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ABSTRACT

This study examined the perspectives of three graduates of a problem-based learning (PBL) physical therapy (PT) program about their clinical practice. Researchers used qualitative methods of observation, interview, and journaling to gather the data. Three sessions of audiotaped interviews and two observation sessions were conducted with the three graduates, and each participant also maintained a reflective journal. Content analysis showed that, from the participants' perspectives, they were practicing at typically expected levels as clinicians. The attributes that governed the perspectives of the participants about their physical therapy clinical practice included flexibility, reflection, analysis decision making, self-reliance, problem-solving, independent thinking, and critical thinking. Further, the findings indicated that the factors that influenced those attributes included the PBL process, parents' value system, self-reliant personality, innate personality traits, and deliberate choice. Finally, the findings indicated that the participants' perspectives, in general, appeared to support the espoused efficacy of the PBL educational approach. Among the many attributes they noted that governed these perspectives, problem solving, as postulated by Barrows (H. Barrows, 1983), was one of the most frequently mentioned benefits gained from their PBL PT training. (Contains 2 figures and 26 references.) (Author/SLD)

PROBLEM-BASED LEARNING IN A PHYSICAL THERAPY PROGRAM AND SUBSEQUENT CLINICAL PRACTICE: THE PRACTITIONERS' PERSPECTIVES

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The purpose of this study was to describe the perspectives of three graduates of a problem-based learning (PBL) physical therapy (PT) program about their clinical practice. We used qualitative methods of observation, interview, and journaling to gather the data. Three sessions of audiotaped interviews and two observation sessions were conducted with three exemplars from a university's PBL PT program. Each participant also maintained a reflective journal. The data were analyzed using content analysis. From the findings of the study, it was noted that, from the participants' perspectives, they were practicing at typically expected levels as clinicians. The attributes that governed the perspectives of the participants about their physical therapy clinical practice included flexibility, reflection, analysis, decision-making, self-reliance, problem-solving, independent thinking, and critical thinking. Further, the findings indicated that the factors that influenced those attributes included the PBL process, parents' value system, self-reliant personality, innate personality traits, and deliberate choice. Finally, the findings indicated that the participants' perspectives, in general, appeared to support the espoused efficacy of the PBL educational approach. Among the many attributes they noted which governed these perspectives, problem solving, as postulated by Barrows, was one of the most frequently mentioned benefits gained from their PBL PT training.

There is a growing trend among physical therapy (PT) program faculty and administrators to adopt a problem-based learning (PBL) instructional approach for their curriculum. Of the 206 accredited or developing physical therapy programs (APTA, 1998) in the United States, 10 programs wholly utilize the PBL approach throughout all phases of the curriculum with an additional 28 programs recently adopting a modified PBL approach (M. J. Harris of the APTA's Commission on Accreditation in Physical Therapy Education, personal communication, March 11,1999). Physical therapy students, however, face a challenging transition as they move from classroom to clinical practice (May, Morgan, Lemke, Karst, & Stone, 1995). Does PBL make that transition into practice smoother without sacrificing clinical competence? Clinical competence is the major objective of physical therapy education programs (Kaufman, Portney, & Jette, 1997). The literature reflects PBL's relative acceptance in the classroom (Rouse & Borsting, 1990; Bernstein, Tipping, Becovitz, & Skinner, 1995; Van Langernberghe, 1988; Newble & Clarke, 1986); however, an instructional approach that leads to the achievement of didactic proficiency without the accompanying clinical distinction becomes valueless. Do the purported benefits gained from the classroom experience

equate to beneficial outcomes in the clinical setting? This question has not yet been fully answered in the PT profession (Seymour & Dybel, 1996). This research attempted to answer this question as seen from the perspectives of three graduates.

The works of educational reformers such as Tyler (1949), Dewey (1916), Eisner (1971), and others (Adler, 1982; Barrows, 1985), have provided an extensive storehouse of valuable information for use in curriculum design and instruction in K-16 education. More recently, Barrows (1983) has asserted that traditional curriculum delivery, which utilizes lecture-based learning for the most part, may not adequately meet the needs of students in the medical professions. He has maintained that problem-based learning (PBL) is a viable alternative. PBL, Barrows has asserted, stimulates medical students to make relevant choices in the basic sciences that eventually prepare them for practice and the development of proficient clinical skills. It is not uncommon to hear students remark, especially from the health care-related majors, that they have so much to memorize they have no time to learn (VanLeit, 1995). Barrows (1983) has further asserted that such information overload is further complicated by the use of tests that primarily assess recall and recognition of facts. He has further pointed out that the passive acquisition of facts greatly limit the time students have to spend on the intellectual skills involved in clinical reasoning. According to Magistro (1989), PT practice would be enhanced if educators facilitate the development of problem solving and critical thinking skills in their students. Similarly, VanLeit (1995) has contended that, particularly in the field of medicine, clinical reasoning and critical thinking must be crucial components of the learning process. She has asserted that clinical reasoning best mirrors the practice of medicine and as such can only enhance the learning process.

The purpose of the study was to describe the perspectives of physical therapy practitioners about their clinical practice. The research described (a) the clinical practice of recently graduated practitioners whose PT preparation used a PBL delivery approach, and (b) the application of the learning gained from such an approach beyond the classroom setting. It encompassed the following fundamentals: (a) The lack of definitive and substantial data that examined clinical practice of physical therapy practitioners who were trained in a PBL PT program; and (b) the growing assumption that the traditional lecture-based learning (LBL) instructional delivery approach does not adequately prepare physical therapy students to assume their roles in the changing health care environment. For the purpose of this research, we used Finkle and Torp's (1995) definition of PBL:

> A curriculum development and instructional system that simultaneously develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem solvers confronted with an ill-structured problem that mirrors real world problems (p. 1).

