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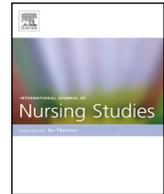
Graduate nurses' learning trajectories and experiences of Problem Based Learning: A focused ethnography study

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ABSTRACT

Background: Problem-based learning seeks to foster active, collaborative and self directed learning. It is increasingly utilized in health professional education; however, it is difficult to ascertain effectiveness. Empirically, student satisfaction does not match academic achievement but the reasons for this are unclear.

Objective: To explore the experience trajectories and satisfaction of graduates who had completed an undergraduate problem-based learning nursing program.

Design and methods: Qualitative focused ethnography using individual and group semi-structured interviews. Categories and themes were identified using inductive constant comparison. A comparative matrix analysis of differing levels of the two core processes illuminated specific experience profiles.

Participants and setting: Forty five program graduates who had graduated between one and nine years previously from a Western Canadian program offered at four academic sites. The sample was mostly female ($n = 37$), aged 26–30 years ($n = 23$) and graduated 5–8 years previously ($n = 20$).

Results: Levels of satisfaction with the program varied markedly. Two core processes contributed to this: "*understanding*" and "*valuing*" problem-based learning. Specific experience profiles included: "*Happy as fish in water*" which represents those who understood and valued the approach, and flourished; "*I'll do it but I won't like it*" reflects those who understood and could adjust to the academic context but did not particularly value it; "*I just want to be a nurse*" characterized those who consistently disliked and resisted the process but endured in order to graduate. Each profile was characterized by attitudes, intentions, learning preferences and program satisfaction.

Conclusions: We theorize an underlying mechanism explaining these diverse levels of satisfaction are differing orientations to studying. This approach to understanding how students typically approach learning is strongly linked to perceptions of academic quality and program satisfaction in higher education research, although it has been neglected in nursing problem-based learning research. Orientations to studying include reproductive surface learning, deep learning for understanding and meaning, and strategic approaches to maximize desired objectives. These orientations are congruent with the descriptive typologies developed in this research. This provides an effective explanation as to why some students adapt easily and flourish in problem-based learning contexts, while others

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continually struggle to adapt. Further research is needed to determine the relationship between deep, surface, and strategic orientations to study and student satisfaction in nursing programs.

What is already known about the topic?

- Problem-based learning seeks to foster active, collaborative and self-directed learning.
- Levels of satisfaction do not correspond to actual academic achievement in problem-based learning programs.
- Poor understanding of underlying mechanisms explaining why problem-based learning works for only some students.

What this paper adds

- Link between problem-based learning satisfaction and experience trajectories.
- Experience trajectories are related to varying levels of understanding and valuing problem-based learning.
- Orientation to studying is a core underlying mechanism to explain experience trajectories.
- Students have tendencies to learn for understanding or reproducing material.
- Surface learners struggle more in problem-based learning than deep or strategic learners.

Contribution of the paper: This research describes specific experience trajectories of graduate from an undergraduate nursing Problem Based Learning program based on varying levels of understanding and valuing the PBL philosophy and process.

1. Introduction

Effective nursing practice depends on nurses who continually ensure that their practice is informed by best current evidence, who think critically and who are flexible in response to changing client situations. Nursing education programs seek to foster these attributes through both the content and the process of teaching (Morales-Mann and Kaitell, 2001). The philosophy underlying Problem Based Learning (PBL) is that transformational learning for students is based on active, realistic experiences that engage students in self directed inquiry and critical thinking (Spiers et al., 2010). Undergraduate nursing programs using problem-based learning (PBL) approaches have distinct advantages in promoting skills in communication, problem-solving, critical thinking, teamwork, evidenced based practice, and self-directed learning (Cooper and Carver, 2012).

The body of descriptive research indicates that student experiences in, and satisfaction with, PBL based nursing programs is highly variable. There is a paucity of evaluative research in nursing PBL contexts and current general and nursing-specific research fails to demonstrate the effectiveness of different adaptations of PBL in different contexts with different student groups (Newman, 2004; Williams and Beattie, 2008) and to indicate why different students struggle with different aspect of the process. This has been referred to as the "black box of PBL" (Prosser, 2004). The purpose of this study was to explore the experience trajectories of nurses who had completed a PBL based undergraduate program.

