

Using Problem Based Learning method between 2014 and 2020 with nursing students: A Case Study

Raúl Hormazábal-Salgado 1

Nancy Suazo-Díaz 2

Gustavo Hawes-Barrios 3

Marcela Moris-Moyano 4

1. -Master of nursing, School of nursing, Faculty of Health Sciences, The University of Talca. Avenida Lircay s/n, Talca, Chile.
2. -Master of nursing, School of nursing, Faculty of Health Sciences, The University of Talca. Avenida Lircay s/n, Talca, Chile.
3. -Master in Education Sciences, Vice Rectory of Undergraduate, The University of Talca, Avenida Lircay s/n, Talca, Chile.
4. -Master in Competence-Based Education, Vice Rectory of Undergraduate, The University of Talca, Avenida Lircay s/n, Talca, Chile.

* **Corresponding author information:** Raúl Hormazábal-Salgado, School of nursing, Faculty of Health Sciences, The University of Talca. Avenida Lircay s/n, Talca, Chile (rhormazabal@utalca.cl).ORCID ID: <https://orcid.org/0000-0002-6736-9983>

RUNNING HEAD: Problem-based learning in nursing education

Abstract

Background: Problem Based Learning (PBL) is a pedagogical method that helps nursing students develop their independent learning potentials. This paper describes a seven-year experience of adopting PBL method with nursing students, as well as the perspectives of the nurse tutors.

Objective: To explore the experiences of nursing teachers who have taught using PBL between 2014 and 2020.

Methods: Semi-structured interviews were conducted with the participating tutors. The interviews were analysed, and dimensions and categories were developed from the content of the interviews.

Results: Four dimensions were raised: Experiences, Learning, Instrument and Commitment. The experiences of tutors were favourable. Learning occurred both for tutors and students. The role of the tutor as a guide for students was highlighted. Evaluations must consider the individual progress of the students and recognise the benefits of tutoring.

Conclusion: PBL is mutually beneficial for both students. New challenges in the professional training through continuous improvement were formulated.

Keywords: Education, nurse education; professional competence; problem-based learning; academic tutoring

1. Background

Problem Based Learning (PBL) is a problem-oriented educational approach which uses problem scenarios to encourage students to engage themselves in the learning process. PBL emerged during the 1960s and has expanded world-wide. It has been popularised by Barrows and Tamblyn (1980) following their research into the reasoning abilities of medical students at McMaster Medical School in Canada (Savin-Baden & Major, 2004). PBL seems to be a welcome tool for students as it provides an environment to equip themselves with higher order thinking skills and learning abilities as demanded by today's economy (Chan, 2016).

PBL is a methodology that can also be viewed as it relates directly to the way nurses practice. It requires student-centred, interdisciplinary, small groups analysing problems in a clinical context, with little information given at the beginning of the PBL work. In professional activities, it is common for nurses to have to deal with minimal information in their attempts to solve problems and treat patients appropriately. These characteristics make this approach suitable for use in nursing education programs with a constellation of benefits for nursing students. PBL helps to support students' learning by fostering and modelling valuable clinical reasoning, leadership skills, and introducing students to managed-care practices and principles, within an inviting and friendly exchange between teachers and students (Baker, 2000; Wells et al, 2009; Miguel et al, 2018; Wosinski et al, 2018). Many abilities can be practised by nursing students during PBL. This encourages closer attention to independent learning and personal growth compared to other methodologies. With PBL, nursing students can develop their leadership and professional skills, which are indispensable qualities in their future practices (Gou et al, 2018). Nursing students

believe that PBL effectively contributes to the learning process. Students recognise the importance of a problem-based approach to effective learning, active collaboration, teamwork, improving communication skills, identifying their own learning needs and transferring theoretical knowledge to nursing practice (Gönc et al, 2015). Additionally, PBL allows the evaluation of generic competences. Some attitudes such as honesty, responsibility, autonomy and empowerment are also reinforced through the active participation of students in the evaluation, urging the extensive adoption and comprehensive incorporation of this approach into nursing education (González Hernando et al, 2014; Hajibabae & Ashrafizadeh, 2019). In the PBL process, students are guided by a tutor by means of mentoring sessions. Mentoring consists of an intentionally organised learning activity related to PBL, where interaction between novices and experts is crucial for learning (Mulder, 2017). In nursing, being prepared as a mentor is multifaceted and includes: subject and content expertise, knowledge of the PBL process and philosophy, skilful facilitation, nursing professional practice knowledge and integration to PBL, and a complete understanding of all the years of the nursing curriculum (Matthew-Maich et al, 2016).

