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Kristine M. L'Ecuyer
Saint Louis University, Lecuyerk@slu.edu

David Pole
Saint Louis University

Sheila A. Leander
Saint Louis University

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ARTICLE

The Use of PBL in an Interprofessional Education Course for Health Care Professional Students

Kristine L'Ecuyer, David Pole, and Sheila A. Leander (Saint Louis University)

A problem-based learning (PBL) framework was utilized in a series of six interprofessional team seminars (IPTS) for post-baccalaureate students from seven health professions. The goal of IPTS was to develop a collaborative practice-ready workforce prepared to respond to patient care needs through use of concrete examples, skills development, critical thinking, and problem solving in safe, faculty-facilitated small groups. The collaborative nature of PBL closely correlates with teaching methodologies of the IPTS series. This study analyzed critical reflection assignments of nursing students in accelerated programs to determine the effectiveness of IPTS at preparing students for interprofessional collaborative practice. Findings indicated that PBL is an effective method for teaching interprofessional collaboration skills to nursing students.

Keywords: problem-based learning, PBL, interdisciplinary education, interprofessional education, critical reflection, accelerated nursing curricula, collaborative practice

Introduction

Problem-based learning (PBL) has been used as an instructional method in medical school education since 1969, and is now widely used in numerous health professions (Spaulding, 1969; Savery, 2006). PBL has been described as a student-centered teaching/learning method that uses problems relevant to desired learning outcomes as a means of encouraging self-directed learning, critical thinking, lifelong learning, and self-evolution among students (Rideout & Carpio, 2001; Savery, 2006). PBL requires student collaboration to develop strategies to resolve problems, consider alternative solutions, and justify their solution to others (Paige & Smith, 2013). The collaborative nature of PBL makes it an ideal method for use in interprofessional education (IPE) courses in the training of health professionals; however, the usefulness of PBL in IPE has not been thoroughly examined in published peer-reviewed literature. We used PBL in an interprofessional course to simulate the role of health care professionals collaborating on real patient scenarios in a seminar setting. This study adds to the body of knowledge about the use of PBL in health professions education, and specifically, it addresses its use in interprofessional education.

The purpose of IPE is to improve interprofessional collaborative practice (IPCP). This occurs when health professionals from different backgrounds work together to accomplish

common goals with patients, families, and communities in order to deliver the highest quality of care. Collaboration-ready practitioners have developed their understanding and skills through effective IPE curricula that enables them to demonstrate respect for the roles and responsibilities of different professions in patient care, effective teamwork, and communication skills (World Health Organization, 2010; Interprofessional Education Collaborative, 2011). Faculty at a midwestern university implemented IPE in the baccalaureate and postbaccalaureate health professions programs beginning in 2006 (Ruebling & Royeen, 2010). The IPE courses are based upon core premises developed from the available literature in IPE and education. These core premises were confirmed with the publication of the report from the Interprofessional Education Collaborative (IPEC) Expert Panel that outlines national core competencies for IPCP (IPEC, 2011). These premises include the requirement that IPE learning experiences involve two or more professions and provide for student engagement in collaborative use of shared expertise directed toward improving the process and outcomes of patient care (Ruebling et al., 2014; Ruebling & Royeen, 2010; World Health Organization, 2010).

While the university offers several IPE courses at the baccalaureate level, there is one primary course for students in postbaccalaureate programs. The course analyzed in this research, the interprofessional team seminar (IPTS), is a

requirement in the curricula of students from the following programs: medicine, nursing, physician assistant, physical therapy, occupational therapy, social work, and pharmacy. The course consisted of six classroom seminars in which students worked in small, interprofessional groups. They worked to develop their understanding of the roles and responsibilities of different professions and developed skills in collaborative decision making, care planning, and critical analysis. To accomplish the IPTS learning objectives (Table 1), a PBL framework with embedded IPEC core competencies was used to introduce students to the core principles and skills of IPCP. The PBL cases focused on patient safety and quality care. The ultimate goal was to improve problem-solving skills in a team format and prepare students for collaborative practice in an effort to reduce errors and adverse patient outcomes. IPTS required students to form teams and simulate prerounding huddles or discharge planning while a faculty facilitator supported the process and helped draw out the attributes of IP teamwork, not just those of the clinical cases.

This research report focuses on the experience of nursing students in the IPTS course and is part of a larger study in progress across all professions involved. In the nursing program, the IPTS course was incorporated into two accelerated, postbaccalaureate, prelicensure degree options. The accelerated baccalaureate (ABSN) option is 12 months (or three semesters) long. The accelerated master's (AMSN) option is 21 months (or five semesters) long. In the ABSN curriculum, the seminars were required in the context of acute care clinical and leadership courses in semesters 2 and 3. In the AMSN curriculum, the seminars were required in the context of advanced clinical studies in semesters 4 and 5. Participation in the seminars contributed to each student's course grade.