2. Background

PBL is based on the assumption that both process and content must be explicit in order to assist students in attaining the knowledge, attitudes and behaviors characteristic of competent professional nurses (Rooney and Beattie, 2012). In both general PBL and health-discipline PBL curriculum research, there are significant problems in attempting to identify appropriate criteria to assess program outcomes and effectiveness (Albanese, 2009; Colliver and Markwell, 2007) and meta-analysis has not resolved the effectiveness debate (Dias, 2006; Walker and Leary, 2009).

There is limited research on using PBL in nursing education. Current work is largely focused on selective aspects of PBL, such as its use in clinical practice (Ehrenberg and Hãggblom, 2007) or in particular courses (Goelen et al., 2006). It also is generally reliant on data collected at the end of the program rather than a period of time after graduation. The majority of nursing PBL research focuses on self perceived development of self-directed learning (Williams, 2004), and component outcomes of PBL (Cooper and Carver, 2012) such as problem solving, communication (Uys et al., 2004), conflict resolution skills (Seren and Ustun, 2008) and critical thinking (Tiwari et al., 2006; Yuan et al., 2008) at the completion of the program. PBL appears to be effective in supporting clinical problem solving, long term retention of material, skill development and critical thinking (Shin and Kim, 2013; Strobel and van Barneveld, 2009). Interestingly, researchers have found no relationship between PBL satisfaction and learning progress even though learning progress was significantly better (Sangestani and Khatiban, in press); and no differences between self-reported competence between PBL and non-PBL graduates at six months (Applin et al., 2011). Critical thinking, problem-solving and communication are key strengths perceived by PBL graduates (Rakhuda, 2011; Rowan et al., 2009) although there is inconclusive evidence that PBL fosters critical thinking in undergraduate students significantly more than traditional lecture formats (Agnes et al., 2006; Yuan et al., 2008). One meta-analysis suggests student academic

performance is as good or better than in lecture-based approaches across disciplines (Walker and Leary, 2009).

The transition from traditional learning contexts to PBL can be difficult but once accustomed to it, participants enjoy PBL and gain a range of study and interpersonal skills (Cooper and Carver, 2012; Rakhuda, 2011). Graduates perceive that they gain increasing autonomy and self-directed learning that in turn leads to greater depth and breadth of learning (Chikotas, 2009; Wood, 2005). Significantly, graduates tend to evaluate PBL more positively after entering professional practice then they do during, or at the end of, the program (Lobb and Butler, 2009; Smith and Coleman, 2008).

Key to understanding why student satisfaction varies and evolves appears to be intellectual maturation, the process of development from passive, teacher directed learning to self-directed learning (Kocaman et al., 2009; Wood, 2005). Students often enter PBL programs with experience, values and expectations from teacher-dependent learning from high school or other learning situations. The intimidation and threat posed by a new learning model can develop into resistance from students who struggle with the expectations inherent in self-directed learning (Spronken-Smith et al., 2001). However it is not clear what mechanisms underlie why some students are able to reach the desired intellectual developmental stage of independence while others do not, and why some students embrace, adapt to, or continually resist the approach, and thus experience very low levels of satisfaction.

2.1. Rationale for the study

Most PBL nursing education research has described specific aspects or outcomes, and there is a paucity of research exploring the entire experience that has been enriched by practice experience, in other words, by graduates who have had time since graduation to synthesize and reflect on their experience as a whole. A major limitation of previous work has been data collection at the point of completion, when participants may be more influenced by immediate concerns such as final exams or other evaluative pressure.

The research question "How do PBL graduates describe their PBL education experience?" emerged from a larger study that explored graduates' perspectives of the contribution of their PBL program to the development of their professional practice, which is reported elsewhere (Williams et al., 2012). The data analysis in this sub project was conducted separately but simultaneously with the larger project. The focus of this article is the experience profiles developed to explain differences in the program experience trajectory and how this is related to perceived satisfaction with the program.

The University of Alberta BScN Collaborative Program is offered at four academic sites; Edmonton and Red Deer, and two smaller sites at Grande Prairie and Fort McMurray. It is one of two undergraduate PBL nursing programs in Canada. PBL was implemented in 1997. PBL defined in this program is "context-based learning" in the belief that not all encounters with clients are problematic in nature and is described elsewhere (Spiers et al., 2010; Williams and Day,

2009). The first cohort experienced all content via PBL. After this cohort, support courses (e.g. anatomy and physiology) reverted to traditional lecture format in three sites while all nursing courses retained PBL format at all sites.