Our basic research question was as follows: What are the perspectives of graduates of a PBL PT program about their clinical practice behaviors? There were three exploratory questions that guided this study:

1) What are the attributes that govern these graduates' perspectives?

2) What are the factors that influence these attributes?
3) In what way do the perspectives that these graduates hold about their clinical experiences, support or run counter to the espoused efficacy of the PBL educational approach?

As a growing phenomenon in the profession of physical therapy, PBL signals a new direction for physical therapy education. However, its efficacy in all aspects of physical therapy has not been fully established. It is important that if this form of learning is to be fully embraced and implemented in the physical therapy profession, then it should be fully explored to determine its advantages and disadvantages.

Theoretical Framework

The theoretical framework for the study was based, in part, on Barrows' medical model of problem-based learning (Barrows, 1983). The model, designed for learning in the medical professions, has two fundamental postulates. "The first is that learning through problem-solving is much more effective for creating in a student's mind a body of knowledge usable in the future than is traditional memory-based learning. The second is that the physician skills most important for patients are problem-solving, not memory skills" (Barrows & Tamblyn, 1980, p. viii).

The American Physical Therapy Association's (APTA) practice model was also used as a theoretical basis for this study (APTA, 1997). The guidelines of the model, originally designed for physical therapy clinical practice, encapsulated Barrows' medical model and were used in this study as an etic framework for categorizing interview responses and field observations. Five elements encompass the APTA model: *Examination*-- "the process of obtaining a history, performing relevant system reviews, and selecting and administering specific tests and measures to obtain data" (p. 1180); *Evaluation*--making "clinical judgments based on data gathering during the examination" (p. 1180); *Diagnosis*--using the information gained from the examination and the evaluation to identify and determine syndromes; *Prognosis*--determining "the level of optimal improvement that might be attained through intervention and the amount of time required to reach that level" (p. 1180), and; *Intervention*--implementing treatments or therapy methods designed to impact the patient's condition.

Review of Relevant Literature

Two areas of literature review are presented in this section: Research on the classroom application of PBL and research on the clinical application of PBL. We found that, although some research has been done that examined the classroom performance of students who were instructed with a problem-based learning (PBL) approach, very little research explored the clinical practice of physical therapy graduates who were instructed with the same instructional delivery system. Barrows and Tamblyn (1980) have pointed out that a PBL instructional approach results in increased retention of learning since students who acquire knowledge while working with actual problems and who develop

their clinical reasoning skills at the same time, have a greater recall and use of knowledge. Boud and Feletti (1991) have stated that PBL allows students to develop an effective and efficient clinical reasoning process while encountering the difficult and complex patient situations they face. They further pointed out that students develop an intuitive problem-solving ability. According to VanLeit (1995), the PBL approach used in the University of New Mexico occupational therapy program has caused a new excitement in students. They are not told what to do but are guided to identify important questions and issues on their own. She concluded, "In our experience, problem-based learning has facilitated students' thinking and problem-solving skills. The students move beyond being passive data collectors, as in the LBL format, and begin to apply information and use a variety of reasoning skills critical to solving real clinical problems" (p. 352). But this, the studies seem to show, is a promise or hope rather than a well documented fact. It is intuitive logic that has yet to be proven in rigorous study.

Research on the Classroom Application of PBL

Rouse and Borsting (1990), faculty at the Vision Therapy Service at Southern California College of Optometry, pointed out that "Students entering clinical rotations are confronted with the need to develop their 'clinical reasoning processes' as they encounter patients" (p. 123). They expressed concern, however, about "the insufficient problem-solving skills in students entering the Vision Therapy Service. . . . Students tend to carry to the clinical setting a learning strategy that was used in didactic course work" (p. 123). To gauge the impact of PBL, they implemented a PBL approach (hypothesis generation, the development of learning issues, diagnosis and management plan, and the process of problem synthesis) in a clinical setting at the college for third year clinicians who had a weekly vision therapy rotation of four hours (three hours of patient contact and one hour of discussion). The students were exposed to a PBL model that used simulated patient problems or case studies to generate discussion within the groups. Eighty-eight percent of the students felt that the PBL format was superior to the older discussion group format in helping them improve their problem solving skills. Although a preliminary study at best, this research showed that the PBL approach had received some positive assertions in a short-term situation.

In a five-week study, Bernstein et al. (1995) offered some further insight into medical students' attitudes towards PBL. The primary focus of their study was to evaluate shifts in students' attitudes about PBL. They studied 250 medical students in a pretest, posttest manner regarding their attitudes about PBL at the beginning of a PBL session and then five weeks later using a four-component learning questionnaire - knowledge, clinical skills, team work, and relate to patients. Traditional methods were rated better than PBL for knowledge acquisition, however, the authors concluded that "Direct experience with PBL led to more favorable attitudes among the students" in the areas of teamwork and doctor patient relationships (p. 245).

The claims of Bernstein et al. have been previously advanced by Van Langernberghe (1988) who conducted a descriptive study, using a questionnaire, with 112 first-year students and 100 second-year students from the PBL PT program at The Hague. One

purpose of the research was to evaluate the studying approaches of those students and compare the results with normative inventory values for 2,208 students of more conventional programs. The author utilized *The Short Inventory of Approaches to Studying* as his instrument which measured eight learning dimensions labeled as *achievement motivation, reproducing orientation, meaning orientation, comprehension learning style, operation learning style, versatility, learning pathologies,* and *prediction of success*. The results showed that the scores from the first and second year students on *reproducing orientation, operation learning style,* and *learning pathologies* were significantly lower than the normative values. Conversely, the scores from the first year students were significantly higher than the normative values on *achievement motivation* and higher also for both groups in the areas of *comprehension learning style, versatility, and prediction of success.* The scores from year two students in *achievement motivation* and both groups in *meaning orientation* were not significantly different from the normative values. He concluded that "the comparison with the normative scores provide evidence that overall the physical therapy students in the problem-based program in the Hague possess more desirable studying approaches than a large sample [the inventory values of 2,208 students] of other students in higher education" (p. 524). Caution is in order, however, since the results may reflect the opinions of students who were already familiar with the approach and, therefore, chose the PBL program over others. This is significant because students who made that choice may have reflected their own abilities rather than the impact of PBL.