Framework for the Use of PBL in an IPTS Course

Preparing health profession students for practice in the 21st century has increased the demand to teach contextually relevant material in a manner that fosters critical thinking (Tayyeb, 2013). In a report about training today's medical students, Morrison and colleagues outline the paradigm shift from individual to team-based practice, as well as specific teamwork competencies required to meet patient care needs. Specific competencies include shared leadership roles, open-ended discussion and problem solving, flexibility, and adaptability to meet the needs of the team and the patient (Morrison, Goldfarb, & Lancken, 2010). Several researchers identified that PBL provides a framework for building critical thinking, interpersonal skills, and teamwork (Alben, Krueger, Berezniak, Tjioe, & Ferretti (n.d.); Barral & Buck, 2013; Tayyeb, 2013).

Translating the goals and objectives of IPE from paper to the classroom is challenging. Calls for integration of teamwork and IPE into health professions education have been issued over the past 10 years (Greiner & Knebel, 2003; World Health Organization, 2010). The publication of *Core Competencies for Interprofessional Collaborative Practice* (IPEC, 2011) reinforced the framework linking IPE and IPCP, and the necessity of education programs to create collaboration-ready practitioners (World Health Organization, 2010; IPEC, 2011). The IPEC document identifies four domains of essential behaviors and skills for IPCP: a) values and ethics; b) roles and responsibilities; c) interprofessional communication; and d) teams and teamwork. These domains were incorporated into our IPTS course. IPTS sessions included the progressive introduction of case studies and concepts, faculty-facilitated small groups, and student-engaged learning. Our retrospective analysis of the IPTS course design

Table 1. IPTS learning objectives.

IPTS Course Learning Objectives	
1.	Communicate your professional role and responsibilities clearly to patients, families, and other care professionals, and explain the roles and responsibilities of other care providers and how you will work together as a team to meet patient care needs.
2.	Understand the relationship between effective team communication and improved patient safety and health outcomes, and choose effective communication tools and techniques to facilitate discussions and interactions that enhance team function.
3.	Demonstrate skills at effective interprofessional team and patient-centered communications that integrate the knowledge and experience of other health professionals and patients to provide appropriate care of the patient.

Table 2. Correlations between PBL and IPTS course components.

PBL Components (Alben et al., n.d.; Barral & Buck, 2013; Tayyeb, 2013)	IPTS Components (IPEC, 2011; Mitchell et al., 2012)
The presentation of an applied problem to a small group of students who engage in discussion over several sessions.	Small groups of 13–15 students representing at least five of the seven health professions participate in six IPTS sessions over the academic year addressing different aspects of competencies and practice of IPE and IPCP.
A facilitator provides supportive guidance to the students, conveys expectations and application of learning to practice, and enables students to identify relevant information.	45 faculty members representing the seven professions involved in the IPTS course facilitate small groups in the six sessions. Faculty are provided a facilitator guide with cases, key learning objectives of each session, and participate in a faculty orientation and discussion prior to each session.
The discussion of the problems is structured to enable students to create conceptual models to explain the problem presented in the case.	The IPTS course is based upon the goal to improve patient safety and quality of care through IPCP. Case-based discussions require students to develop an understanding and appreciation for the training and contributions of other health professions in the specific context of understanding the patient's needs, developing shared goals, clear roles, effective communication, and negotiating interprofessional care plans.
As students discover the limits of their knowledge, they identify learning issues—essentially questions that cannot be answered with their current fund of knowledge.	The faculty facilitators have students lead the discussions and activities to identify where the knowledge and skills of other professions contribute to the diagnosis and treatment of the whole patient.
Between meetings of the group, learners research their learning issues and share results at the next meeting of the group	Students from all seven professions are engaged in their shadowing and clinical rotations for their given profession. Each session includes a brief discussion on what the students are seeing in clinic that relates to the IPTS learning objectives, and the faculty facilitators share personal experiences of IPCP and patient care.

identified multiple components that correlated with a PBL framework (Table 2). This correlation provided support for the use of PBL as a teaching strategy in IPE and especially in courses that promote collaboration and team building.

Research Aims

The aim of this study was to determine the effectiveness of PBL methodology in an interprofessional course at preparing nursing students for interprofessional collaborative practice. We conducted a qualitative content analysis of student critical reflections to assess the use of PBL in the clinical application of the interprofessional team seminar course learning objectives (Table 1).