3. Design

Qualitative focused ethnography that strongly draws on principles of grounded theory analytic techniques was used to frame this study. Our theoretical approach was based on constructivist principles in that we privileged participants' interpretations and perceptions of meaning as reflected in their memories of their experiences (Mills et al., 2006). Focused ethnography approach focuses on a specific topic among a particular group of people and privileges one kind of data collection, in this case, interviews (Knoblauch, 2005). It is used to obtain an in-depth understanding of experiential perspectives within a geographically dispersed group.

Overall ethical approval for the study was granted by the University of Alberta Health Research Ethics Board (study ID Pro00006748) with ethics/administrative approval from each of the collaborating sites, Alberta Health Services and Covenant Health Services.

3.1. Sample

Academic achievement was defined for the purposes of this study as having successfully completed the requirements of the program, indicated by graduating. Purposive sampling was used to recruit 45 Registered Nurses via an invitational letter, article and advertisement published in the provincial nursing association newsletter (Spiers et al., 2010) and posters in clinical agencies in the four cities. Theoretical sampling occurred in response to identification of emerging themes and negative cases; for example, most participants entered the program from high school but those who had intervening experience appeared to have a different experience trajectory, so we recruited 16 participants with a break of at least one year between high school and nursing. Maximum variation was sought to include those who "liked" or "hated" the PBL approach, as well as those who were ambivalent (Morse et al., 2002).

The sample was predominantly female (n = 37, 82%) and aged 26–30 years (n = 23, 51%). Twenty participants graduated 5–8 years previously, 16 within the past 3–4 years and 7 nine years ago at the time of data collection. Participants mainly attended one of the two larger Collaborative sites of Edmonton (n = 21) and Red Deer (n = 11) and the rest were drawn from the smaller sites. Most worked in staff nurse positions (n = 31) or as nursing instructors (n = 19). The majority were employed in acute care settings immediately following graduation (n = 32).

3.2. Data collection

Data collection consisted of semi-structured individual and focus group interviews conducted by the lead author and a trained research assistant, neither of whom had known the participants as students. A combination of

individual and group interviews was used to meet the scheduling and individual preferences of participants. Three interviews occurred by telephone or email as participants lived out of the province or country. Eight focus groups (n = 22; 2–7 per group; length ranged from 2.5 to 3.5 h) and 23 individual interviews (time range from 2–3 h) were completed from October 2009 to July 210. After a grand tour question, "Tell me about your experience in the PBL program," questions in both the focus groups and individual interviews explored participants' journey through the program and transition into clinical practice. Concurrent data collection and analysis ensured that analysis from each data collection episode iteratively contributed to the next interview by including questions at the end of the interview to probe into areas of emerging interest and to verify current analysis (Morse et al., 2002). Field notes were created to track observations about pertinent features of the interview, interpersonal interaction and non verbal behavior, particularly in the focus groups. At analytic saturation of important theoretical categories in the overall experience (around the 25th interview), we constructed a typical "story" to share with participants, followed by the question, "How does this story resonate with your own experience?" This facilitated verification of existing analysis and focus on dimensions that were different to the common experience (Germain, 2001). Theoretical saturation, where all categories appeared to be fully described with no new data occurred at approximately 40 interviews. Interviews were digitally recorded and transcribed verbatim.

3.3. Data analysis

The first seven interviews were analyzed by the team. Thereafter, the first author took primacy in coding and team members provided comparative coding on select transcripts. The team maintained consensus on analysis, questions and subsequent interviews. The team maintained consensus on analysis, questions and subsequent interviews and incrementally incorporated these outcomes throughout the project. Team members individually kept analytic memos and team meeting records tracked evolution of analysis and interview protocols. Data analysis employed strategies of constant comparison. Open and in vivo coding identified ideas in each transcript and constant comparison within and across transcripts was used to collapse codes and create categories. Axial coding identified relationships between categories and between themes and categories. Theoretical coding was used to generate themes (Charmaz, 2009). Extensive use was made of participants' own words to exemplify the themes and to represent their understandings as accurately as possible. Following description of the overall experience trajectory, comparative matrix analysis allowed us to explore the interactions and outcomes of differing levels of the two core processes identified in the data and assisted in hypothesis generation and theoretical sampling (Draucker et al., 2007; Miles and Huberman, 1994; Strauss and Corbin, 1990). This approach gave rise to typical experience profiles (Fig. 1). We compared each transcript to determine the profile that best represented their experience. Verification techniques were incrementally used to ensure the rigor of the study by iteratively and systematically checking the data, the focus of the research, the fit of the data with the conceptual analysis and interpretation (Morse et al., 2002).