Newble and Clarke (1986) also compared the approaches to learning of students in a traditional and a problem-based medical school. They used a modified version of the *Short Inventory of Approaches to Studying* for their study, the *Lancaster Approaches to Studying Inventory*. The 64-item self-report questionnaire was administered to medical students in the first, third, and final years of medical school at two Australian universities. The University of Newcastle used a problem-based approach to learning, while the University of Adelaide utilized the more traditional lecture-based approach to learning. At the University of Adelaide, 97 first-year students, 94, third-year students, and 43 final-year students completed the questionnaire. At the University of Newcastle, 63 first-year students, 46 third-year students, and 44 final year students completed the questionnaire. The questionnaire was grouped into 16 subscales that were then combined with three major factors: reproducing orientation (surface approach), meaning orientation (deep approach), and strategic orientation (strategic approach). Active questioning in learning, preoccupation with memorization, and awareness of implications of academic demands made by staff were three areas that fit under the factors of meaning orientation, reproducing orientation, and strategic orientation respectively. The authors concluded that students who adopted a surface approach were primarily motivated by a concern to complete the course or by fear of failure. They used rote learning to acquire knowledge and only developed a superficial level of understanding of that knowledge. Conversely, they pointed out, students who adopted the deep approach, "are motivated by an interest in the subject matter. . . . Their intention is to reach an understanding" (p. 267). Finally, students who adopted the strategic approach "use processes which, at any point in time, may be similar to those used by both the surface and deep learner" (p. 268). According to the authors, "the Adelaide curriculum would tend to

support or induce a surface approach or, at best, a strategic one. . . . The curriculum, teaching methods and forms of assessment at Newcastle would be expected to encourage the deep approach " (p. 269). The authors noted:

> Overall it appears that the approaches to learning used by Newcastle students are very much those which would be thought desirable by all medical schools. . . . In conclusion, this study is one of the first to provide evidence that shows a difference between students at a traditional school and an innovative problem-based school. It also shows that the students in the problem-based school appear to have an approach to studying that closely approximates the aims of most medical schools. (p. 272)

Research on the Clinical Application of PBL

Few studies were found that examined the clinical performances of problem-based students (Richards, Ober, Cariago-Lo, Camp, Phillip, McFarlane, Rupp, and Zacarro 1996; Kaufman, Portney, Jette 1997). Those found were mainly in the area of medicine and most concluded that PBL students tended to perform better than lecture-based learning (LBL) students. There were even fewer studies in the profession of physical therapy that examined the issue of clinical performance of PBL students. Seymour and Dybel (1996) have pointed out that "Research on the development of clinical decision-making skills in the physical therapy profession is not well documented" (p. 77).

Research at Bowman Gray School of Medicine at Wake Forest University conducted by Richards et al. (1996) has revealed that students who completed two years of basic science education using a PBL approach tended to receive higher clinical ratings than their counterparts who were taught using a lecture-based learning approach. The authors stated that separate analyses by graduating year revealed this as an ongoing trend and not a result of one or two unusual classes. The subjects represented the entire graduating classes of 1991 through 1995 and included 91 PBL and 401 LBL students. The results should be viewed with some caution, however. The researchers did not indicate whether the raters were blind as to who the PBL or LBL students were. Raters who may have been familiar with the form of learning the students received could have allowed their own biases to influence their ratings. The comparison of the two groups in common clerkships and the longitudinal nature of the study, however, make a strong case for the efficacy of PBL. But not all studies have resulted in favorable support for PBL over LBL.

Kaufman, Portney, and Jette (1997) compared the clinical performances of 78 PT students in traditional LBL and PBL curricula. They conducted a retrospective study of two classes: 1992 (LBL, $\underline{n}$=34) and 1994 (PBL, $\underline{n}$=44) comprising 34 students in the 1992 class and 44 students in the 1994 class. They utilized a modified version of the New England Consortium Physical Therapy Student Clinical Performance Instrument (CPI) to measure clinical performance. The researchers noted that among both the PBL and the LBL students their findings determined "that for many of the test items, most of the students were judged to demonstrate entry-level competence even in the first affiliation." They concluded, however, that the results supported their hypothesis that "entry-level

physical therapy students educated with a PBL approach would not receive higher ratings in their clinical affiliations than students educated with a traditional approach" (p. 30).

Some research has indicated that problem-based learning promotes higher achievement (Richards et al. 1996) and greater student satisfaction (Rouse & Borsting, 1990) than does lecture-based learning. If indeed students achieve higher and are much more fulfilled, then probably more health professions education programs should consider its utility in the classroom. This can have tremendous implications for changes in curriculum, instruction, and learning for students. Possibly, the impact of PBL would also be felt in the workplace since universities would graduate students more prepared to take their place in the workforce. This is the central theme of this research: to determine the ways in which PBL may impact clinical practice.

Methodology

A phenomenological, qualitative research method was used for this study; one that utilized audio-taped indepth interviews of graduates currently in professional practice, observation of their clinical practice, and reflective journaling to collect the data and investigate the research questions.

