-based learning and the promotion of problem solving: Choices for physical therapy curricula. *Journal of Physical Therapy Education*, 15 (1), 26-31.

Kelly, P. A. and Haidet, P. (2005). A comparison of in-class learner engagement across lecture, problem-based learning and team learning using the STROBE classroom observational tool. *Teaching and Learning in Medicine*, 17 (2), 112-118.

Koh, G.C., Khoo, H.E., Wong, M.L., and Koh, D. (2008). The effects of problem-based learning during medical school on physician competency: a systematic review. *Canadian Medical Association Journal*, 178 (1), 34-41.

Kuiper, R. A. and Pesut, D. J. (2004). Promoting cognitive and metacognitive reflective reasoning skills in nursing practice: Self-regulated learning theory. *Journal of Advanced Nursing*, 45 (4), 381-391.

Larin, H., Wessel, J., and Al-Shamlan, A. (2005). Reflections of physiotherapy students in the United Arab Emirates during their clinical placements: A qualitative study. *BMC Medical Education*, 5, 3.

Lusardi, M. M., Levangie, P. K., and Fein, B. D. (2002). A problem-based learning approach to facilitate evidence-based practice in entry-level health professional education. *Journal of Prosthetics and Orthotics*, 14 (2), 40-50.

Mann, K.V. and Kaufman, D.M. (1999). A comparative study of problem-based and conventional undergraduate curricula in preparing students for graduate medical education. *Academic Medicine*, 74 (10), s4-s6.

Norman, G. R. and Eva, K. W. (2003). Doggie diagnosis, diagnostic success and diagnostic reasoning strategies: An alternative view. *Medical Education*, 37 (8), 676-677.

Norman, G. R. and Schmidt, H. G. (1992). The psychological basis of PBL. A review of evidence. *Academic Medicine*, 67 (9), 557-565.

Ozturk, C., Karayagiz Muslu, G., and Dicle, A. (2008). A comparison of problem-based and traditional education on nursing students' critical thinking dispositions. *Nurse Education Today*, 28 (5), 627-632.

Richards, B. F., Ober, K. P., Cariaga-Lo, L., Camp, M. G., Philp, J., McFarlane, M., Rupp, R. , and Zaccaro, D. J. (1996). Ratings of students' performances in a third-year internal medicine clerkship: A comparison between problem-based and lecture-based curricula. *Academic Medicine*, 71 (2), 187-189.

Rideout, E., England-Oxford, V., Brown, B., Fothergill-Bourbonnais, F., Ingram, C., Benson, G., Ross, M., and Coates, A. (2002). A comparison of problem-based and conventional curricula in nursing education. *Advances in Health Sciences Education*, 7 (1), 3-17.

Risquez, A., Moore, S., and Morley, M. (2007-2008). Welcome to college? Developing a richer understanding of the transition process for adult first year students using reflective written journals. *Journal of College Student Retention: Research, Theory and Practice*, 9 (2), 183-204.

Saarinen-Rahiika, H. and Binkley, J. M. (1998). Problem-based learning in physical therapy: A review of the literature and overview of the McMaster university experience. *Physical Therapy*, 78 (2), 195-207.

Santasier, A. M. and Plack, M. M. (2007). Assessing professional behaviors using qualitative data analysis. *Journal of Physical Therapy Education*, 21 (3), 29-39.

Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1 (1), 9-20.



Solomon, P. (2005). Problem-based learning: A review of current issues relevant to physiotherapy education. *Physiotherapy Theory and Practice*, 21 (1), 37-49.

Springer, L., Stanne, M. E., and Donovan, S. S. (1999). Effects of small-group learning in undergraduates in science, mathematics, engineering and technology: A meta-analysis. *Review of Educational Research*, 69 (1), 21-51.

Strobel, J. and van Barneveld, A. (2009). When is PBL more effective? A meta-synthesis of meta-analyses comparing PBL to conventional classrooms. *The Interdisciplinary Journal of Problem-based Learning*, 3 (1), 44-58.

Uhlin, L., Johannesson, E., and Silén, C. (2007). *To challenge students beliefs to support transition into higher education*. Retrieved 04/07, 2009, from [http://www.nshu.se.libaccess.lib.mcmaster.ca/download/7263/slutrapport\\_157g04\\_uhlin.pdf](http://www.nshu.se.libaccess.lib.mcmaster.ca/download/7263/slutrapport_157g04_uhlin.pdf)

van der Meer, J. and Scott, C. (2008). Shifting the balance in first-year learning support: From staff instruction to peer-learning primacy. *Australasian Journal of Peer Learning*, 1 (1), 70-79.

van Langenberghe, H. V. (1988). Evaluation of students' approaches to studying in a problem-based physical therapy curriculum. *Physical Therapy*, 68 (4), 522-527.

Vermunt, J. D. and Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction*, 9 (3), 257-280.

Wiegand, M. R., Gillette, P. D., and Brosky, J. A. (2005). Outcomes of a problem-based and experiential learning model in a physical therapy professional issues course. *Kentucky Journal of Excellence in College Teaching and Learning*, 3. Retrieved 04/09, 2009, from <http://www.kjectl.eku.edu>

Williams, B. (2001). Developing critical reflection for professional practice through problem-based learning. *Journal of Advanced Nursing*, 34 (1), 27-34.

Williams, R., MacDermid, J., and Wessel, J. (2003). Student adaptation to problem-based learning in an entry-level master's physical therapy program. *Physiotherapy Theory and Practice*, 19 (4), 199-212.

Williams, R. M., Wessel, J., Gémus, M., and Foster-Seargeant, E. (2002). Journal writing to promote reflection by physical therapy students during clinical placements. *Physiotherapy Theory and Practice*, 18 (1), 5-15.