4. Results

The general process of completing the program was labeled as "taking control of your learning" to describe how participants incrementally came to comprehend, harness and employ PBL processes to a greater or lesser extent so that they flourished or floundered. Doing this involved two distinct co-processes of "Understanding" and "Valuing" PBL. Within this overall experience process, three distinct experience typologies were identified which explained variations in experiences and levels of satisfaction: "happy as a fish in water", "I'll do it but I won't like it" and "I just want to be a nurse."

Completing a PBL based nursing program was a confusing, exhilarating academic and personal challenge.

		Understands PBL	
		High	**Low**
Values PBL	**High**	**A: "Happy as a fish in water"** Enjoys learning and flourishes as student and evolving nurse; realizes power as a self-directed learner	**D: Theoretical Category** Possibly unsuccessful in PBL program and withdraws.
	Low	**B: "I'll do it but I won't like it"** Uses but resents process: Unsure of benefit at the time but over time comes to appreciate value	**C: "I just want to be a nurse"** Never comfortable with process: likely to subvert process as regards PBL as an inefficient waste of time

Fig. 1. Analytic matrix comparing levels of understanding and valuing PBL.

309 This article's focus is how the different experience profiles
310 influenced perceptions of satisfaction with the program.

4.1. Taking control of your learning

312 The educational experience was about "*Taking control of
313 your learning.*" This consisted of two intertwined processes,
314 "*understanding PBL*" and "*valuing PBL*". "Understanding
315 PBL" refers to the evolving comprehension that *how* one
316 learns is more significant than *what* one learns:

317 *Third year I really started to appreciate what we were
318 learning. And how we were learning it. It's not as much the
319 <u>what</u> as the <u>how</u>.*

320 The PBL teaching philosophy that encouraged students
321 to be actively engaged in the learning-teaching process
322 rather than passive recipients. "*Understanding PBL*"
323 demanded a complete paradigm shift in assumptions
324 about learning. Students experienced considerable frus-
325 tration and dissatisfaction with the structure and process.
326 They felt that the curriculum was "chaotic", the tutors lazy
327 and that they were "*not getting our money's worth-we were
328 teaching ourselves*". Students "*learned as you go*" gradually,
329 so they embodied an attitude of inquiry as a *habit* through
330 sheer repetition:

331 *We just did it all the time: WHY?... That was drilled into
332 our heads .... Always, <u>always</u> here in the hospital or the
333 classroom, I'll be talking to myself, "why is this happening?*

334 Eventually, familiarity brought confidence by the end of
335 year two or beginning of year three of the four year program:

336 *As I progressed, I just became more comfortable. This is the
337 normal part of the program and you learned how to use the
338 process in a more comfortable manner throughout.*

339 The corresponding process, "*valuing PBL*" reflects how
340 students sought meaning in PBL as part of their develop-
341 ment as a professional nurse. Students comprehended that
342 the conditions experienced in PBL also reflected the
343 realities of practice. "*Valuing PBL*" could occur during, or
344 more commonly, some months to years after graduating as
345 one participant explained:

346 *I hated doing it like everyone else. But, after the fact, you
347 realize that it was beneficial too and when you're starting
348 out as a nurse, it helps you to plan out things.*

349 Both "*understanding*" and "*valuing PBL*" were integral
350 processes necessary to foster a professional self identity
351 that included desirable attributes of competent RNs and
352 this was reflected in an evolving sense of satisfaction with
353 the extent the program enabled them to reach this goal:

354 *If you can get used to [PBL] it's going to make you a much
355 better nurse... If you can get through that first year of
356 being a little afraid and having to figure things out and
357 kind of scrambling, I think that it's going to be the best
358 thing for you, at the end of it all.*

4.2. Experience trajectories

360 We constructed a 2 × 2 comparison matrix to hypothe-
361 size different student profiles and program experience

362 trajectories based on contrasting levels of the two core
363 processes. While this approach creates typical profiles
364 there are nuances between profiles that are not repre-
365 sented. Fig. 1 illustrates the learner profiles developed in
366 this analytic matrix.