Description of Participants and Data Sources

In this study we observed and interviewed three graduates from a single PBL-based PT program who were selected using the intensity method of purposive sampling (Patton, 1990). The participants included an exemplary graduate from each of the first three graduating classes of the program, one from each year, 1996 to 1998, and constituted one male and two females. The three exemplars, Robert, Sharon, and Terry (pseudonyms), possessed similar attributes, were all in their early thirties, and, prior to PT school, had no experience with PBL. All worked in hospitals and were members of the first three PT graduating classes at Nova Southeastern University. Candidate participants were recommended for study by the chairperson of the PT program and four other faculty, all who taught the first three classes. Faculty were given the following list of characteristics to consider when selecting the exemplars: compassion and support, flexibility, independent thinking, information-rich, maturity, mentoring/leadership qualities, open-mindedness, professionalism, respected by peers, respect for others, strong communication skills, strong academic skills. Table 1 explains the period of time the three participants were introduced and exposed to either the LBL or PBL instructional approach at NSU. All participants' program of study lasted two years or six semesters. Robert, a member of the first graduated class in 1996, was exposed to LBL for his first two semesters of PT education at NSU. Thereafter, he was trained with a PBL instructional approach. Both Sharon, who graduated in 1997, and Terry, who graduated in 1998, received all of their PT training with a PBL instructional approach.

Table 1

Participants schooling in NSU's LBL and/or PBL PT program

Pseudonym	Fall 1994	Sp 1995	Sum 1995	Fall 1995	Sp 1996	Sum 1996	Fall 1996	Sp 1997	Sum 1997	Fall 1997	Sp 1998	Sum 1998
Robert	LBL	LBL	PBL	PBL	PBL	PBL	xxxxx	xxxx	xxxx	xxxx	xxxxx	xxxx
Sharon	xxxx	xxxx	xxxx	PBL	PBL	PBL	PBL	PBL	PBL	xxxx	xxxxx	xxxx
Terry	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	PBL	PBL	PBL	PBL	PBL	PBL

Data Collection Methods

Once the participants were identified, they were then contacted by phone and apprised of the nature of the study. They gave their permission to conduct and audiotape the interviews and observe their clinical performances. They all also agreed to maintain a reflective journal. The researchers set up the dates and times, and obtained written consent on the first day for the observation, interviews, and audiotaping. Two observation sessions and three interview sessions were conducted per participant. The first two interviews were preceded by the two observation sessions. The third and final interview was conducted without any prior observation. The total time for the interviews for the participants averaged 160 minutes over 3 sessions. Observations of the participants in clinical practice averaged 120 minutes over 2 observation periods. Journals were distributed to the participants, explained to them, and then collected by one of the authors at the finish of the data collection period. Data were collected over a period of 4 months, between May and September 1999.

The observation sessions were always the first research method conducted with the participants. The sessions were designed to record the participants' clinical behavior as they interacted with patients, and to document the setting so that the reader could develop a mental picture of the therapists' working environment. Observations occurred in the physical therapy departments. The researchers asked no questions and made no comments during the observation sessions. Instead, they took field notes and wrote analytic memos and contact summaries following each visit to record the setting and each physical therapist's interaction with patients and behavior during that visit.

The first interviews were conducted immediately after the observation session and were audiotaped. They were later transcribed by a transcriptionist. The researchers reviewed the transcripts along with the tapes, usually about two days later to check for accuracy and completeness. There were a set number of the same questions that were asked of all the participants from an interview guide, but different questions were also posed to each participant. These questions arose from the observation sessions or were questions that required follow-up from answers that were previously given. All the questions were original questions that the researcher created using Barrows and Tamblyn's (1980) and

the APTA's (1997) models as a framework. The first interview generally began with a line of questioning that solicited basic biographical information about where the participants grew up and where they went to undergraduate college. We also posed questions about general college education and their present work environment. The interviews followed a semi-standardized format (Berg, 1995) and began with questions, in part, designed to get the participant comfortable with the line of questioning. As the interview continued, we began asking more detailed questions related to the physical classroom experience. In the second interview the questions were more detailed and related to their existing clinical practice. Participants were also encouraged to reflect on the responses given in the first interview.

Unlike the first and second interviews, the third interview was done without any prior observation session. That final interview provided an opportunity to restate previous questions and to ask additional questions. It also provided time to gain answers to any lingering questions that needed clarification. The third interview also allowed the participants to use that time to clarify their own statements or add any new ones.

At the end of the first interview sessions, a blank notebook of approximately 100 pages was provided to each participant in which he or she was encouraged to record journal entries. They were all asked to keep a daily journal that reflected their thoughts and experiences during their everyday clinical practice. They were encouraged to record their thoughts about their own clinical experiences and their feelings about their interactions with patients, their colleagues, students, and other health care professionals. They were specifically encouraged to record their reflections about the positives and negatives about their daily performances in practice. We explained to them that the purpose of the journal was to provide added information to the study reflecting their own self assessment of their daily interactions with others in the clinical setting. They were also provided examples of the types of appropriate journal information so as to add further clarification. The purpose of the journals was to fill gaps in information that the observation sessions and the interviews missed. This purpose was not explained to the participants so as to avoid influencing them about any specific information they should record. The journals were retrieved on the last interview date.

Data Analysis

Qualitative data from the three types of sources were analyzed using content analysis procedures (Berg, 1995). The data were systematically and mechanically maintained, coded, and sorted into classifications of subtopics or themes. All interview transcripts, field notes from observations, and journal accounts were read and re-read, and the responses were coded according to the five categories of the APTA *Elements of Patient/Client Management*. A sixth category labeled "*Perspectives about PBL*" was created to capture data that did not fit into the other five categories. For example, each piece of information was labeled as one of the following: EX (examination), EV (evaluation), DX (diagnosis), PX (prognosis), INT (intervention), and PPBL (Perspectives about PBL). Recurring themes were noted and scrutinized for inclusivity within a category and exclusivity among the categories. Figure 1 depicts the topics that were discussed under each category as a

means of further peeling back the layers of information to expose the pertinent expositions shared between the researcher and participants. As also noted in Figure 1,