The PBL methodology involves a problem situation which is required to be solved by a group of students. A good, well-thought out problem is the key to the effectiveness of PBL. This problem must be challenging, but not too challenging; its heart must contain professional real-life applications; it has to be open-ended and ambiguous; it must be difficult enough for group work so that students think that they cannot do it without collaboration (Chan, 2016). The expertise of tutors enable them to provide students with a high-quality problem in order to analyse and solve it during the PBL.

Evaluating the effectiveness of PBL is multifaceted and comprehensive. Student evaluation ranges from standardised tools and teacher-made tests to self-assessments and peer reviews. In PBL, group and tutor evaluations are performed by the tutor and the students (Baker, 2000). In nursing programs, specifically the PBL, it is important to have standardised evaluations in order to assess students objectively. In large group of students, different expectations and standards may occur among educators. Using rubrics may minimise the possibility of such a situation arising and promote fairness. By means of rubrics, all students' work will be evaluated using the same standard (Chan & Ho, 2019). This is the main reason why rubrics must be used in PBL.

The PBL has been implemented in the School of Nursing of the University of Talca by a team of lecturer-nurses, over a seven-year period (2014-2020). The implementation of PBL methodology required a series of consecutive stages, in order to ensure its effectiveness. At first, rubrics to guide and assess students were created. The assessed areas which composed the rubrics were autonomy, teamwork, self-assessment, and co-assessment skills. These instruments are reviewed by tutors and the students during the first tutoring session, in order to clarify questions from learners and thus guiding the PBL process. After this, students must use them as a tool to complete the PBL, step by step, while being guided by the tutor. The facilitating function of the tutor guide was determined through mentoring. These tutorials are meetings between the teacher, who plays the role of guide,

and a group of students. The tutor is responsible for delivering a piece of information about a clinical scenario, in addition to monitoring the progress made by the students. This piece of information is also called problem situation.

After completing the final PBL, students were graded by tutors according to the rubrics. The average grade of the PBL in the last six years depicted the high quality of the work, the students' commitment, and thus the effectiveness of this method. It should be noted that the rating scale in the institution is from 1.0 to 7.0, with 4.0 being the minimum approval mark, whereas 6.0 and above is classified as "very good" (see table number 1).

Table number 1 – demographic data PBL, nursing, The University of Talca

Number of Item	Years of PBL development						
	2014	2015	2016	2017	2018	2019	2020
Number of students per class	42	81	69	68	52	51	68
Number of PBL groups	8	16	8	8	9	9	9
Number of students per group	5-6	5-6	8-9	8-9	5-6	5-6	7-8
Number of groups per facilitator	1	2	1	1	1	1	1
Number of facilitators	4	8	8	8	9	9	9
Number of rubrics	5	5	5	5	4	4	5
Number of mentoring sessions	7	5	5	5	4	4	5
Average Grade of PBL	6.4	6.5	6.7	6.8	6.8	6.5	6.8

During the period, the number of groups, students per group and facilitators changed. In 2016, every tutor was in charge of two groups due to the larger size of the class. In 2018, the number of tutorials was reduced from five to four, because facilitators considered that an extra mentoring session was unnecessary. This was due to the significant progress that most groups reached by the third tutoring session, between 2014 and 2017. However, over the next two years after this modification, students' doubts at the beginning of their work with the PBL were exacerbated. For this reason, in 2020, tutors decided to add one early mentoring session focused only on teaching students the relevant aspects of PBL.

The PBL process was carried out in consensus with all parties involved. This included undergraduate nursing students as well as nurse-tutors, who totalled nine by 2020. Tutors have multiple areas of clinical and professional expertise, encompassing nursing care in community and hospital settings. The tutor's professional experience spanned from 12 to 29 years, counting on at least five years of experience as PBL facilitators (see table number 2).