Review of Literature

Although there has been considerable research of the use of PBL with medical students, fewer studies exist with nursing

students. Regarding nursing students, mixed results were reported in a literature review of systematic reviews and meta-analysis on the cognitive basis of PBL, knowledge acquisition through PBL, and effects of PBL on clinical competencies (Yaqinuddin, 2013). The researcher concluded that PBL does not impact knowledge acquisition, but impacts application of knowledge (Yaqinuddin, 2013), and recommended further study of PBL across disciplines. The same year, a meta-analysis of 22 research studies on PBL in nursing education was published (Shin & Kim, 2013). The effect of PBL in nursing education was found to be 0.70 standard deviations, a medium-to-large effect size, supporting PBL as a benefit when compared with traditional teaching methods. Positive effects of PBL in the areas of learning and student satisfaction, and psychomotor skill development in clinical education were discussed (Shin & Kim, 2013).

Limitations of the current body of nursing research related to PBL include a lack of studies that assess the use of PBL throughout the curriculum, and lack of longitudinal

studies that evaluate learning outcomes of PBL (Shin & Kim, 2013). The following review of literature is limited to select recent studies that focused on the use of PBL in undergraduate nursing education (Hwang & Kim, 2006; Ozturk, Muslu, & Dicle, 2008; Klunklin, Subpaiboongid, Keitlertnapha, Viseskul, & Turale, 2011; Yuan et al., 2011; Williams et al., 2012), in new graduate nurse education in practice settings (Vittrup & Davey, 2010; Yoo & Park, 2014), and the skills essential for interprofessional collaborative practice. The perspectives of faculty who have used PBL are also discussed.

PBL in Undergraduate Nursing Education

Hwang and Kim (2006) reported improved knowledge and learning motivation, but no difference in attitude, in a study of the effects of PBL compared to traditional lecture for second-year students in a one-semester adult health nursing course in Korea. A pretest-posttest quasi-experimental design was used to study knowledge, attitude, and learning motivation. The researchers developed a 32-item knowledge test, and used a modified learning attitude scale and motivation survey that had been previously validated in other studies. Students in the PBL group ($n = 35$) scored statistically significantly higher on the knowledge test and learning motivations scale than the traditional lecture group ($n = 36$). A statistically significant difference in attitudes was not found between the two groups on a positive attitude scale (Hwang & Kim, 2006).

Yuan and colleagues (2011) compared the views of nursing students on the effectiveness of PBL in a sample of 28 fourth-year and 23 second-year undergraduate nursing students in China who had completed a one-semester PBL course. The course was not further described. Overall, the students scored PBL as moderately effective. Students rated PBL as highly effective in stimulating group discussion, promoting open discussion of differing opinions, and sharing what they had learned. Results of qualitative analysis of two open-ended questions indicated that PBL fostered self-directed learning and thinking, improved application of knowledge, extended thinking, and increased the ability to analyze situations in different ways, share opinions with others, and solve problems. However, half of the fourth-year students and 22% of the second-year students thought PBL was time-consuming, stressful, and contributed to an increased workload (Yuan et al., 2011).

The effects of PBL in a health promotion course for undergraduate nursing students in Thailand were explored using qualitative inquiry (Klunklin et al., 2011). Twenty-five nursing students from second through fourth year were interviewed. Content analysis revealed themes of adapting, seeking assistance, self-development, and thinking process development. Students related that they were initially

confused, stressed, or bored while they adapted to PBL. With the help of faculty, they eventually found PBL to be a valuable learning aid. Students reported learning to adjust to group work, share experiences, and acknowledge opinions of others. The researchers concluded that PBL could be attributed to increased ability to problem solve, and satisfaction with creativity in learning, group work, and leadership development (Klunklin et al., 2011).

Like many other studies of PBL in nursing education, PBL was used in the above studies to deliver nursing theory in one-semester courses. The usefulness of PBL across the curriculum also has been studied. One group of researchers studied the effectiveness of PBL to teach skills such as critical thinking, interpersonal skills, and teamwork in nursing students in one program that used traditional teaching methods, and in another program that used PBL throughout the curriculum (Ozturk et al., 2008). The California Critical Thinking Disposition Inventory (CCTDI) was used to measure an individual's critical thinking disposition on a scale of < 240 (weak) to > 300 points (high). A statistically significant difference in critical thinking was reported in the group that used a PBL model as compared to the group that was educated with traditional education. The authors suggested that the active and self-directed nature of PBL encourages the ability to think critically, be tolerant of the ideas of others, and evaluate conflicting information to order to reach a conclusion (Ozturk et al., 2008).

Few longitudinal studies exist. Williams and colleagues (2012) studied the contribution of a PBL curriculum to the evolution of professional nursing practice post-graduation. In an ethnographic study, eight focus groups and 23 individual phone interviews were completed. These nurses ($n = 45$) reported PBL helped them be more self-aware, open to learning, and willing to seek out knowledge. In addition, PBL impacted their interprofessional interactions, helped them become self-directed, and feel comfortable taking on leadership roles with the health care team. Practicing conflict resolution strategies in the classroom improved their ability to use those skills in clinical settings as a nurse (Williams et al., 2012).

