

Problem based learning in Italian universities

Antonella Lotti

Dipartimento di Scienze della Formazione, Università di Genova. E-mail: Antonella.lotti@unige.it

ABSTRACT

The goal of this paper is to describe how the educational approach called “Problem based learning” is applied in Italian Universities.

First we define what Problem based learning is, when it was introduced into the University programs, how it was disseminated all around the world, which are its methodological characteristics and the underlying theoretical principles.

Key words: problem based learning, medical education, instructional methods

RIASSUNTO

L'apprendimento basato sui problemi, problem based learning o PBL, è un metodo formativo introdotto nella Facoltà di medicina di McMaster University nel 1971 da Howard Barrows. Da allora ha creato una sorta di rivoluzione nel mondo accademico mondiale. Anche in Italia è stato introdotto in numerose università, in corsi di formazione per medici e infermieri, sino dalla fine degli anni Ottanta. Questo lavoro delinea le caratteristiche del PBL nella sua formazione autentica, evidenzia gli aspetti teorici partendo da John Dewey a Howard Barrows e Henck Schmidt, tratteggia i cenni storici, offre una panoramica delle riviste, dei congressi internazionali e della cattedra UNESCO dedicati al PBL. Illustra brevemente le sperimentazioni attuate in alcune università italiane: il Curriculum Parallelo Sperimentale del corso di laurea in Medicina dell'Università di Bari, il Curriculum Parallelo della scuola per infermieri di Foligno, il Canale Parallelo Romano dell'Università La Sapienza di Roma, l'esperienza ancora attuale del Campus biomedico di Roma per la formazione di ingegneri, medici e infermieri, la sperimentazione al primo triennio dell'Università di Siena, il corso di infermieristica dell'Università di Genova, il master in management sanitario dell'Istituto Superiore di Sanità, la sperimentazione nel corso di laurea di scienze della formazione dell'università di Foggia, la doppia esperienza del polo Humanitas dell'Università di Milano: il corso in italiano e il corso in inglese della International School of Medicine in Milan.

Parole chiave: PBL, educazione medica, strumenti didattici

1. INTRODUCTION

The goal of this paper is to describe how the educational approach called “Problem based learning” is applied in Italian Universities.

First of all we will try to define what Problem based learning is, when it was introduced into the University programs, how it was disseminated all around the world, which are its methodological character-

istics and the underlying theoretical principles. We also will try to identify how it is applied at the Italian University level.

2. THE ORIGIN OF PBL BY HOWARD BARROWS

Problem based learning as a distinct educational concept had its origins in the field of medical education in the 1960s. At that time, clinical medical educators at McMaster University in Ontario, Canada, became increasingly concerned with students' ability to recall and apply in clinical settings, biomedical content knowledge and skills taught in previous biomedical coursework [1].

In 1968, 4 years before the first class entered the new medical school at McMaster University, its education committee undertook the design of the school's curriculum. The physician who was the initial chair of the committee indicated that all members were "frustrated with some aspects of traditional medical education..." (Spaulding 1991). Students were passive and exposed to too much information, little of which seemed relevant to the practice of medicine. They were bored and disenchanted when medical education should have been exciting. The committee noted that medical education didn't become exciting for students until residency training, when they were working with patients trying to solve their problems. They decided that from the beginning of school, learning would occur around a series of biomedical problems presented in small groups with the faculty functioning as "tutors or guides to learning". No background in educational psychology or cognitive science guided them, just the expressed hope that students would be stimulated by this experience, would see the relevance of what they were learning to their future responsibilities, would maintain a high degree of motivation for learning, and would begin to understand the importance of responsible professional attitudes. In this way, problem-based learning, as a defined curricular method, was born over 3 decades ago. [2].

The McMaster experiment was successful and provoked a small revolution in the community of medical schools all around the world. Some newly-established Universities in Europe adopted the PBL method: the university of Limburg in Holland in 1972, the University of Aalborg in Denmark and the University of Linköping in Sweden in 1974.

All around the world many medical schools tried to convert their curriculum into a problem based one. In 1979 World Health Organization (WHO) facilitated the creation of "The Network of community oriented educational institutions for health" which grouped many schools of medicine, in each continent, which were community-oriented and used problem based learning as their main instructional method.

