



Research Article

The view of students and tutors on the application of problem-based learning (PBL) in the basic cycle of a Medical Course in Ceará, Brazil

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Abstract

Background: Problem-based learning (PBL) is a didactic-pedagogical student-centered strategy adopted by several medical schools worldwide. It was described the view of students and tutors of a Course in Medicine on the implementation of PBL, its benefits, limitations and satisfaction. **Methods:** a cross sectional study was conducted with questionnaires to 89 students and 10 faculty members of the basic cycle. **Results:** most students and faculty members were satisfied with the strategy, and believed that it positively influenced the performance of students. For satisfied students the main benefits were: articulation of theoretical knowledge to practice, development of new skills and improving group attitude. For tutors, PBL provided mainly greater student participation, articulation between theory and practice, acquisition of good grades and success in group work. Failures were identified related to the implementation of PBL in the course, the unpreparedness and lack of involvement of both groups, which may result from the lack of continuous training, or inefficiency of the same, triggering several difficulties at all stages of the tutorial process. **Conclusions:** The PBL has generated the results to which it proposes, but it is necessary to correct the flaws so that its achievements are not compromised.

Keywords: medical education, Problem-Based Learning, medical training

INTRODUCTION

For some decades many medical schools have been discussing the need to redesign curricula and teaching methodologies to train professionals able to meet the demands of contemporary society. In this context, it has been highlighted the Problem Based Learning (PBL), of Canadian-origin, whose characteristics can respond to the needs of

curricular change in medical courses (Gomes et al., 2009; Gomes and Rego, 2011).

PBL is a student-centered teaching-didactic strategy (Araújo and Sastre, 2009), anchored in the Constructivism, in the (re) construction of knowledge (Moraes and Manzini, 2006), stimulating the ability of self-formation, fueled by an active search for information (Barrows and Tamblyn, 1980).

For medical education the concept of PBL is presented as an instructional alternative to conventional procedures (Schmidt, 1983). The model provides the student the conditions to develop techniques, cognitive and attitudinal skills applicable both for the care of patients, and for the maintenance of posture to study and to learn throughout his professional life (Barrows and Tamblyn, 1980).

The PBL was conceived at McMaster University in Canada, in the 1960s and then spread to several countries by Maastricht University in the Netherlands, and Newcastle in Australia (Mamede et al., 2001). It is currently adopted in medical schools in Canada, USA, Netherlands, Africa, Asia and Latin America as well as other schools in the field of health as Nursing, Physiotherapy, Dentistry and Veterinary Medicine (Araújo and Sastre, 2009). Its application has been disseminated to other fields beyond health, such as Mathematics, Chemistry, Engineering (Ribeiro and Mizukami, 2005; Sánchez, 2010; Merlano et al., 2011). In Brazil, the first schools to adopt the PBL were the School of Public Health of Ceará in the early 1990s, and then the universities of Marília and Londrina (Mamede et al., 2001; Bertoncello et al., 2008).

The PBL has been widely debated and evaluated through studies and research in various countries. The Course of Medicine, at the Federal University of Ceará (Cariri Campus), currently owned by the Federal University of Cariri-UFCA, the unit of subject in this study, adopted the strategy in 2001 and, since its implementation no evaluation was performed to assess the its success. Thus, we realized the need to describe the impact of PBL in the academic and instructional behavior of students, from the viewpoint of the same, as well as know the perception of teachers in relation to this practice.

METHODS

A cross-sectional study was conducted in the Medicine Course, at the Federal University of Cariri, with a sample of students and professors taken from a population of 240 students and 64 faculty members. All students from 2nd to 4th semester (year 2011) were invited to fill out a questionnaire, and likewise, the teachers who made up the basic cycle of the course (1st to 4th semester) who had previous or current experience with tutoring in PBL. The biannual delimitation occurred this way because the formation of PBL tutorial groups of this course takes place from 1st to 3rd semester.