PBL in New Graduate Nurse Education

PBL also has been studied in new graduate nurse education in hospitals. In a study that implemented structured group PBL activities in a graduate nurse program, researchers reported improved critical thinking, clinical judgment, and knowledge acquisition skills (Vittrup & Davey, 2010). In this study, nine one-hour-long PBL sessions were provided to each group of new graduate nurses for three years. Interviews were conducted at the end of the sessions ($n = 8$). The new graduate nurses all reported they felt the PBL sessions

were beneficial. The following themes emerged: critical thinking—bringing everything together; knowledge acquisition—the domino effect; and interactive participation—a different experience. The final theme is noteworthy as it credited PBL for creating an environment where the new graduate nurses were inspired by others, received support from peers, and strengthened communication skills. The new graduate nurses reported PBL broadened their views, allowed them to think holistically, feel more confident, and improve problem-solving skills through group discussion (Vittrup & Davey, 2010).

Similar results were found by Yoo and Park (2014) who utilized a pretest, intervention, and posttest design to study the effect of PBL on problem-solving ability of 190 new graduate nurses. A control group ($n = 96$) received traditional lecture, while an experimental group ($n = 94$) received instruction with case-based learning (CBL) strategies. The traditional lectures consisted of three lectures on common nursing errors and the process of problem solving. Using the same cases as the traditional lecture, the CBL group watched short videos, analyzed the cases, had group discussions to solve problems, and proposed solutions. The scores on a problem solving inventory (PSI) tool revealed a statistically significant difference in problem-solving ability in the group that used CBL (Yoo & Park, 2014).

Nursing Faculty Perspectives of PBL

The skill of the faculty facilitator using a PBL methodology is a consideration. Paige and Smith (2013) suggest PBL is more than a teaching strategy, and its use requires a paradigm shift in the way faculty think about teaching, learning, and the teacher-student relationship. With a qualitative phenomenological approach, they explored nurse faculty experiences of participating in a PBL faculty development program. Four major themes were found: change in perception of the teacher-student relationship; struggle in letting go; uncertainty; and valuing PBL as a developmental process. The nursing faculty in this study viewed their role as a facilitator of learning, and commented that students using PBL acted more independently and collaboratively. Some faculty initially struggled with the PBL strategy, and the authors suggest that faculty must examine their teaching perspective for congruence with the intent of PBL in order to ensure its effectiveness (Paige & Smith, 2013).

Summary

Studies about the effect of PBL in theory courses have produced mixed results. While previous studies reported lower knowledge acquisition in PBL groups (Andrews & Jones, 1996; Frost, 1996; Kim et al., 2000), others have reported statistically significant higher knowledge scores (Hwang &

Kim, 2006). In addition, Yuan and colleagues (2011) report that students find PBL time-consuming and stressful. Yet nursing students in PBL programs have reported higher levels of satisfaction (Rideout et al., 2002), and self-direction and enjoyment in learning (Tiwari et al., 2006). PBL has shown promise in nursing education as an active teaching strategy that improves confidence, problem-solving ability, critical thinking, application of knowledge, and the ability to function in a team using improved leadership, communication, and collaboration skills (Ozturk et al., 2008; Vittrup & Davey, 2010; Williams et al., 2012; Yaqinuddin, 2013; Yoo & Park, 2014). These studies suggest that PBL contributes to the learning and practice of skills in undergraduate nursing programs that will be required for future interprofessional collaborative practice. The IPE literature supports the importance of creating opportunities for students to practice these skills in preparation for the clinical environment and work with interprofessional teams. Such findings warrant the investigation of the usefulness of PBL in IPE courses as a strategy to improve teamwork and communication skills, important core objectives in interprofessional education, and future collaborative practice.

Methods

Qualitative content analysis was conducted on critical reflection assignments collected after session five (of six). In order to assess application of skills learned in IPTS, the assignment asked students to describe a clinical situation in which aspects of teamwork and collaboration related to the learning objectives within IPTS. Kolb's experiential learning theory (Kolb, 1984) provided the framework for the assignment. This is a four-stage cyclical model of learning in which a learner's concrete experience is translated through reflection into concepts and then used as a guide for further experience. A "what, so what, now what" reflection structure (Eyler & Giles, 1999) was utilized in implementing Kolb's theory. "What" was the experience; "so what" was the reflection, conceptualization; and "now what" was the guide for future experiences. This simple format shaped the assignment and promoted a higher order reflection from learners (Clark, 2009). During the 2012–2013 academic year, 67 ABSN and 21 AMSN students participated in IPTS. The assignment was required but not graded, and 81 (92%) of students submitted the assignment. In order to have equal representation of both postbaccalaureate programs, investigators analyzed 20 reflections from each program ($n = 40$). Reflections were randomly selected from the 61 ABSN submissions, and all submissions from the AMSN students were used.