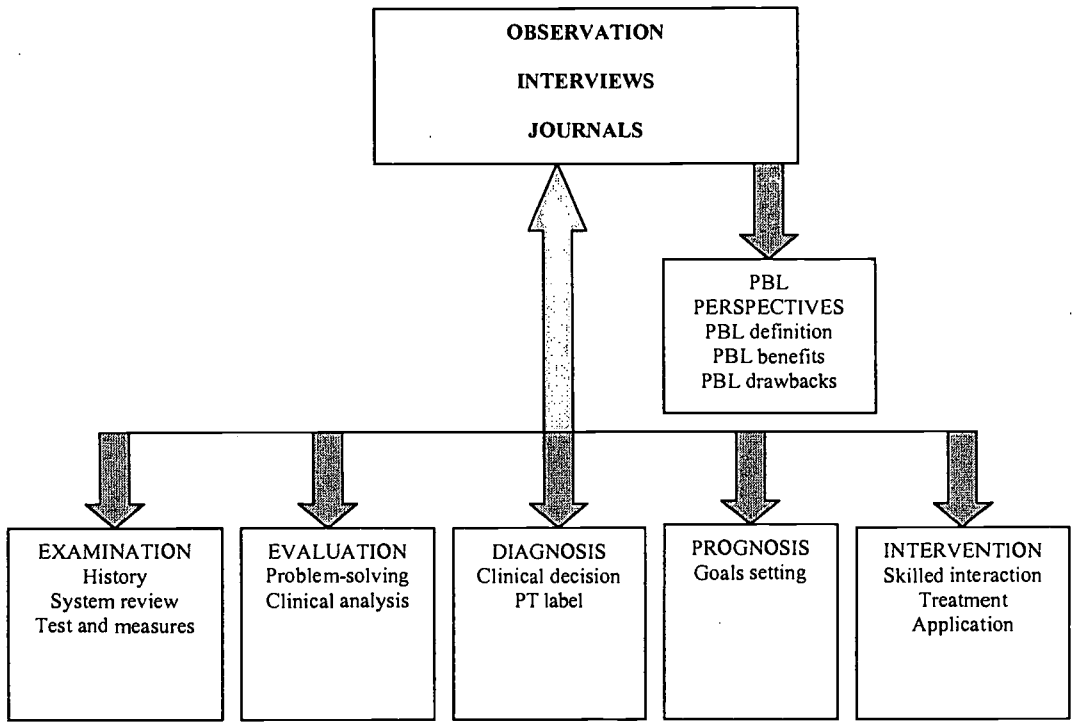

Figure 1. Classifications of Data Responses

observation, interviewing, and journaling were used to capture the perspectives of participants through each phase of clinical practice. Respondents varied in how much information they provided under each category.

The data were validated by comparing the perspectives of the graduates gleaned from the interviews with observations of their clinical practice, and with their reflective journal entries. There was high agreement among the sources of data.

Findings

The results of the study were catalogued using the six-category outline that included the five elements of patient/client management derived from the APTA clinical outcome guidelines (APTA, 1998) and one additional category. The salient issues of each participant's perspective as derived from the data collection are highlighted.
Mini summaries of the similarities and differences to approach and language in each of the six categories are also provided in the ensuing cross-case analysis.

Perspectives about PBL

The three participants perceived PBL as having a major impact on their clinical practice. Their thoughts and perspectives were very similar in all five areas of clinical practice. They did differ in their experiential definition of PBL, but essentially their explanations reflected many of the various attributes of PBL. They expressed that PBL influenced the way they approached and handled each phase of clinical practice and all viewed the approach as generally positive. Among the many aspects discussed, two areas stood out. First, there was agreement among the three participants about the difficulties that PBL presented to them at its introduction. Secondly, they all championed PBL for its role in developing their problem solving skills, an element, they claimed, that enhanced their clinical evaluation skills. They expressed a level of concern, however, about their skill levels in certain specific areas of clinical practice. For example, Robert spoke of his deficiency in the area of joint manipulation, while Terry expressed concern about her training in the area of palpation. They both stated that they were not always aware if they were correctly performing certain tasks. They indicated that more feedback was needed from facilitators to confirm or challenge students' clinical skill levels. Overall, however, the three participants established that the PBL physical therapy training enhanced their clinical skills and adequately prepared them for practice in the physical therapy profession.

Examination

All three participants approached this practice area in a similar fashion. Sharon noted that she begins with history taking, a very important aspect of examination, which allows her to establish rapport with the patients. She then performs the appropriate tests and measures in an attempt to get to the problem as quickly as possible. Similarly, Robert stated that he begins with a review of past history and considers the patient interview a high priority. He pointed out that he uses the examination period to make his patient comfortable so that he can elicit the desired information. He solicits information from the patient regarding his or her own goals, an attempt to "make sure we're both on the same page," and then observes the patient's movement before beginning his tests and measures. He stated, "I do a lot of screening . . . before I even get to the official examination." Terry's approach mirrored Robert's and Sharon's in some aspects. Like Sharon and Robert, she begins with history-taking with emphasis on gathering information about a patient's prior level of function and social history. Similarly, she also solicits information from the patients about their own goals, and "I give them an opportunity to ask me anything before we start the exam." She then proceeds to conduct the examination.

The three participants used similar language to describe their approach to the examination phase of clinical practice. The participants uttered the terms, history taking, test and measures, and social history, when discussing this area. The language was very similar to that used by the APTA in describing the *Examination* element of patient client management (APTA, 1997, p. 1181). Overall, all three participants approached the examination phase in a relatively similar fashion to the guidelines discussed in the

APTA's Elements of Patient/Client Management (APTA, 1997). As students, they were taught approaches to the examination phase that are similar to the APTA guidelines.

Evaluation

The three participants were in agreement about the basic starting point during the evaluation process. They indicated that the data gained from the examination process served as the basis for the decision-making. There were some differences, however, in their description of, and comfort levels with, this practice area.