4.2.1. Cell A: "Happy as a fish in water"
368 Cell A reflects attributes of high levels of "under-
369 standing" <u>and</u> "appreciating" PBL which was reflected in
370 their generally high levels of satisfaction:

371 *I gush about it. I just really enjoyed it .... it was a really
372 hard and really scary and really wonderful and it all comes
373 together... I think it was for me the best way to learn it and
374 not just for me. I just think... you GET it if you learn it that
375 way.*

376 These participants enjoyed PBL because it matched
377 their preferences for active, self-directed and collaborative
378 learning. Participants appreciated focus on understanding,
379 meaning and application:

380 *When it's lecture based, it's a lot of memorization. And I
381 just don't have that. I can't memorize! But PBL, we could
382 talk about things and I could apply. I still remember the
383 names of the scenarios... I could retain that information
384 because I could put it back to a name [in the scenario].*

385 Participants perceived they were learning how to seek
386 and use information deliberately rather than to reproduce
387 a list of skills or facts. PBL was intellectually invigorating
388 and empowering and they could tolerate the ambiguity
389 inherent in an approach that assumes there may be
390 multiple solutions to a problem:

391 *The learning you have in PBL is not systematic, it's not A to
392 Z, it's not... yes or no, right or wrong answers. You often
393 discover in PBL that there can be many answers, many
394 different rationales, many ways of looking at things.... It's
395 not the traditional type of learning....it changes you in
396 ways that are slow, but it's a developmental thing... I
397 think it's just like a reconditioning of your patterns and
398 methods of thinking.*

399 Key attributes were that participants enjoyed challen-
400 ging themselves and engaging in active collaborative
401 learning:

402 *Once I figured out how the program was geared and how to
403 use it to my learning styles and ultimate advantage – I
404 thought it was brilliant. I enjoyed the flexibility of the
405 delivery and the opportunities for research. I think I
406 became a better student as I was not only responsible for
407 my own learning – but also to contributing to that of
408 others. This probably made me a less lazy student that I
409 otherwise might have been.*

4.2.2. Cell B: "I'll do it but I won't like it"
411 This cell represents those who understood PBL pro-
412 cesses but did not value it or experience much satisfaction
413 as a student. However, following graduation they tended to
414 re-evaluate their experience in light of the demands of
415 their professional practice. Typically, these participants
416 initially struggled with PBL. It was a shock to their sense of

confidence as a learner. They worried about missing appropriate knowledge and skills and worried they were not learning anything "practical":

> I struggled with making sure that we were learning the appropriate material…. You had to sift through to figure out what was important and that bothered me. I didn't like that at all.

By second year, they were comfortable although their engagement was resigned rather than enthusiastic, prepared, as one participant said, "*to bite the bullet.*" Fundamentally, they realized that to be successful, they needed to adapt to, and use PBL, to the best of their ability. Ambiguous evaluation criteria and variation between instructors was a source of extreme frustration as it undermined the validity of the approach:

> I thought of it as a game: if I could read the instructor and know what that instructor wanted, I could produce, deliver exactly what that person wanted and I would get an A+. Whereas if I didn't … know what that instructor wanted and I wasn't clear on what their expectations were, my mark … wasn't as good, so as I developed…it was more… sitting with the instructor and saying "I want to succeed in nursing." How can I do that in this tutorial?

They tended to tolerate or dislike PBL because of the lack of structure, reliance on other students' quality of work in scenario research, and lack of focus on immediately examinable material. Clinical experience was pivotal for this group because practice demonstrated how PBL paralleled nursing processes, but essentially, the process of learning was a *means* to the goal of graduating. This dislike continued well after graduation until they started to clinically employ their PBL skills as a Registered Nurse which drew upon their skills in group process, conflict resolution, critical thinking and problem solving. This encouraged them to re-evaluate the value and contributions of PBL:

> I don't think I saw it at the time. I _know_ I didn't know it at the time. But thinking back now…I totally didn't appreciate it at the time. But now I'm quite grateful that ~~they~~ actually did it…

A major contribution to this reassessment postgraduation was the shift in focus from immediate educational performance challenges, such as examinations, to broader abilities such as clinical critical thinking:

> Back then it was the details – can I pass this exam? _Now_ it's … can I critically think – and that's… more important. ….[Back then] you wanted to be a good nurse but immediately you wanted to pass the test [P: 032: absolutely] and critical thinking does NOT come into play when you sit down and you have ten multiple-choice questions in front of you. Your critical thinking means nothing. You know there's a right answer.

