PBL in Healthcare Sciences. A case study on curriculum innovation

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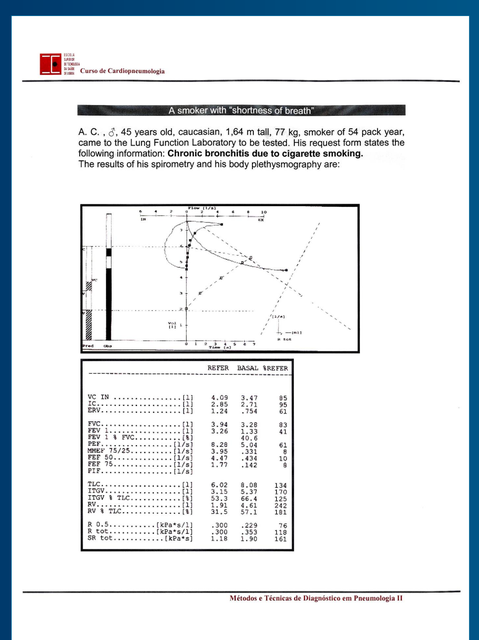
Students of a Cardiopulmonary Sciences curriculum in a Portuguese higher education institution have shown poor learning outcomes and low satisfaction on a course about lung function tests. A transmissive pedagogical approach, mainly based on lectures, was the common teaching practice. Aiming for a change, PBL was considered as a powerful alternative and also as a contribution for progressively innovating the curriculum.

Purpose:

- to create PBL activities in a lung function tests course
- to describe their implementation
- to analyse the effects of PBL integration in students' performance and attitudes
- to characterize the generated learning environment

What was done:

- A PBL module was developed under the constraints of a higher education institution with no PBL tradition and experience.
- Three PBL-based activities on lung function tests were designed (Figure 1).
- Throughout 6 weeks the activities were implemented in 6 PBL sessions of two hours each. 28 students worked together in four small groups (Figures 2 and 3).
- Participant observation (teacher/researcher) during PBL sessions provided data for describing both the generated learning environment and the integration process of PBL activities and for analysing the resulting effects in students' performance.
- Throughout PBL sessions students were informally interviewed, in order to grasp their perspectives about the new learning approach they were experiencing.
- A pre and post questionnaire was applied to verify eventual students' attitude changes about the course.
- A written test with the same format as the tests usually applied in the course was used to assess the students. The results were confronted with their previous grades in the course in order to appraisal possible effects of PBL approach in their performance.



Curso de Cardiopneumologia

A smoker with "shortness of breath"

A. C. , ♂, 45 years old, caucasian, 1,64 m tall, 77 kg, smoker of 54 pack year, came to the Lung Function Laboratory to be tested. His request form states the following information: **Chronic bronchitis due to cigarette smoking.**
The results of his spirometry and his body plethysmography are:

		REFER	BASAL	%REFER
VC IN	[l]	4.09	3.47	85
IC	[l]	2.85	2.71	95
ERV	[l]	1.24	.754	61
FVC	[l]	3.94	3.28	83
FEV 1	[l]	3.24	1.33	41
FEV 1 % FVC	[%]		40.5	
PEF	[l/s]	8.28	5.04	61
MMEF 75/25	[l/s]	3.95	.331	8
FEF 50	[l/s]	4.47	.434	10
FEF 75	[l/s]	1.77	.142	8
PIF	[l/s]			
TLC	[l]	6.02	8.08	134
ITGV	[l]	3.15	5.37	170
ITGV % TLC	[%]	53.3	66.4	125
RV	[l]	1.91	4.61	242
RV % TLC	[%]	31.5	57.1	181
R 0.5	[KPa*s/l]	.300	.229	76
R tot	[KPa*s/l]	.300	.353	118
SR tot	[kPa*s]	1.18	1.90	161

Métodos e Técnicas de Diagnóstico em Pneumologia II

Figure 1: Example of a problem delivered in PBL sessions

Figure 2: Small group working in a PBL session

Figure 3: General aspect of the classroom

What was found:

- Factors restraining PBL implementation were identified (Figure 4).
- Most students didn't change their attitudes toward the course, however they generally showed highly positive attitudes toward PBL as a learning method. As PBL advantages they referred the promotion of the following skills: information search and processing, reasoning, collaborative learning, self-assessment.
- No major diferences were observed on students' grades before and after PBL. However, better grades were observed among students working in the groups that performed better during PBL sessions.
- Student-student and students-teacher interactions evolved along the sessions. Students progressively increased spontaneous (without the teacher's reinforcement) questioning in order to clarify the problem and to identify learning needs.

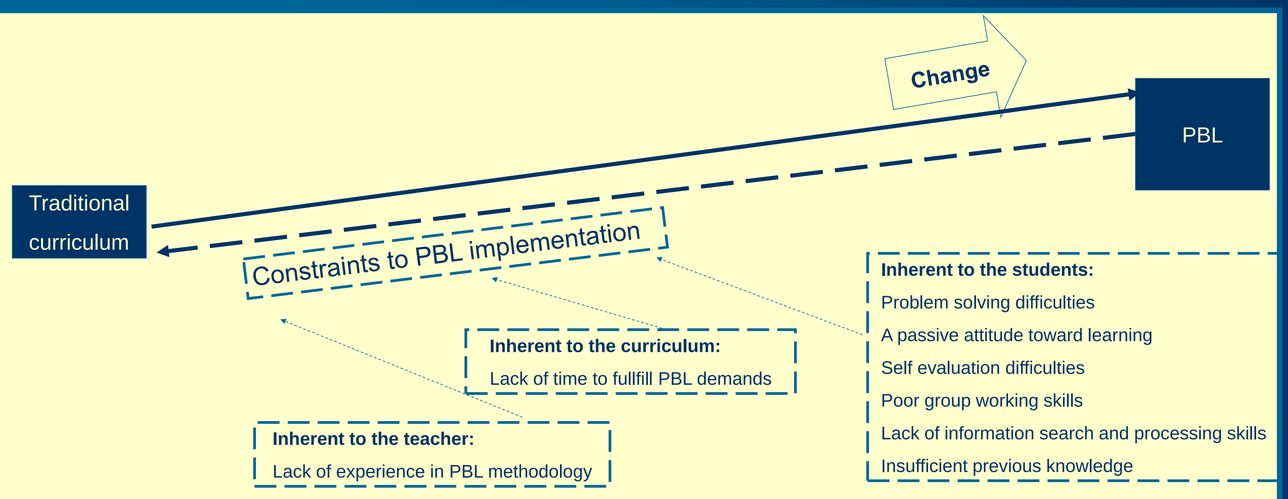


Figure 4: Factors constraining change from traditional curriculum to PBL

Take home messages about PBL integration in a traditional curriculum:

- PBL is a relevant methodology with great potential to train students in Cardiopulmonary Sciences.
- Students need previous preparation in PBL methodology in order to understand their role.
- A change toward PBL claims for a trained teaching staff. A training program requires both a theoretical component and an applied one promoting exchange of ideas and experiences as well as specific practical training.
- A teacher (or tutor) with no PBL experience should approach tutorial sessions accordingly, such as, an adjusted version of the seven-jump model.
- Adequate assessment procedures are needed in order to enhance the learning skills that PBL potentially promotes.
- PBL implementation is a complex and difficult process that demands the conjugation of three main dimensions: the students, the institution, and the teaching staff. Partial, isolated initiatives have added difficulties. A successful integration requires the conjugated efforts of the three dimensions.

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