Sharon approached this area with a very "holistic view of my patients." She showed some indecision about her total confidence in this area, but pointed out that she has gotten better at the cognitive task of honing in on the appropriate areas while still focusing on a patient's complications. She saw this phase as a decision-making process where the practitioner is deciphering what is a reasonable and realistic treatment plan for a patient. Conversely, Robert spoke confidently about his evaluation skills. He spoke of being in a state of constant evaluation while treating his patients while using critical analysis and clinical reasoning to dissect information. Terry's perspectives about this area of physical therapy practice were similar to Robert's. She indicated that PBL served her best in this area, "because I use a lot more problem-solving and critical thinking when I examine a patient." She went on to state, "I know how to pick and choose what is most appropriate during my evaluations."

The language among the participants varied. Sharon considered the evaluation process a "honing in process where decision-making skills are needed." Robert used terms such as "critical thinking" and "clinical reasoning," while Terry saw the process as one of "critical thinking" and "problem-solving."

Despite the differences in vocabulary, and the comfort level with the process, it was apparent that the participants considered the similar factors at the onset of the evaluation phase.

Diagnosis

The three participants worked in settings where most patient diagnoses were already made before the patients were seen by the physical therapists. Accordingly, they rarely had to determine a medical diagnosis. They all indicated, however, that they developed a PT diagnosis for each patient. Sharon explained that she developed a physical therapy or movement diagnosis with all her patients based on a patient's signs and symptoms. Robert offered a more specific designation when he spoke about using a patient's functional status, which may be derived from a patient's signs and symptoms, as a basis for developing a diagnosis suitable for his treatment plan. He also added that he found himself making secondary diagnoses based on the results of his examination. He went on to point out that sometimes these secondary diagnoses became primary because of their effects on a patient's physical status. Terry's approach was essentially the same as Robert's in specificity. She stated, "So every patient I see, I'm gathering a broad amount of information and then sifting for any kind of problem or functional limitation and

relating it to functional mobility." Terry also surmised that her ability in that area was reinforced by the PBL philosophy which "taught me to consider all possibilities."

As was evident, the participants had few opportunities to engage in medically diagnosing patients. Their approaches to whatever diagnosing they did do were essentially the same, even though Robert's and Terry's were more specific. The only common language used was in the term "functional" as was stated by Robert and Terry.

Prognosis (Goal Setting)

The comments of Robert, Sharon, and Terry indicated that they used like approaches to assist them with setting goals and determining patients' prognosis. Each participant used similar paths with considerations of other minor additions. Sharon considered a patient's past history, his or her motivation, the treatment time frame, and the family support as necessary factors "to come up with reasonable goals and outcomes." Robert's approach was essentially the same except in one area. He did not indicate that treatment time was a factor to consider. He used a patient example to illustrate his approach pointing out that he considered a patient's pre-existing condition, past medical history, and support at home as essential factors in setting goals. Terry's approach mirrored Robert's in a number of ways. She used a patient example to illustrate her point and stated that she considered a patient's prior level of function, support at home, and past medical history in setting goals. She also added that a patient's cognitive status and safety were major considerations.

According to the APTA (1997), a patient's prognosis should be predicated on the setting of goals in order to achieve desired outcomes. The perspectives of all three participants reflected that thinking. The words used to describe the factors necessary for setting goals may have varied among the three, but the meaning was essentially the same. Phrases such as "prior level of function" and "previous history" can be used interchangeably and have the same meaning when discussing the need for gathering historical data.

Intervention (Treatment)

Sharon's, Robert's, and Terry's initial approach to the intervention phase were, in some ways, different, while in others, similar. Sharon emphasized that she usually begins by attempting to treat "a patient's worst problem." She considered patient education to be a critical element in achieving desired outcomes. Robert, on the other hand, stated, "first of all, when I start, my treatment is guided by what the patient cannot do." He emphasized that his training taught him to "Treat what's wrong with the patient. Do not treat the symptoms." He also pointed out that team treating with other disciplines such as occupational therapy (OT) was important to him in achieving desired outcomes. Terry gave high priority to a patient's stated concerns. She stated "I will adapt to what the patient needs." They all emphasized, however, that it was important to avoid the use of prescribed protocols for every patient, and instead design treatments based on each individual's concerns, particularly the functional deficits. Accordingly, Terry and Sharon indicated that such an approach to treatment was influenced by their training which

taught them to problem-solve and critical analyze situations before prescribing interventions.

In both the observation sessions and the interview sessions, the three participants were all engaged in the three components of physical therapist intervention to varying degrees. For example, Sharon clearly spelled out the importance she placed on patient education, while Robert was observed collaborating with an occupational therapist in the treatment of a patient. He also spoke about the importance of that aspect to the care of patients. There were few common language themes among the participants. When discussing the influence of PBL on the intervention phase of clinical practice, the terms "problem-solving" and "critical thinking" were themes mentioned by both Terry and Sharon. The three participants frequently used the term "function" when discussing a most important aspect of care that interventions must address.

Further analysis revealed that from the participants' perspectives, they were satisfied with their present clinical practice in all five categories of the APTA's elements of patient/client management (APTA, 1997). The attributes that governed the perspectives of the participants about their PT clinical practice included analysis, critical thinking, decision-making, flexibility, independent thinking, problem-solving, reflection, and self-reliance. Among the many attributes the participants noted which governed these perspectives, problem solving, as postulated by Barrows, was one of the most frequently mentioned benefits gained from their PT training. This attribute, according to the graduates, was most beneficial in the evaluation phase of clinical practice. In earlier years, it was primarily the responsibility of physicians to make evaluative judgments and prescribe the appropriate treatments; therefore, physical therapists utilized little problem solving in their practice (Magistro, 1989).