3. PBL AT THE INTERNATIONAL LEVEL

In 2000 The Network was transformed in "The Network: Toward unity for health" that today counts over 200 member institutions, organizations and individuals, with the vast majority from developing countries. The latter sought collaboration with their health systems to adapt and integrate health personnel's education and health services in order to improve the health of the community. TUFH members also explore innovative educational approaches (e.g. community-based education and problem-based learning) to fulfil this mission. Among those institutions we also find Harvard University.

Nowadays many Universities use PBL at the international level; In particular in Europe there is an UNESCO Chair for PBL, which is hosted by the University of Aalborg in Denmark, that organizes workshops, research activities, a Masters program, and also a biennial research symposium on PBL.¹

Other conferences dedicated to PBL are the International problem based learning symposium, held every 2 years in Singapore, and the Pan-American Network for PBL that is held in North and South America every 2 years.

There are also 2 Journals dedicated to Problem-based learning:

¹ The first research symposium on Problem Based learning was held in Aalborg in 2008, the second one was held in Melbourne, Australia in 2009, the third one was held in Coventry, UK, in 2011. The following one it will be held in Kuala Lumpur in Malaysia next 3-4 July 2013.

1. *Interdisciplinary Journal of Problem-based learning* which was launched in 2006 and published by Teaching Academy at Purdue University, School of Education, University of Indiana, USA and in 2010 jointly by the University of Memphis. The journal is an online, peer-reviewed publication, offered to the educational community as an open-access journal.
2. *Journal of problem based learning in Higher Education* which will be launched in 2013 and published by Aalborg University.

4. THE AUTHENTIC PBL AND ITS CHARACTERISTICS

Before describing how PBL is applied in Italy, I would like to give you a very short description of what PBL is, which are its main characteristics and its underlying theoretical principles according to the philosophy of Howard Barrows, who wrote a new book in 2010 to re-define what authentic PBL is, because he found that the application of his educational approach, in some situations, showed some intended and un-intended “pollution” [2].

During the last decades, problem-based curriculum, as introduced in its true state at McMaster University School of Medicine in 1968, has mutated into many different formats, each labeled as “problem based” or PBL. Most of these mutations differ significantly from real problem-based curriculum or problem based education [2].

Definition of problem

In authentic problem-based learning, problems provide the stimulus for learning. They are not narratives or case presentations, but rather are presented to learners as they appeared in the real work setting. They facilitate the development of problem-solving skills. They present opportunities for the learners to acquire the integrated and relevant knowledge and skills needed for their next stage of education or professional practice. Although written simulation formats are the cheapest and easiest to create and to use, they have learning limitations that need to be recognized. There are a wide variety of formats that provide many advantages for the learner [2].

The main formats are: written problems, problem simulations, sequential management problem, problem-based learning module, computer simu-

lations, virtual reality, human simulations, models, and actual problems.

Definition of tutor

The key idea is that the teacher in the tutor’s role is that of a facilitator or educational guide for learners in aPBL. The tutor provides guidance as needed, allowing the learners to assume responsibility for the learning process and or their own learning. [2]. The tutor has the responsibility to guide learners through all the phases of a PBL unit, to probe learners’ knowledge and understanding to be able to judge learners’ strengths, weaknesses and progress, to monitor and manage the group’s interpersonal dynamics, to encourage learners to take on responsibility for their own learning and evaluation. McCaughan pointed out similarities between Barrows’ principles for the PBL tutor’s actions with Dewey’s theories that address teacher behaviors and with Carl Rogers’s conceptual frameworks that support the therapeutic behaviors of the client-centered therapist [3].

Definition of the educational setting

The common learning configuration in a PBL session is with a small group of learners, usually five to seven, with a tutor. This allows the participants in the group and the tutor to get to know each other as a team and adequate time for all the learners to be able to express their ideas, knowledge and suggestions in the group [2].

Definition of evaluation

The key idea is that assessment drives learning. The assessment methods used in PBL need to measure learners’ progress towards achieving the outcome objectives, but in a way that is learner-centered and in the right context. The self and peer assessments carried out in the tutorial groups are complemented by an end of unit formal assessment of the performance of the individual learners working with a problem. The pooled results of these assessment methods can assist in the evaluation of a curriculum [2]. Students are evaluated by formative and summative

assessment. Assessment can be carried out within the tutorial group to evaluate problem-solving performance, self-directed performance and the performance as a member of the group. At the end of the unit each student should be evaluated to verify that she/he has also gained specific knowledge applied to these problems.