IRB approval was granted to analyze de-identified critical reflections. The investigators reviewed the learning objectives

of the course and developed initial codes for student quotations that linked to the learning objectives. The investigators were careful to use the text verbatim and did not interpret or infer meaning. All researchers analyzed an initial set of five reflections from each group, ABSN and AMSN. Consensus was achieved for inter-rater reliability prior to the analysis of the full dataset (Graneheim & Lundman, 2004).

Trustworthiness is an essential component of validity in qualitative methodology (Glesne, 2011). Specific activities were included in this study to strengthen the trustworthiness of analysis and included prolonged engagement with the data, frequent return to the data, and collaboration among team members. All research team members have extensive experience in program evaluation and assessment of student feedback. Pole had been the course director and involved in the development of the IPTS course since its inception. L'Ecuyer and Leander, both experienced nursing faculty, were responsible for the curriculum content, evaluation, and learning experiences of the ABSN and AMSN programs, respectively. All research team members have facilitated small-groups in the IPTS course and relied on prior experience with qualitative narrative analysis.

A research assistant downloaded reflections from the online course management system and assigned numbers in which students were identified as AMSN student 1–20 and ABSN student 1–20. Student names were not transcribed to the data sheets, therefore, researchers were not able to associate names to comments. Researchers independently analyzed the full set of 40 reflections and met again to achieve consensus of coding. Multiple group analysis sessions were utilized to reduce researcher bias and strengthen validity. A total of 201 unduplicated statements were identified and coded. Deductive analysis resulted in statements coded in relation to the IPTS learning objectives. A second inductive analysis resulted in the themes identifying student knowledge, skills, and observations of teamwork attributes as they related to the patient care and outcomes.

Findings

Researchers identified 10 themes in the coded statements. The themes were collapsed into five primary themes: 1) identifying attributes of good or poor teamwork in practice; 2) articulating importance of effective communication when providing health care; 3) understanding roles and responsibilities of other professions; 4) expressing confidence to engage other professions in practice; and 5) connecting PBL to interprofessional practice. The frequency with which each theme occurred was counted (Table 3) in order to identify data patterns and clarify meaning (Sandelowski, 2001).

Table 3. Frequency of themes represented in the data.

Theme	Total Number of Statements
1 Identifying attributes of good or poor teamwork in practice.	77
2 Articulating importance of effective communication when providing health care.	45
3 Understanding roles and responsibilities of other professions.	28
4 Expressing confidence to engage other professions in practice.	28
5 Connecting PBL to interprofessional practice.	37

Generally, findings illustrated that nursing students can articulate an understanding of the roles of other professions, identify attributes of good and poor interprofessional teamwork, and have confidence in engaging other professions in interprofessional practice. The theme emerging most frequently was identifying attributes of teamwork in practice (Theme 1). Students described their observations of good or poor teamwork in a clinical setting and the impact of that teamwork on patient care and outcomes. One student graphically detailed a memorable observation:

“One particular doctor took charge. He consulted with the nurses and other doctors and gave very clear instructions. He then discussed with the pharmacist the dosages of the medications. He provided clear instructions and then waited for other members of the health care team to say it back to ensure that there were no misunderstandings. In just a few minutes the patient was intubated and the crisis was averted.”

Other students offered wide-ranging comments:

“Overall, I have noticed great care by each individual professional, however, the continuity of care is lacking from a lack of collaboration”

“This experience allowed me to see both the improved patient safety and health outcomes when a team functions effectively and the possible dire results when team communication fails.”

“IPTS has helped me to be more acutely aware of interprofessional teamwork in the clinical setting and has taught me to appreciate how interprofessional collaboration leads to better patient outcomes.”

In the second most frequently occurring theme (Theme 2), students expressed thoughts about the importance of communication in patient care and/or a stated intention to consult with other professions in a clinical setting. Students articulated the perceived importance of effective communication with the following quotes:

“I will value opinions and ideas from other professions because they may see something that I do not see. If more of the picture is brought to my attention then I will better understand the treatment plan and be more apt to confidently implementing interventions.”

“I was able to see how each member of the team is kept up to date on the changes... This is important in terms of the care of the patient because if one person of the team is unaware of the changes made in the plan of care.”

Students exhibited their increased understanding of the roles and responsibilities of other professions in the third theme. This encompassed examples of roles in patient care and observations about respecting interprofessional collaboration to improve that care. This theme built on the learning that students expressed about communication in the second theme and demonstrated how IPTS influenced student learning of inter-related concepts. Examples of data for this theme were:

“This opened my eyes to the fact that as a nurse I cannot only focus on nursing aspects. To achieve the best outcomes in the most efficient manner I must also have a good understanding of what the other professionals I work with do and how they accomplish their goals.”