The factors that influenced those attributes included the PBL approach, parents' value system, self-reliant personality, innate personality traits, and deliberate choice. We also found that the participants' perspectives supported, for the most part, the espoused efficacy of the PBL approach; however, the respondents did not attribute all of their gains in skill proficiency to PBL, but gave credit to one or more of the other factors as well. One participant wavered between giving credit to her innate personality traits and PBL's impact. Similarly, another credited the PBL approach for the acquisition of certain attributes, but also credited his own self-reliant personality as an accompanying variable. Still another offered her parents' value system as another variable that influenced the acquired attributes. Figure 2 offers a depiction of each respondent's unique responses and outlines the attributes that governed each participant's perspective and the factors that influenced those attributes.

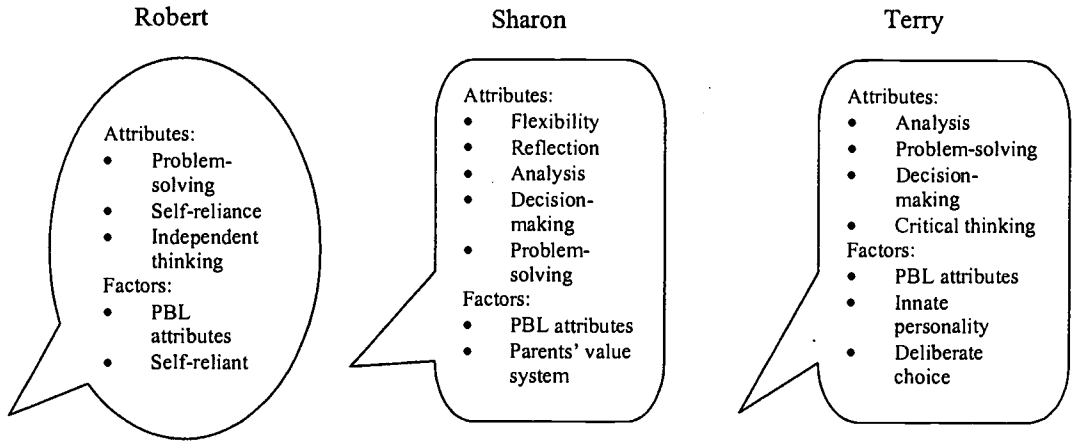

Figure 2. Attributes that govern participants' perspectives and factors that influence the attributes

Conclusions

Three major conclusions can be drawn from the data regarding the research questions. The first conclusion directly addresses the purpose of the study. Conclusions two and three address the first and second exploratory questions respectively. The answer to the third exploratory question is intertwined among all the conclusions. Each will be presented and discussed in turn and in relation to prior research.

First, from the participants' own perspectives, they were practicing at typically expected levels as clinicians. An analysis of their interview comments, their journals, and the observations of their clinical practice appeared to confirm that opinion. Their interactions with patients, their examination and treatment skills, their communication skills with patients, and their general presentation all attested to clinicians who seemed to be well versed in all areas of patient care management. This finding supported those found by Kaufman et al. (1997): PBL students did not receive higher clinical ratings than LBL students, but the PBL students' demonstrated expected clinical competence. Accordingly, their clinical practice, were no better or worse than LBL-trained clinicians. For this study, the practice patterns in all five areas were based on the APTA's elements of patient/client management in clinical practice. At minimum, the study offers a working hypothesis that graduates of a PBL PT program are as effective in clinical practice as their LBL-trained colleagues.

Second, among the many attributes that governed the perspectives of the physical therapists about their physical therapy clinical practice, problem-solving was one of the most frequently mentioned attributes. The participants postulated that their problem-solving skills were greatly enhanced by the PBL process. These findings support those of Barrows and Tamblyn (1980), Boud and Feletti (1991), and Solomon, Buckley, and Stratford (1996). Of course, problem-solving formed the basis of this study's theoretical perspective (Barrows & Tamblyn, 1980) and is hailed by PBL proponents as one of the essential components necessary for effective clinical practice. The attributes were most

beneficial in the evaluation phase of clinical practice. The evaluation phase of clinical practice is a highly cognitive process. In earlier years, physical therapists relied solely on physicians to prescribe the appropriate treatments and utilized very little problem solving in their practice. Today, with new laws that allow a physical therapist to be a primary care practitioner and health care gatekeeper, such reliance must now be supplanted with a highly effective clinical reasoning process. It was also evident from what the therapists stated that their PBL PT training enhanced their independent thinking skills in ways similar to that reported by Schmidt and de Vries (1992) and Solomon et al. (1996). By its very nature, the PBL process allows the asking of many questions and the provision of very few answers. Students wade through masses of conflicting information on subject areas in order to make judgements about the most effective and efficient principles to apply. In the clinical setting today, the information congestion is a very present dilemma. As physical therapists assume their new roles in an ever-changing health care environment, they must possess excellent independent thinking skills to effectively filter through to the relevant data. It is not unusual that the participants found this element beneficial to their clinical practice.

The third conclusion was that the PBL instructional approach is one of many factors influencing PT clinical practice. It was clear that the participants generally held positive views about the PBL instructional approach as was used during their PT educational training. This confirmed the findings of Rouse and Borsting (1990), Bernstein, Tipping, Becovitz, and Skinner (1995), and Moore-West, Harrington, Menin, Kaufman, and Skipper (1989) who reported that students exposed to PBL had very favorable attitudes towards the approach. It must be noted, however, that not all of the respondents attributed all of their gains in skill proficiency to PBL. Terry did not denote such thinking as a negative to PBL, but she wavered between giving credit to her innate personality traits and PBL's impact. Similarly, Robert gave credit to the PBL for the acquisition of certain attributes, but also credited his own self-reliant personality as an accompanying factor. Sharon offered her parents' value system as another factor that influenced the acquired attributes. Individuals' attributes may be influenced by many factors during the learning process. It may be difficult to definitively determine the degree to which an individual's PT clinical practice may be influenced by either the tenets of an instructional approach or any other factor. The perspectives about these attributes, for the most part, appeared to support the espoused efficacy of the PBL educational approach.