Table number 2: Demographic profile of participants

Particip- pant	Gender	Area of clinical and professional expertise	Number of years as a PBL facilitator	Total number of years of professional experi- ence
1	Female	Primary health care	5	14
2	Female	Medical-Surgical Nursing Nursing management	6	29
3	Female	Acute nursing care	7	22
4	Female	Paediatric Nursing Care	5	25
5	Male	Paediatric Nursing Care Primary health care	7	22
6	Female	Primary health care Nursing management	6	14
7	Female	Medical-Surgical Nursing	6	16
8	Male	Primary health care Mental health nursing	6	12
9	Female	Acute nursing care	7	29

2. Methodology

The main objective of this case study is to learn about the experience of the facilitators of nursing students who developed the PBL between 2014 and 2020. In doing this, semi-structured interviews were conducted, containing the most relevant items related to the experience of the mentoring process. These interviews lasted a maximum of 30 minutes, and focused through the organising question: What has been your experience as a PBL facilitator during all the periods in which you have participated?

The target population consisted of the nine lecturers who participated as facilitators in PBL (Table 2). Thus, evidence is available from the various groups of tutors involved. Each of the interviewees gave their consent to participate in the activity, thereby respecting any ethical concerns involved in the research.

The interviews were recorded and then transcribed. The answers were analysed using the QDA Miner Lite program, version 2.0.6. (2019). From the content of the answers, emergent dimensions and categories were established in order to compile the information, providing clear and precise concepts of the teachers' experience (table number 3).

Representative phrases of the interviews conducted gave support to each of the dimensions and categories were extracted. Subsequently, an interpretative analysis of the discourses focused on the

individual and group experience of the tutors in the PBL method was performed. Next, the main findings were contrasted with the literature. Finally, the conclusions of the analysis were written.

3. Results

From the data analysis, four dimensions emerged: (1) Experiences; (2) Learning; (3) Instrument; and (4) Commitment (Table 3).

Table number 3: dimensions and categories

Dimensions	Categories	Quotations
1. Experiences	1.1. Facilitators' experiences	<p>“My experience has been good, all groups I have been in charge of have achieved the objective of the PBL.” Interview 1</p> <p>“...One as a tutor must study in order to guide the students... I have been pleasantly surprised with their pro-activity... It has been an enrichment, a very good experience for all of us.” Interview 3</p>
	1.2. Similarities between PBL groups	<p>“At the beginning, all students are very confused and have multiple questions about the PBL, but after a while they overcome them and improve”. Interview 4</p> <p>“...I want to highlight the fact that some students, actually very few, have remained without contributing significantly during the activity...” Interview 3</p>
	1.3. Differences between groups	<p>“...I have noticed generational differences among the students...” Interview 4</p> <p>“In general, there are no big differences between the groups... every student receives the same teaching”. Interview 5</p>
	1.4. Difficulties in the development of PBL	<p>“The students of the first group in 2014 focused a lot on looking for information but left for the end the preparation of the portfolio that contains the evidence.” Interview 4</p>
	1.5. Disciplinary practice	<p>“...PBL helps students to contrast theory with practice... this is a reliable source of evidence versus the reality of the local and regional environment.” Interview 2</p>
2. Learning	2.1. Student self-learning	<p>“As a tutor I feel that the PBL is the first experience of self-learning for the students”. Interview 1</p> <p>“(The experience) has been an enrichment upgrade” Interview 1</p>
	2.2. facilitator self-learning	<p>“The tutor also gets a feedback from all the infor-</p>

	<p>2.3. Previous knowledge</p> <p>2.4. Comprehensive view</p> <p>2.5. Teamwork</p>	<p>mation gathered by the students during the process”. Interview 2</p> <p>“...I did not have previous knowledge about the PBL methodology... I was never interested to know what it was about”. Interview 3</p> <p>“A clinical scenario is approached by the students from different points of view, not just the disease but an integrative and psycho-social way”. Interview 2</p> <p>“The students are capable of giving it (the problem) a second view....” Interview 7</p> <p>“Teams are randomly formed, so students have to learn how to work in teams”. Interview 2</p>
<p>3. Instrument</p>	<p>3.1. Guidance</p> <p>3.2. Continuous improvement</p>	<p>“...It is necessary to be objective, when one guides within the subject then one according to the current contingent issues in the health care system”. Interview 7</p> <p>“..Every year that the PBL is planned for the respective period, we review the rubrics together... suggestions arise that enable its continuous improvement....” Interview 5</p>
<p>4. Commitment (Improvements of the PBL)</p>	<p>4.1. Assessments</p> <p>4.2. Time</p> <p>4.3. Mentoring</p>	<p>“Differences in student assessments should be established depending on the individual performance of each member within the PBL working group...” Interview 1</p> <p>“I could suggest to establish different ranges of assessment according to the rubrics, because sometimes giving a grade to the student implies the attitude they will have towards their work.” Interview 6</p> <p>“...it would be very good if students had more time to do the PBL or at least some special schedule should be created to work the PBL.” Interview 3</p> <p>“The mentoring sessions contribute from the point of view in which one as a tutor can guide students on the way they should work.” Interview 5</p>