It was considered that the 1st semester students had a brief contact with the method, and their responses could vitiate the study. So it was decided not to include them. Those already in the 4th semester, although not part of the tutorial groups were selected because they had the longest experience and could provide an important response after cessation of tutorial activities. Thus, it was formed a sample of those who wished to participate in the study (89 students and 10 professors) and, after signing a consent form they completed the questionnaire.

Data were analyzed using Epi-info software, version 7, which allowed to describe how PBL was applied in that course and identify factors associated with student satisfaction regarding the method. To this end, we adopted the Chi-Square Test for independence at a significance level of 0.05 and estimated the chance of satisfaction dependent on aspects related to strategy, to students and tutors through the odds ratio (OR).

RESULTS

Of the eighty five (85) students surveyed, 52.8% were male, of an average of 21 years of age, ranging from 17 to 29 years old, distributed as follows: 36 in the 2nd semester, 27 in the 3rd and 26 in the 4th. For most of them (80.9%) the first experience with PBL occurred in the Course of Medicine at UFCA. According to them, 84.3% had received clarifications on the application of the method before attending the tutorial groups, wherein 33.3% found it insufficient.

Regarding the dynamics of tutorial activities, students said that two to three sessions were held to solve a problem, being more common the occurrence of two sessions (94.4%), one for presentation of the problem and one for the problem completion. Most students (43.5%) stated that the 1st and last meeting occurred within a week (42.7%); about 28% in two weeks, and 29.2% indefinitely. Approximately 57% revealed that there was no fixed schedule (day and time) to carry out the activities.

As for the quality of the elaborated problems, 50.6% of students considered them well built and 48.3% reasonable. To 75.3% of students, the tutors had domain of the PBL. However, 46% believed that the variety of backgrounds of the

tutors hindered learning.

Regarding satisfaction with the learning methods adopted in the course, 76.4% of students were satisfied with PBL, most of which were observed in the 3rd semester (89%) and the smallest in 2nd (66.7%).

When asked about the choice of curriculum model adopted in the course, 66.3% of them answered that they would choose the (traditional one and the PBL) a mixed model, and about 10% the completely traditional curriculum. The largest number of supporters of mixed curriculum was in the 4th semester (84.6%). According to the students who were satisfied, the method contributes to the articulation of theoretical knowledge to practice (80.8%) the developing of new skills (73.5%); the improvement in group attitude (60.3%); the encouragement of autonomy in relation to the studies (32.3%); and an adoption of a more humanitarian view towards others (17.6%).

The twenty one (21) students who were dissatisfied cited some reasons to justify their dissatisfaction. The main one was that the PBL was not well applied in the course (76%). About 57% reported that the tutors were unprepared, as well as themselves (33.3%). Another reason was the lack of punctuality of the tutors (23.8%) and their own teammates (9.5%). Furthermore, 19% criticized the modular structure of the curriculum.

The chance of student satisfaction was estimated by odds ratio (OR) according to some predictors aspects displayed in Table 1. It was found that student satisfaction was not influenced by the existence of prior experience with PBL ($p = 0.20$). On the other hand, the prior training of students to participate in tutorial groups, the quality of the elaborated problems and the security of tutors in conducting groups increased the chances of student satisfaction in OR = 6.3x, 4.2x and 7, 7x respectively. However for those who believe in loss to learning due to different backgrounds of the tutors, the chance of satisfaction was less than 1 (OR = 0.24) and, likewise, for those who denounced that PBL was not being applied properly in the course (OR = 0.00).

Table 1. Potential factors affecting the satisfaction of the medical students UFC-Cariri with PBL

The interference factors	Satisfaction		Odds ratio (CI)	p
Prior experience with PBL	Yes	No	0.48 (0.15 – 1.51)	0.20
Yes	11	6		
No	57	15		
Training before participating of the groups	Yes	13	6.35 (1.88-21.4)	0.00
No	6	8		
Quality of the processed problems	Good	5	*4.2 (1.39 – 13.15)	0.007
Reasonable	40	28		
Assurance of tutors regarding method the	Yes	9	7.73 (2.58 – 23.09)	0.000
No	58	10		
Loss in learning due to different Backgrounds of the tutors	Yes	15	0.24 (0.08 – 0.71)	0.007
No	26	42		
Poor implementation of PBL in the course	Yes	16	0.00 (0.00-0.042)	0.00
No	1	67		

CI = Confidence interval. * One response was excluded to allow calculation of OR

As for the ten (10) faculty members, 60% are female, with average age of 41.2 (± 8.9) years old. Half of the group is graduated in Medicine and the other in biomedicine, nursing, physiotherapy and psychology. Most of them (60%) had a Master's degree and only 20% held a doctorate degree. Regarding employment, 90% were regular members of the institution.