5. UNDERLYING THEORETICAL PRINCIPLES

Barrows writes that:

There are many antecedents to problem-based learning in the writings of Bruner, Gagne and Dewey and it is logical to think that their work inspired its development as an educational method in medicine in the late 1960s. The roots of problem-based learning can be traced to the progressive movement, especially to John Dewey's belief that teachers should teach by appealing to students' natural instincts to investigate and create [4].

There is a common underline thread that links together PBL with John Dewey's book "How we think", cognitivism and constructivism.

Hencke Schmidt, a Dutch cognitive psychologist, led many researches to provide empirical support for the cognitive underlying bases in PBL [5, 6].

Problem-based learning is a relatively new form of instruction with a long intellectual history. Its roots in the philosophies of rationalism and American functionalism (Dewey 1929) clarify why this approach to learning and instruction emerged in conjunction with the cognitive revolution in psychology. It is not purely coincidental that McMaster University admitted its first batch of medical students in its problem-based curriculum a year before Ulric Neisser's now classic book *Cognitive Psychology* was published (Neisser, 1967). We have argued that in PBL, a number of principles of learning are implemented, considered to be basic to many forms of human learning, comprehension and problem-solving. These principles can be summarized as: prior knowledge, activation and elaboration through small-group analysis; the construction of problem-oriented semantic networks, including contextual cues derived from professional relevant problems; and the fostering of epistemic curiosity [7].

During the Progressive Era, Dewey saw the tackling of significant problems as the ultimate way to engage learners in meaning making and problem

solving. He further believed that learning should be situated within the context of community. Interest in such open inquiry, activity-based and integrative approaches in our classrooms has grown in recent years. These types of approaches are sometimes called constructivism.

Problem based learning may be one of the best exemplars of a constructivist-learning environment [8].

6. PROBLEM-BASED LEARNING IN ITALY

Problem-based learning was introduced in Italy in several Universities and in some schools of Medicine, Engineering and Education. In some cases PBL was part of action-research, which lasted only some months or some years. In other cases, PBL is maintained as the main instructional method until today.

1. University of Bari, School of Medicine

In 1988 the University of Bari started a Parallel track², which was both community-oriented and problem-based. A group of teachers, led by a charismatic dean and a small group of Faculty members who very motivated to introduce a reform in medical studies, were trained by WHO Experts and collaborating centers. They planned all the educational activities before starting the new program. Each academic year, the parallel track admitted 20 students who attended a program, which was com-

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- 2 Parallel Track is a an approach to change involving the establishment of an innovative curricular track as a curriculum distinct from, but running parallel with, the already existing curriculum. In 1987 WHO published an offset publication dedicated to 8 parallel tracks: National Autonomous University of Mexico; Upper Pensinsula Medical education Program , Michigan State University, USA; University of the Philippines; MESRAP Program, Chulalongkorn University in Thailand; Primary Care Curriculum, University of New Mexico, USA; Alternative Curriculum, Rush Medical School, USA; New pathway Program, Harvard Medical School, USA; Problem Based Curriculum, Shangai Second Medical University, China [9].

pletely integrated and interdisciplinary, organized in several blocks. PBL, role playing, early contacts with patients and skills lab were the main educational methods. OSCE and written essays were the main evaluation methods.

The Experimental Parallel Curriculum of Bari was the first Parallel Track in Europe and its activities were analyzed and published at national and international level. Unfortunately the premature death of the Dean resulted in the end of this challenging experiment in 1995 [10].

2. University of Perugia, Pole of Foligno, School of Nursing

In 1988 a pioneering regional school of nursing decided to introduce a parallel track which was completely community-oriented and problem-based. When the Italian law transformed the regional school of nursing into undergraduate university program, only the teachers of nursing kept the PBL in their educational activities while the majority of other teachers of basic and clinical sciences didn't adopt PBL [11].

3. University of Roma, La Sapienza, School of Medicine

In 1993 The University of Roma La Sapienza decided to introduce a Parallel Track, called Canale Parallelo Romano (CPR) an experimental undergraduate medical course. Prof Aldo Torsoli led the planning of this initiative and created a group of 50 teachers and 5 students. The Roman Parallel track started in March 1995.