4. Discussion

Facilitators perceive the PBL as a positive and effective methodology for nursing students. Experiences of facilitators were perceived as “good”, standing out the positive feedback for facilitators throughout PBL process. The main variables that influenced their opinions were related to a satisfactory students’ overall performance, represented upon the obtained grades across the seven-year span.

In the interviews, similarities, differences and difficulties among student groups were mentioned by tutors. One similarity was the student’s limited initial understanding of PBL methodology, a situation that demanded greater support from the facilitator during this stage in order to fully overcome the challenge. This leads to a positive final outcome for all groups of students by the end of PBL. On the other hand, the described differences between groups in the development of PBL resulted mainly from generational behaviours by the students, which did not have a detrimental effect on the final outcome of PBL. One of the main difficulties among students was that of adopting an incorrect problem-solving approach and losing focus on the primary goal of PBL. It was observed that, when this methodology was first applied in 2014, some groups organised their work in a sort of way that caused students to lose focus of the main objective of PBL. In that year, students devoted an excessive amount of time prioritising certain activities, delaying unnecessarily the resolution of the given situation. Another problem was the heterogeneous contribution in the development of PBL, distributing unevenly the workload among the group members. Tutors observed that some students tend to work harder than their peers, causing a detriment to their own learning. These variations could be found in the different ways that students learn. In this context, it is worth considering that learning approach variations are critical for better learning. Facilitators should not demand that a student use a particular approach to learning, but they should create learning opportunities that encourage students adopt other approaches even within the PBL approach itself (Chan, 2016). For all the above reasons, students’ organisation and knowledge becomes relevant throughout the entire process, requiring further guidance from tutors. As such, the role of the facilitator is indispensable since the success of PBL depends on them (Wells et al, 2009). By means of the facilitator’s active role, all the aforementioned problems have been progressively solved, especially due to the higher expertise of each tutor acquired within the period.

Disciplinary practice of nursing was also relevant for respondents. They considered PBL as a methodology that harmoniously unifies theoretical and practical work within real life health care contexts. The diverse nature of instructors’ professional backgrounds enriched PBL significantly by providing different scenarios where a situation is needed to be solved by the students. Tutors use their own professional experience to guide the students, merging theoretical and practical work. To this respect, it is important to consider that students value multi-modality and personalised feedback, balancing positive and constructive comments in a direct, timely, and clear way. Multi-modal feedback may include written, audio recorded or face-to-face (Paterson et al, 2019). This is necessary during and after the PBL work. Conversely, the PBL methodology is a professional challenge for nurse instructors since they have to keep themselves abreast with the topic and

learning continuously, updating their disciplinary knowledge of their own speciality as well as in PBL in order to fulfil the requirements for this methodology. By doing this over a period of at least five years, tutors have become experts in PBL over time. Chan (2016) states in her study that PBL does not just affect the educational development of students, but also that of practitioners after practising PBL methodology in their class. Therefore, the instructors' performance and knowledge in PBL has been substantially improved throughout the period where they performed that role, gaining expertise which in turn improves student's learning process.

Learning exerts a pivotal role in the process for both instructors and students, because the nurse tutors and students enhance each other's competences. While tutors are able to hone their skills and become experts overtime, the main focus of PBL is the student self-learning, according to facilitators. They perceive that this methodology favour that students learn by themselves, which involves teamwork and an integrative view of the given clinical case. Self-learning is possible thanks to the student's initiative, which is an important factor to enhance their various abilities. Student's initiative is represented by self-efficacy, ability that enables nursing students to face a PBL curriculum (Gou et al, 2018).