4.2.3. Cell C: "I just want to be a nurse"

> I didn't like the program. It didn't suit my learning needs. It wasn't what I expected. I don't think I got value for the dollar that was spent … but I came out a nurse.

Cell C represents those who maintained low levels of understanding and valuing of PBL throughout the entire four years. They persistently resented it and tended to be dissatisfied with the program. There was only one participant, a mature student, who strongly reflected this profile; others were significantly less strong. There was substantial reference to peers in their program or current students (from participants who were nursing instructors) manifesting these attributes. Characteristics of this profile included a strong regret of the decision to enter a PBL program because they "*did not really learn anything.*" Key attributes included low tolerance for ambiguity and a need for extensive external confirmation that they had mastered the essential content that did not waver throughout the entirety of the program. The following quote illustrates the strong C cell participant's security and resultant satisfaction in the first two years in a traditional nursing program compared to the PBL context:

> I absolutely probably felt more alive in my life than I ever have in those first two years [traditional program]….because I knew what was expected of me… the marks _proved_ that I was doing well … I _knew_ what I had to learn, and I never did in PBL….I was always floundering with this thing [PBL]… nobody ever could say to me, "yes you need to know that or no you don't."

A typical comment was that "*I hated nursing tutorials*" throughout the entire program. PBL learning scenarios were overwhelming and participants described difficulty with time and workload management as well as difficulty in identifying priority information. They believed a lecture format would provide necessary content in a clear manner and "*you're not sitting there guessing about what do I have to learn about this*". These participants required a more linear form of learning, in which acquisition of information in "basic courses" is separated from application:

> If you need to solidify information in order to be able to utilize it, you can't just pull it out of… 15 people's all-nighters _looking up_ information instead of _learning_ information and _then_ expect them to be able to _utilize_ it… That information needs to be solidified through straightforward systematic courses, _then_ you can play with it.

These students were more likely to subvert PBL processes. Their engagement in activities such as group brainstorming, discussion, or feedback lost meaning over time and became superficial and rote because it was deemed *redundant*, as one participant revealed, "*It just became a game. It became a lot of fluff. It became so repetitive… it was just a waste of time.*" Over the course of the program, perceptions of unnecessary learning turned to resentment because "*You pay a lot of money to become a nurse at the end. And to not have as much instruction…*" This resentment persisted and it often took years to reassess their experience:

> It's taken till now [research interview] to realize – to actually see some of those benefits from PBL 'cause when I first graduated, I thought why didn't I do the other program? I felt like I really didn't learn anything.

Cell D is a theoretical category generated by comparison of the two main processes even though we did not have any direct data or participants reflecting this profile. However, we did have shadow data, or second hand information from our participants (Morse, 2001) who recalled students who had dropped out:

> Between our first and second year we lost more than half the class, and I think a lot of that was just not being able to learn – not knowing their learning style yet and so failing things…. because they didn't know how to do it on their own.

Although the estimation of attrition in the above quote is possibly an exaggeration and not reflective of other reasons students may withdraw, the perception is clearly articulated that some students were inherently unable to adjust to PBL. These students may have liked nursing and have even had liked the idea of self-directed collaborative learning, but were unable to adapt effectively:

> Those would be the people who… always felt frustrated with it, felt like they didn't know how to study or what to study for tests. Maybe they were the people who didn't speak up in class.

5. Discussion

Our overall PBL program experiences reflect existing research, which has been consistent for the past twenty years (Chikotas, 2009; Rowan et al., 2008; Smith and Coleman, 2008) and indicates the commonalities in PBL experience regardless of the instructional subject (Cooper and Carver, 2012). Our participants were eager to describe how they "liked" or were satisfied with the program to a greater or lesser degree, although their enjoyment was unrelated to their overall academic success in completing the program. The core processes of understanding and valuing PBL, contain elements of control, responsibility and motivation commonly found in general PBL research. It reflects the intellectual maturational process from passive dependency to self-directed independence (Kocaman et al., 2009; Papinczak et al., 2009; Salamonson et al., in press) even when graduates are unable to appreciate the contribution of PBL until well after graduation (Chikotas, 2009; Smith and Coleman, 2008). Despite the study being limited in size, the essential core concepts are congruent with extent research and provide direction for further work.