On experience with PBL, 70% of the faculty members reported having experienced it prior to the development of this study. All claimed to have experience in tutoring, and 70% of them for over two years. Almost all (90%) reported having received some form of training, which occurred mainly through courses or workshops and educational meetings. However 40% of them revealed feeling qualified, only partially. Even with 60% of faculty feeling fully trained, only 30% were able to synthesize the proposed BPA satisfactorily.

Most faculties (70%) said they believed their training or skill made them skilled to carry out any problem presented in

the tutorial group. However, 20% confessed to face difficulties in the practice of tutoring. According to them, the biggest one was the misunderstanding of some themes explored, and the lack of systematic guidance from who elaborated the problems.

All faculty members said they believe the BPA influenced positively the medical training. Among the benefits were reported: greater participation of students (100%); articulation between theory and practice (90%); acquisition of good grades in the evaluation process (90%); success in group work (80%); facility to develop new skills (50%); autonomy and responsibility in relation to the studies (50%).

As for the application of the method in that course, 44.4% stated that it was not being implemented as proposed, as previously mentioned by a portion of students. Nevertheless, 90% of the group said they would choose BPA associated with the traditional model as a curriculum model to be adopted in the course. Only 10% would choose PBL alone as a curricular model, and no one would adopt a totally traditional.

DISCUSSION

The results allow us to analyze the characteristics of the application of PBL in medical course of UFCA, showing the benefits achieved with the strategy and critical points for students and tutors. Moreover, it allows to identify if these points contribute to student satisfaction with PBL, an important fact for the learning process.

It was found that the conduct of tutorial sessions in relation to the number of meetings is correct since it is flexible. This course follows the recommendation of Engel (Engel, 1992), which proposes the structure of the PBL cycle through two sessions, one for the analysis of the problem and the other for resolution. In this period the participants follow the Seven Steps proposed by Schmidt (Schmidt, 1983). According to Engel (Engel, 1992), only this way of structuring the PBL would allow better use of its potential.

The students criticized the varied backgrounds of tutors and found that it could cause hindrance to learning. This criticism is common to several studies on PBL. Students from the Universidade do Extremo Sul Catarinense (UNESC) revealed that the difficulties of the tutors to conduct a tutorial session, were due usually to lack of mastery of the method, not to belong to the specific area in which occurred the tutorial session (Silva et al., 2007).

In another study, students from Marília Medical School (Faculdade de Medicina de Marília - FAMEMA) explained that tutors must know the content discussed during tutoring in order to question them. According to the authors of the research, the students still had the conception of the teacher's role as keeper of knowledge, existing in traditional teaching. Tutors, who did not point the errors, propitiated more insecurity towards the 1st semester students who still lacked confidence in their ability to self-learning with tutor facilitation (Moraes and Manzini, 2006).

Barrows (1992) considers a better tutor one who has the ability to facilitate, even if he/she is not a specialist in the field of study. According to him, it is not admissible an expert in a particular area of study who is a weak facilitator. Komatsu (2003) reaffirms that tutors must have the ability to understand the peculiarities of the educational program, the methodology of teaching and learning, the learning objectives to be achieved by students in the unit. Also, tutors need to get involved and commit to the mentoring group. In the present study, both students and tutors complained about the lack of training, or the insufficiency of the same, and this may explain the above limitations or difficulties, besides the poor quality of the elaborated problems and lack of mastery of the method by some tutors.