“IPTS helped me realize that it's alright not to have all the answers yourself. We had talked about the various professions and how crucial it is for everyone to come together if it's necessary in providing the patient with the best care possible.”

The fourth theme comprised evidence of increased confidence and ability to engage other professions when in clinical practice. These expressions of increasing skill were based on IPTS and its concrete demonstration of IPCP in a seminar setting where it was safe to practice and ask questions. One student revealed both insecurity and growth:

“I become timid within groups of individuals and IPTS helped me grow professionally. I had to become comfortable speaking out and advocating for my profession.”

Another student described her team's performance:

“My IPTS team embodies interprofessional teamwork. Though we all have different backgrounds professionally, all of us listened attentively to each other's thoughts and concerns about each patient case as we collaborated on the best ways to trust and manage their care.”

Students explained how the PBL strategy affected their learning outcomes in IPTS in the fifth and final theme (Theme 5). They connected PBL to interprofessional practice and attributed their learning to IPTS in the following quotes:

“My experience in this IPTS session really equipped me with crucial conservation skills required to function effectively within Inter-professional teams in order to provide quality patient care”

“The IPTS seminars have really helped me develop a sense of professional collaboration. I have been exposed to what other professions see as most important, and it sometimes differs from my view.”

“During our sessions, we would work on the case within our own profession and then discuss the case as a group and come up with goals and problem areas for the patient. We worked well together. What one profession lacked another picked up.”

“IPTS seminar has helped bring these ethical virtues to the front of our minds, effectively juxtaposing them with real-life clinical scenarios so that we will be better prepared to provide our patients with excellent and safe care despite the complexities of health care today.”

“I have been in this situation in the past during one of my rotations and I was unsure as to how I should bring it up. Being involved with IPTS group discussions has given me a different perspective on how different occupations handle different situations.”

Discussion

The IPTS course utilized a PBL framework to engage students in the progressive investigation and practice of skills related to IPCP. Faculty facilitators guided the students within that framework to solve case-based patient problems. Through analysis of written reflection assignments in the course, five primary themes were identified. We determined that PBL methodology in an IPTS course is effective in preparing nursing students for IPCP by allowing them to practice needed skills with an interprofessional team in a seminar

setting. The primary themes were similar to results from other studies in which PBL showed promise in improving confidence, problem solving, critical thinking, teamwork, leadership, communication, and collaboration skills in nursing students (Ozturk et al., 2008; Vittrup & Davey, 2010; Williams et al., 2012; Yoo & Park, 2014). These skills correlate with IPE core competencies of collaborative decision making, care planning, and critical analysis (IPEC, 2011; Mitchell et al., 2012). The participants in this study self-reported they were more prepared and more confident to engage with other professionals in team settings. Our findings lead us to conclude that a PBL framework helped students identify and demonstrate core attributes and competencies of IPE and IPCP in the clinical setting and has better prepared them as collaboration-ready practitioners.

Our findings differ from research in which nursing students found PBL only moderately effective, time consuming, and stressful (Yuan et al., 2011). In our study, PBL was utilized in IPE, which was carefully embedded into the curricula. The IPTS course did not teach theoretical concepts, but rather focused on the acquisition of team collaboration skills in small group sessions to assist with skill acquisition of IPCP skills. This may have contributed to very little criticism of PBL as stressful and time consuming, as evidenced by the fifth theme, "Connecting PBL to interprofessional practice."

A literature review about the use of IPE and PBL reported limited evidence related to the effect of PBL on specific skills and knowledge outcomes in IPE (Thompson, 2010). Although we did not use PBL to improve knowledge outcomes, we posit that our findings provide qualitative evidence for PBL as an effective skill-building tool for IPCP. We found the use of relevant patient care problems fostered critical thinking among students and was a strength of the PBL strategy in IPE. Our findings indicate that nursing students were able to describe attributes of effective and poor teamwork in the practice setting. These results are in agreement with Williams and colleagues (2012), who reported that PBL increases students' self-awareness and confidence to assert themselves in the clinical setting.

Despite careful planning, the following limitations were identified. The data came from written reflection assignments and were subject to student self-report. Although the assignment was not graded, it was required for course completion, and that may have affected the quality of student comments. Because the students in this study were second degree students in accelerated curricula, findings may be different from traditional students. In addition, when students submitted their assignments to the course website, their submissions were not anonymous, which may also affect the validity of the data.