This study's key contribution is identification of the experience trajectories are indicative of the underlying cognitive mechanisms that mediate learning outcomes and satisfaction with PBL and that help illuminate the "black box" of PBL (Chamorro-Premuzic et al., 2007; Entwhistle and McCune, 2004). We believe a crucial underlying mechanism is *orientation to studying*. This is a significant area of research in higher education although it has been largely neglected in nursing (Entwhistle and McCune, 2004; Felder and Brent, 2005; Taylor and Miflin, 2008). The concepts and profile attributes described in this model are congruent with the findings of our inductive analysis based on comparison of both profile attributes and characteristics and characterization of each participant's transcript. Some participants clearly reflected a particular orientation, others indicated weak/strong or transition from one to another. However, as we were not able to directly confirm them with participants at the time of the study, this is, as yet, theoretical speculation.

5.1. Orientation to studying

Orientation to studying refers to the ways students approach their studies based on their self-conceptions as learners (including factors such as age, culture, goals and motivation as well as study habits and prior learning experiences), perceptions of the teaching and learning context (e.g. academic culture and assessment demands), and the demands of the particular learning task (Entwhistle and McCune, 2004; Richardson, 2011; Struyven et al., 2006; Vermunt, 2005). Study orientations are not associated with intelligence (von Stumm and Furnham, 2012) and no one particular approach is inherently superior; what is important is the correspondence between the student's orientation, the academic context, and the task. Previous research indicates that nursing students in general have diverse orientations to studying (Leung et al., 2008) however, there is a complete lack of research in PBL contexts. We suggest that incongruence between orientations to studying and PBL combined with inability or unwillingness to adapt study strategies to meet the demands of PBL underlies the outcome trajectories (Prosser, 2004). The three study orientations that have consistently been validated are deep, surface, and strategic learning (Entwhistle and McCune, 2004).

Deep learners reflect the characteristics of our participants in Profile Cell A. These learners are intrinsically motivated by the desire to find meaning and understanding. They enjoy exploring learning for learning's sake and their study strategies were oriented toward understanding by integrating old and new information. They are critical of acquired knowledge, want to question and apply knowledge and are willing do whatever is necessary to understand (Bran and Balas, 2011; Chamorro-Premuzic and Furnham, 2008; Entwhistle and McCune, 2004). These learners find the lack of direction invigorating and that it stimulates greater engagement and motivation (Wood, 2005). PBL is congruent with deep approaches in medical programs (Papinczak, 2009) possibly because PBL is better at fostering learning and application of principles (Walker and Leary, 2009). In general nursing education, deep learning approaches have been associated with improved learning outcomes (Tiwari et al., 2006) and in medical PBL research, deep learners adapted better with less stress, tolerated ambiguity and ultimately perceived the program and approach to learning more positively (Papinczak, 2009) as did our Cell A participant profile. Consequently, they experienced PBL as an exciting and gratifying challenge because PBL processes were congruent with their preferences (Newman, 2004).

Surface learners are extrinsically motivated individuals whose goal is to reproduce rather than understand learning material (Bran and Balas, 2011) which reflects Cell C profile. They are primarily interested in learning the minimum amount of material to achieve their goal of passing courses (Chamorro-Premuzic et al., 2007; Newman, 2005; Smith

and Coleman, 2008). Their transition into PBL was traumatic because their memorization-based approaches were no longer appropriate and they experienced frustration with the self-directed requirements throughout the program. These learners were pragmatic in that only the material deemed most important in terms of external rewards (e.g. exams) was regarded as important (French et al., 1998) so ambiguity in learning or assessment causes considerable anxiety. Surface orientations prevail among younger and high school entrants to university who seek to reproduce content in exams using memorization rather than focus on understanding and application (Pettigrew et al., 2011; Vermunt, 2005). Nursing students may prefer this orientation even when exposed to active learning strategies (Walker and Leary, 2009) and was clearly evident in Profile C participants' resistance to active engagement in PBL. Their perceptions that PBL contained excessive and unnecessary work reflects their ineffective approach to study because they could not identify key content (Entwhistle and McCune, 2004). However, in our study, age did not seem to be a strong factor as mature students were represented in each of the three profiles.