The low satisfactory on the description of the proposed PBL indicates that capacity building for implementation of the method should be continuous over the course for both egressed professors and those who consider themselves qualified. Papinczak et al. (2009) suggest that tutors revise the PBL tutorial process and group dynamics regularly within this scenario (Papinczak et al., 2009).

At other universities tutors also had difficulties in applying the method. Some, while guiding groups, others in drafting problems that integrate concepts pertaining to all modules of the course (Silva et al., 2007; Angelo and Bertoni, 2007). Barrows suggests that, in the face of facilitators with difficulties in certain areas of study, the curriculum must have clear learning objectives so that both the facilitator and the students know exactly what is to be learned. In addition, it must have the same access to learning resources, as well as to experts who can guide and answer questions (Barrows, 1992).

With PBL the discussion of a problem is the starting point of the group learning process. Thus it is expected that the text is well-written enough to provoke discussion and stimulate the identification of key elements of the main theme, and deepening of relevant content (Mamede, 2001). On this aspect it was noticed a lacking of involvement in the teaching group because while students denounced the lack of punctuality of some faculty, it was realized that the tutors themselves complained about the lack of guidance and support on the part of the creators of the problems.

Despite all the difficulties pointed out by the groups involved, both expressed high levels of satisfaction with PBL, and

many benefits were cited, overcoming the limitations and losses. The benefits achieved match what the BPA proposes, and it has been observed in several courses in which it is applied. The main ones are the autonomy and attitude in working as a group (Moraes and Manzini, 2006; Silva et al. 2007). In addition to these benefits, students of a Colombian Medical School recognized that methods such as PBL create a motivating environment, allowing to integrate knowledge of basic sciences to clinical settings (Olaya and Cárdenas, 2011).

For students of UNESC, the acquaintanceship within groups allowed them to deal with the peculiar differences of each individual, like to be seen in future work environment, which should be a multidisciplinary situation. The same students also cite that the speech which is widely exercised in the tutorials, is a powerful tool in the everyday life of a physician, both in the relationship of the doctor-patient as the physician-community relationship, considering the health professional such as a diffuser of health education (Silva et al., 2007). In this context, there are several reports on the efficiency of communication and interpersonal relationships with the community (Gomes et al., 2009).

The reviews of Gomes et al. (2009) observed that in 70% of the studies the results of PBL courses are more positive than those of courses with traditional curriculum (Gomes et al., 2009). For Schmidt et al. the success of PBL results in encouraging the activation of prior knowledge in the formation of small groups, and gives opportunity to develop knowledge. These activities facilitate the understanding of the new information related to the problem and increase its long term recollection (Schmidt et al., 2011).

This study identified some factors associated with student satisfaction. This knowledge is important because, directly or indirectly, it can influence learning, since students are active agents in this process. Therefore, this information is useful to guide interventions aimed at quality in implementing PBL. Thus, the qualification before participating with these groups, the quality of the processed problems, the confidence of tutors as to the field method, the loss to learning due to different backgrounds of the tutors (most believed there was no loss), and the misapplication of the method in the course influenced student satisfaction. Only prior experience with PBL was not associated with satisfaction. Three of these factors relate to the involvement of tutors and reinforces the importance of their involvement in the drafting of the problems and conducting tutorials.

CONCLUSIONS

The PBL showed high acceptance by the academic community of the Course of Medicine at UFCA, and for the most part, have generated results which proposes to. However, some flaws pointed out should be corrected so that its achievements are not compromised. The main one is related to the lack of continuous training or inefficiency of the same, generating a chain of problems in all stages of the tutorial process. This fact may contribute to the lack of involvement of a portion of the faculty members and disarticulation between coordinators and tutors, from the production and discussion of problems to the supervision of tutorial meetings.

Ethics Approval

The study was approved by the Ethics Committee on Human Research of the Faculdade de Medicina da Universidade Federal do Ceará (School of Medicine of the Federal University of Ceará).

Competing Interests

The authors declare no conflict of interest.

Author's Contributions

EPL planned the study and analyzed the data. ACDEOA, MDOESJ, LCBA PMBF and performed the data collection and created databases. SBR and MLRN contributed to critical review of the data.

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