Recommendations for Practice

First, even with the findings of this study in hand it cannot be proclaimed that all physical therapy programs should now adopt PBL. With more schools adopting the PBL approach, however, this research may add substance to the debate regarding the efficacy of embracing a problem-based learning instructional approach in physical therapy programs. As a result, more program faculty may see this as encouragement to further explore its utility for their PT curricula. As advocated by Magistro (1989), problem solving and critical thinking and analysis should be essential elements of physical therapy clinical practice. Does the PBL process enhance those elements? This question was not

definitively answered by this research. This research will, it is hoped, shed some light on the efficacy of the instructional approach and its benefits to the profession.

Second, program faculty should explore all aspects of this instructional approach to discover whether clinical competence is enhanced by its adoption. Eisner and Vallance (1974) have counseled educators to make the necessary adjustments that will make schooling fulfilling for students. If more research confirms PBL's claimed benefits, then we as educators must be prepared to change our old paradigms and be agents of change and adopt instructional approaches that allow students to integrate theory and action so that the students can best gain the most beneficial clinical outcomes. The challenge here is for faculty to feel comfortable relinquishing their hold on the traditional instructional modes and pick up the mantle of facilitation in leading the new breed of physical therapists down new and different training paths. If more research confirms that PBL produces physical therapists similar in clinical effectiveness to LBL-trained practitioners, then a viable alternative can be offered to prospective students. Whether it is feasible to run two separate approaches or one might be based on other factors such as cost versus benefit.

Third, the implication of one of the findings is also worth examining. None of the participants were taught using problem-based learning prior to enrolling at NSU. They all experienced severe frustrations when adjusting to PBL at the outset. One could surmise that such stress might have come from any student's difficulty in meeting the demands of a new program, yet all three individuals clearly indicated that the lack of answers and the ambiguity that the PBL method engenders contributed to their initial discomforts. PBL advocates would argue that this uneasiness is fundamental to the PBL tenet so as to provoke and develop the skill of problem solving. Despite such thinking, it is the authors' opinion that this concern needs to be fully examined. There may be an adjustment that needs to be made to help students make a smoother transition from the traditional teacher-centered model to this more student-centered model. Physical therapy programs that use PBL may want to better prepare students for the initial phase to avoid the early frustrations. For example, learning style inventories could be administered to prospective students to appropriately determine if their learning style matches that of the instructional style inherent in PBL.

Recommendations for Further Research

Several questions were generated in the process of conducting this research that further study may answer. First, is the PBL approach suited to everyone? Two of the three participants indicated that PBL has to be matched with individuals and that not all students can flourish in and benefit from PBL. They both talked about PBL benefiting them, but spoke of some of their fellow students whom they believed failed to derive the greatest benefits. Is it then a student's aptitude toward an instructional approach that determines his or her level of comfort and success with that particular approach? Maybe students who do well or poorly with one type of instructional approach do so because of their own inclinations. For example, a student who is self-directed in his or her approach to learning and enjoys group discussions may gravitate more to the PBL approach.

Conversely, a student who is not inclined to be very talkative but enjoys listening and digesting information may find LBL more fulfilling than PBL. Should PT admissions counselors then choose to match students' aptitude with a congruent instructional approach? Perhaps, but further research is needed to adequately answer that question. This is one area that deserves further exploration. As discussed in the literature it is not clear whether students who do well in this format had an original inclination to that area or whether this can work for everyone. The merit in devising a system that best matches students' aptitudes with different instructional approaches might be explored.

Second, does the PBL approach engender problem-solving skills or do students with already good problem-solving skills gravitate towards the PBL approach? All the participants attributed some other factor, in addition to the PBL process, as a contributing factor to their acquisition of attributes such as problem solving applied to their clinical practice. Is it, therefore, the PBL process that must be credited or the student who acquired or developed the skill? The question might be better answered by examining which educational approach best fosters the development or enhancement of those factors.

Third, what we do know is that the data seem to indicate that these participants' PT training had a generally positive impact on their clinical practice. It remains unclear as to what degree, if any, PBL contributed to that positive impact. Further research may be able to determine to what degree PBL or other factors such as innate qualities contribute to the clinical practice of physical therapy practitioners.

Fourth, do PT practitioners trained with a PBL instructional style, perform better clinically than PT practitioners trained with other instructional approaches? The answer to such a question could appropriately determine the benefits or drawbacks of PBL and other instructional approaches in the area of physical therapy education. A long term study could be done that tracks many more students, either from one program or multiple PBL programs and compares them to traditional program graduates using a valid and reliable measuring tool of PT clinical performance. Would the resulting conclusions be the same for all the programs? In the literature review, a valid and reliable tool was not identified, but since there are many today which are used to measure students' clinical performance in other disciplines, it shouldn't be difficult to develop a valid and reliable tool or modify an existing one to measure PT clinical competence.

Fifth, the participants that were chosen for this research were exemplars. From this study, it was hypothesized that three PBL PT program exemplars did no better or worse in clinical practice than would be expected with LBL trained practitioners. This hypothesis could be tested to determine whether the same results would be evident with non-exemplary graduates. Would non-exemplars perform worse, just as well or better in clinical practice than the exemplars who participated in this study? The answer to such as question may help to more clearly distinguish the effects among such factors as PBL and inherent qualities that non-exemplars exhibit during clinical practice.

Obviously, we cannot proclaim on the basis of this research that all PT programs should now reflect a PBL approach exclusively, but for those considering the approach, this study may contribute useful information in making the adoption decision. From the perspectives of the graduates, there is evidence that PBL had at least some measure of positive impact on their clinical practice. Further research may more clearly delineate the nature and extent of the impact of the PBL approach on clinical practice or, for that matter, what factors specifically impact practice.

There is no question that clinicians must be fully prepared to face the challenges posed by a new and different health care system for the twenty-first century. Is the embracing of the PBL approach the answer? It may be one answer.

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