Recommendations

As a result of this study, we recommend PBL as an effective teaching strategy in IPE with accelerated second degree nursing students. Further investigation is warranted because our study used self-reported data. We recommend the development and validation of a tool to assess skill acquisition in IPE using the PBL strategy. The importance of the role of the faculty facilitator and his or her skill in the implementation of PBL should be investigated, and we recommend explicit faculty development in this area. Future assessments of PBL skills in the context of IPE curricula and faculty perspectives of the application of PBL may further strengthen the evidence base of effective methods to prepare students for interprofessional practice.

References

- Alben, J. O., Krueger, W. A., Berezniak, R., Tjioe, S. A., & Ferretti, S. M. (n.d.). Problem-based learning: A model for excellence in medical education. Retrieved from <http://lecom.edu/college-medicine.php/Problem-Based-Learning-A-Model-for-Excellence-in-Medical-Education/49/2205/612/2388>
- Andrews, M., & Jones, P. R. (1996). Problem-based learning in an undergraduate nursing programme: A case study. *Journal of Advanced Nursing*, 23(2), 357–359. <http://dx.doi.org/10.1111/j.1365-2648.1996.tb02679.x>
- Barral, J. M., & Buck, E. (2013). What, how and why is problem-based learning in medical education? *Annual Review of Biochemistry*, 12(8), 34–35.
- Clark, P. (2009). Reflecting on reflection in interprofessional education: Implications for theory and practice. *Journal of Interprofessional Care*, 23, 213–223. <http://dx.doi.org/10.1080/13561820902877195>
- Eyler, J., & Giles, D. (1999). *Where's the learning in service-learning?* San Francisco, CA: Jossey-Bass.
- Frost, M. (1996). An analysis of the scope and value of problem-based learning in the education of health care professionals. *Journal of Advanced Nursing*, 24(5), 1047–1053. <http://dx.doi.org/10.1111/j.1365-2648.1996.tb02942.x>
- Glesne, C. (2011). *Becoming qualitative researchers: An introduction* (4th ed.). Boston, MA: Pearson.
- Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: Concepts, procedures, and measures to achieve trustworthiness. *Nursing Education Today*, 24, 105–112. <http://dx.doi.org/10.1016/j.nedt.2003.10.001>
- Greiner, A. C., & Knebel, E. (2003). *Health professions education: A bridge to quality*. Washington, DC: National Academies Press.