Research on attempts to foster deep learning approaches with identified superficial learners is mixed in PBL contexts (Prosser, 2004). Worryingly, there are indications that efforts to elicit deep learning approaches tend to only intensify superficial learner efforts to use more complex surface strategies to reproduce the attributes of the deep approach (Newman, 2004). Students who perceive PBL as a non-responsive, excessively drawn out process that does not meet their learning needs may cope by "playing the PBL game" (Smith and Coleman, 2008; p. 118). We theorize this strategy of subverting PBL reflects inability to evolve from surface learning orientations.

Finally, *strategic or achievement oriented learners* are extrinsically motivated by academic success but they can flexibly employ surface memorization or deep understanding strategies depending on the demands of the situation (Entwhistle and McCune, 2004; Felder and Brent, 2005; Struyven et al., 2006). They are adept at determining clues about evaluation criteria so that they can adjust their studying in the most effective manner. Participants in our study in Profile Cell B typify this orientation. While this group could tolerate ambiguity with less stress more easily than surface learners, they did express frustration with tutor and course variation because they found it harder to identify evaluation criteria. Similarly, Cooper and Carver (2012) and Wood (2005) found that while some students did adapt well to PBL, they continued to require reassurance that they were achieving necessary knowledge and skills throughout the program. In this study, clinical application helped students make the link between learning and practice and helped transform learning from reproductive/replication to understanding (Newman, 2004).This stimulated reassessment of the value of PBL.

6. Implications for practice

There is a fine balance between satisfaction and academic success in designing PBL curricula. There is sufficient evidence that learning outcomes alone are insufficient to offset problems experienced in the educational process and that not all learner styles are congruent with PBL (Smith and Coleman, 2008). Potential students may be attracted by the goal of nursing and assume that the educational environment is of lesser importance. Specific efforts are needed to ensure potential students understand the nature and implications of PBL prior to committing to the program. Students' reality is that time is finite and nursing programs expensive, so it is reasonable to ensure, as far as possible, that incoming students already possess the types of attributes that will support their motivation and commitment to learning (Taylor and Miflin, 2008). Video or web based descriptions and pre-program experiences should be provided for potential applicants. PBL tutors are metacognitive coaches who support development of problem solving, active collaborative learning skills and self -directed learning (Savery, 2006). There must be comprehensive orientation and active on-going support of PBL, thus providing adequate scaffolding to support students' ability to discern immediate and longer term learning goals. In the same manner, tutors also require consistent initial and advanced professional development to establish and advance tutoring skills not only in PBL but in fostering students' ability to adjust their learning styles to the demands of the learning environment. Introducing concepts of orientation to studying may assist in developing strategies that will improve students' effective self-regulated learning techniques. Struggling students need early counseling and support to develop effective strategies. Workload must be carefully monitored as satisfaction is compromised when the philosophy articulates valuing of deep learning approaches but the workload and assessment mechanisms force students toward a surface approach. Lastly, while intrinsic motivation is an academic ideal in PBL, the unpleasant reality is that some students will reach that goal somewhat unwillingly and others not at all. Understanding patterns of orientations to studying may help faculty understand the fluctuations in readiness for self-directed learning evident in the PBL nursing population.

We theorize a link between study orientation and program experience trajectory that is speculative but nonetheless a valuable explanation that needs to be pursued in PBL nursing research. Further research is also needed to determine the extent to which students with a surface or replication/reproducing orientation can be motivated and supported to adopt approaches amendable with PBL processes.

The small sample and limited context of the study may limit transferability of the study findings. The constructivist assumptions underlying the study privilege the participants' own perspectives and memories of what was important but there may be selective retention of information and retrospective interpretations about their past experience, as well as other factors participants viewed as not important which could affect conclusions drawn from the study.

7. Conclusion

Problem Based Learning seeks to foster students' intellectual development toward self- directed learning.

However, student satisfaction does not mirror academic achievement in nursing PBL contexts. This study is the first that identifies why some students react and adapt to PBL differently based on varying levels of valuing and understanding the learning approach which leads to differing perceptions of satisfaction. Students have varying goals for study which may range from learning for understanding to achieving goals such as graduation or highest academic success. These goals lead to different studying strategies. Deep and strategic learners may experience PBL contexts more positively as their needs and goals are more congruent with PBL than surface learners. Future focus on the influence of orientations to studying informs structural and procedural supports needed for a diverse student population.

Conflict of interest: None.

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