Likewise, teamwork is an indissoluble aspect of nursing professional work that is fully represented in PBL, since student groups are randomly formed at the beginning of the activity. This means that students have to learn how to work in teams with peers with whom they do not necessarily maintain previous ties of friendship, similar to what occurs in the workplace. This has been addressed by Gönc et al (2015) who stresses the importance of PBL in improving work motivation and promoting independent study, as well as teamwork. Furthermore, a bio-psycho-social approach to solve the problem is required, so PBL could be effective in improving the skills of recognition and attitudes about resolving social issues, among other abilities (Itatani et al, 2017). Facilitators affirm that PBL allowed students to develop an integral view at the approach to the problem situation, thereby expanding the possibilities of action in nursing care.

For the Guidance category, student's autonomous performance is highlighted. Facilitators have identified their role within the PBL methodology as a guide for students in the process of finding the best solution to the problem situation, using rubrics as a fundamental tool that enable autonomy in students' performance. Rubrics promote autonomy in the students since they are able to review by themselves the fundamental aspects of the process as well as performing an active role in their own assessment. Assessment must be a shared process capable of giving students the opportunity to become aware of what they learn and how they learn it. It must be based on participation and reflection, and filled with sufficient and high-quality feedback (Miguel et al, 2018).

Continuous improvement is another key aspect of the PBL process. The use of rubrics as instruments to guide PBL leads to objectiveness in the assessment of students, generating feedback as well as continuous improvement of the process itself. While designing and implementing rubrics, objectiveness is an essential aspect to consider, especially in nursing education. The continuous

improvement is possible since rubrics are reviewed and modified by the team of supervisors every year, according to any detected necessity and feedback from the previous experience by supervising PBL groups as mentors. These changes occur because of the permanent participation of instructors throughout the process, which leads to a better comprehension of the main strengths and weaknesses. Besides, rubrics are a marking standard for evaluations, which is useful and necessary when multiple assessors are involved, like the PBL groups. Educators can also save time when marking, as they are not required to repeatedly establish and modify their marking criteria (Chan & Ho, 2019).

Individual assessment of students and time dedication to PBL were pointed out by the interviewees. For them, assessing the students' performance during PBL is challenging because of the need of establishing a uniform criterion, considering their diversity. In other words, the final grades should represent each student's performance by complementing theory with practical skills, on a comparative basis. For this reason, establishing extra items in the rubrics was suggested. Regarding time, tutors suggested counting on more time to develop PBL, due to the high demand of resources on the students' coexistent academic duties from other subjects. This makes very difficult to comply with PBL according to the required standards. Hence, It is important to address this problem since PBL requires more time compared to other methodologies (Savin-Baden & Major, 2004).

The mentoring sessions and the role of nurse-instructors as facilitators were viewed as fundamental to guide the process successfully, and they were consequently assessed favourably by nurse tutors. The role of the tutor was perceived as vital, since PBL requires specific teaching skills that have been considered important. In this regard, Wosinski et al (2018) recommend that tutors should be trained to effectively guide the teamwork of nursing students throughout the process, so that they can achieve their goal and students be safely introduced into PBL and experience the development of clinical reasoning. In addition, effective problem teaching-based learning is essential and has significant effects on the learning, motivation and experience of nursing students (Matthew-Maich et al, 2016).

5. Conclusion

This case study explored the experience of nursing teachers who taught using PBL methodology between 2014 and 2020. Findings reflect that the PBL experience of tutors between 2014 and 2020 has been positive. Feedback permits both facilitators and students to update the areas and topics worked, so they can learn mutually. The tutors experienced personal satisfaction when students managed to motivate and commit themselves to the problem situation. New challenges in the professional training through continuous improvement have been formulated.

Over the six-year span of working with the PBL methodology in the nursing school of the University of Talca, several improvements have been made and implemented successfully. However, some critical aspects as described by the tutors are still unmet, such as counting on more time for the students to work in PBL, and the deficit of individualised evaluation for every student. At this

regard, the tutors expressed permanent interest in making improvements on PBL in the process and subsequent evaluation (rubrics, time, and individualisation of the evaluations). Considering the recurrent difficulties experienced by students in the beginning of their work with the PBL methodology, the interviewed tutors emphasised the need of at least one early mentoring session as optimal for successfully teaching students the relevant aspects of PBL. Furthermore, instructors proposed an individualised evaluation for every student because different participation levels have been detected within each group. By implication, the possibility of evaluating students individually was considered.

All the improvements in the implementation of the PBL methodology would ultimately lead to the consolidation of PBL as a high-quality and reliable teaching practice, contributing positively to the acquisition of professional competences for future nurses.

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