- Hwang, S. Y., & Kim, M. J. (2006). A comparison of problem-based learning and lecture-based learning in an adult health nursing course. *Nurse Education Today*, 26, 315–321. <http://dx.doi.org/10.1016/j.nedt.2005.11.002>
- Interprofessional Education Collaborative (IPEC) Expert Panel. (2011). *Core competencies for interprofessional collaborative practice: Report of an expert panel*. Washington, DC: Interprofessional Education Collaborative.
- Kim, S. A., Kang, I. A., Kim, S., Nam, K. A., & Park, J. H. (2000). Development of a problem-based learning program in nursing education curriculum. *Journal of Korean Psychiatric Nursing*, 9(4), 559–570.
- Klunklin, A., Subpaibongid, P., Keitlertnapha, P., Viseskul, N., & Turale, S. (2011). Thai nursing students' adaption to problem-based learning: A qualitative study. *Nurse Education in Practice*, 11, 370–374. <http://dx.doi.org/10.1016/j.nepr.2011.03.011>
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.
- Mitchell, P., Wynia, M., Golden, R., McNellis, B., Okun, S., Webb, C. E., . . . Von Kohorn, I. (2012). Core principles and values of effective team-based health care. *Discussion Paper, Institute of Medicine*. Retrieved from <http://www.ion.edu/tbc>
- Morrison, G., Goldfarb, S., & Lancken, P. N. (2010). Team training of medical students in the 21st century: Would Flexner approve? *Academic Medicine*, 85(2), 254–259. <http://dx.doi.org/10.1097/ACM.0b013e3181c8845e>
- Ozturk, C., Muslu, G. K., & Dicle, A. (2008). A comparison of problem-based and traditional education on nursing students' critical thinking dispositions. *Nurse Education Today*, 28, 627–632. <http://dx.doi.org/10.1016/j.nedt.2007.10.001>
- Paige, J. B., & Smith, R. O. (2013). Nurse faculty experiences in problem-based learning: An interpretive phenomenologic analysis. *Nursing Education Perspectives*, 34(4), 233–239. <http://dx.doi.org/10.5480/1536-5026-34.4.233>
- Rideout, E., England-Oxford, V., Brown, B., Fothergill-Bourbonnais, F., Ingram, C., Benson, G., . . . Coates, A. (2002). A comparison of problem-based and conventional curricula in nursing education. *Advances in Health Sciences Education*, 7, 3–17. <http://dx.doi.org/10.1023/A:1014534712178>
- Rideout, L., & Carpio, B. (2001). The problem-based learning model of nursing education. *Transforming Nursing Education Through Problem Based Learning*. Toronto: Jones and Bartlett.
- Ruebling, I., Pole, D., Breitbach, A. P., Frager, A., Kettenback, G., Westhus, N., . . . Carlson, J. (2014). A comparison of student attitudes and perceptions before and after an introductory interprofessional education experience. *Journal of Interprofessional Care*, 28(1), 23–27. <http://dx.doi.org/10.3109/13561820.2013.829421>
- Ruebling, I., & Royeen, C. (2010). Model programs: Saint Louis University interprofessional education program. *Journal of Allied Health*, 39(3), e-123–e124.
- Sandelowski, M. (2001). Real qualitative researchers do not count: The use of numbers in qualitative research. *Research in Nursing and Health*, 24(3), 230–240. <http://dx.doi.org/10.1002/nur.1025>
- Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-based Learning*, 1(1), 9–20. <http://dx.doi.org/10.7771/1541-5015.1002>
- Shin, I., & Kim, J. (2013). The effect of problem-based learning in nursing education: A meta-analysis. *Advances in Health Science Education*, 18, 1103–1120. <http://dx.doi.org/10.1007/s10459-012-9436-2>
- Spaulding, W. B. (1969). The undergraduate medical curriculum (1969) model: McMaster University. *Canadian Medical Association Journal*, 100, 659–664.
- Tayyeb, R. (2013). Effectiveness of problem-based learning as an instructional tool for acquisition of content knowledge and promotion of critical thinking among medical students. *Journal of the College of Physicians and Surgeons Pakistan*, 23(1), 42–46.
- Thompson, C. (2010). Do interprofessional education and problem based learning work together? *The Clinical Teacher*, 7, 197–201. <http://dx.doi.org/10.1111/j.1743-498X.2010.00381.x>
- Tiwari, A., Chan, S., Wong, E., Wong, D., Chui, C., Wong, A., & Patil, N. (2006). The effect of problem-based learning on students' approaches to learning in the context of clinical nursing education. *Nurse Education Today*, 26, 430–438. <http://dx.doi.org/10.1016/j.nedt.2005.12.001>
- Vittrup, A. - C., & Davey, A. (2010). Problem-based learning—“Bringing everything together”—A strategy for graduate nurse programs. *Nurse Education in Practice*, 10, 88–95. <http://dx.doi.org/10.1016/j.nepr.2009.03.019>
- Williams, B., Spiers, J., Fisk, A., Richards, L., Gibson, B., Kabotoff, W., . . . Sculley, A. (2012). The influence of an undergraduate problem/context-based learning program on evolving professional practice in nursing graduate practice. *Nurse Education Today*, 32, 417–421. <http://dx.doi.org/10.1016/j.nedt.2011.03.002>
- World Health Organization. (2010). *Framework for action on interprofessional education and collaborative practice*. Geneva: World Health Organization. Retrieved from http://www.who.int/hrh/resources/framework_action/en
- Yaqinuddin, A. (2013). Problem-based learning as an instructional method. *Journal of the College of Physicians and Surgeons Pakistan*, 23(1), 83–85.

- Yoo, M. - S., & Park, J. - H. (2014). Effect of case-based learning on the development of graduate nurses' problem-solving ability. *Nurse Education Today*, 34, 47–51. <http://dx.doi.org/10.1016/j.nedt.2013.02.014>
- Yuan, H. B., Williams, B. A., Yin, L., Liu, M., Fang, J. B., & Pang, D. (2011). Nursing student's views on the effectiveness of problem-based learning. *Nurse Education Today*, 31, 577–581. <http://dx.doi.org/10.1016/j.nedt.2010.10.009>

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Kristine L'Ecuyer is an associate professor of nursing at Saint Louis University School of Nursing and coordinates the Masters of Science in Nursing Clinical Nursing Leader tracks. She is a faculty facilitator for the interprofessional team seminar (IPTS) course. Correspondence concerning this article should be addressed to Kristine L'Ecuyer, Saint Louis University School of Nursing, 3525 Caroline Street, St. Louis, MO, 63104; Email: Lecuyerk@slu.edu.

David Pole is an instructor in Family and Community Medicine and director for the Saint Louis University Center for Interprofessional Education and Research (IPE). He is responsible for IPE programs and curriculum across the baccalaureate and postbaccalaureate health professions programs, and he supports faculty development in IPE/IPCP in both the academic and clinical settings. He is a member of the SLUCare Quality and Safety Steering Committee and has been the course director for the IPTS course since it started in 2008.

Sheila A. Leander is assistant professor, program liaison for the Robert Wood Johnson New Careers in Nursing Program, and coordinator of the Accelerated Bachelor of Science in Nursing track at Saint Louis University School of Nursing. She serves as curriculum advisor for the Interprofessional Education and Research program and teaches IPE courses.