The CPR was intended to provide students with a basic bio-psycho-social professional profile, with a change in the learning approach (active rather than passive), a training to practice evidence based medicine, knowledge and abilities adequate to pursue a supervised practice of medicine, as well as a positive attitude towards multidisciplinary and multi-professional cooperation.

The project framework included problem-based learning and core curriculum. Core contents of the curriculum were identified for clinical sciences according to the prevalence, urgency, severity, cur-

ability and paradigmatic interest of the conditions. The educational process comprised three main sections: Introduction to Medicine (years I-IV), Clinical Sciences (years II-VI), Clinical Clerkship (years V-VI).

The initial results showed that, in comparison with a Control Group of similar size and characteristics (CPR/CG), CPR students did not get higher scores at the Semester exams, but a significantly higher percentage completed them. Problem-oriented learning and the use of clinical cases as triggers for learning basic sciences were well accepted. The identification of core contents represented a major difficulty for those involved in the curriculum planning [12].

The premature death of Professor Torsoli also ended this parallel track.

4. Campus Bio-medico, Roma

In 1993 the Bio-Medical Campus, a new private university, was established in Rome and proposed two programs: undergraduate programs for medical doctors and for nurses. In 1999 they added an undergraduate program for nutritionists and another one for engineers. All the programs declare the adoption of small group activities and problem-based learning. PBL is used also for inter-professional education activities: students coming from Medical program and nursing program are divided into small groups and together discuss clinical cases according to the PBL seven jumps as described by Hencke Schmidt in 1983 [13].

5. University of Siena, School of Medicine

A Problem-based Learning course based on small group technology started in 2001. Over 20 teachers were trained as small group tutors by experts coming from Smith Kline Foundation, WHO collaborating center, and University of Sherbrooke, Canada. The integrated course entitled "Interdisciplinary approach to medical sciences" (AISMe) had the following educational objectives: to develop problem-solving, critical thinking and team work skills. Students are divided in small groups of 10-15 persons; each

group meets once a week with two tutors. Each semester a group meets around 12 times. The group discusses problems following the “seven jumps” process. In the first meeting group, students discuss according their prior knowledge, then they go for self-directed learning to acquire identified learning goals; in the second meeting point students summarize newly acquired information.

In 2000 the course started as an optional one, in 2001 the course became compulsory and involved 30 teachers. The “Interdisciplinary Approach to Medical Sciences” lasted three years: in the first year students discussed dilemma problems, in the second year students discussed problems aiming to identify and retrieve scientific literature; in the third year they discussed problems aiming to critical appraisal of papers concerning the accuracy of diagnostic tests, therapeutics and meta-analysis.

In 2008 the course was reduced to only one year [14].

6. University of Genoa

In 2002 the University of Genoa's School of Medicine started a PBL program for nursing education which continues to this day. The coordinator of the Nursing Program decided to introduce PBL into all nursing disciplines in all the three years. Almost 90 students are divided in small groups and learn led by a tutor across the entire 3 year curriculum. The curriculum is divided in blocks around health priority problems, and PBL cases propose relevant situations. In 2006 PBL was introduced also into continuing education activities for health personnel. (15). More recently PBL is used also in a Master program for managers of health services and into graduate program for nurses.

Nursing teachers from University of Genoa train their colleagues from the University of Parma who are willing to introduce PBL in the Piacenza pole.

In 2010 PBL entered also in the Faculty of education where it is applied in one course “Planning of educational services”, an elective course. In this case it is applied the PBL format for a large class: students are divided in small group of 6 people and they discuss with the supervision of the tutor who moves from one group to another.

In 2010 PBL was used also as a starting activity in a Ph.D. program about Migrations studies and it worked very well because students come from different graduate programs (anthropology, geography, psychology, sociology, education) and discussion in a small group around an interdisciplinary case is very challenging and values the participants' prior knowledge and their different points of view. Ph.D. students appreciated PBL method and now it's used once or twice each academic year.

In 2012 two Faculty members from the Dental medical School decided to use PBL with first year students. After this first offering it was decided to offer it to students as a completely problem based elective course.

7. University of Milano, School of Medicine

In 2003 a parallel track was created in the university of Milan's School of Medicine. The Humanitas Hospital parallel track has been led by a group of teachers, educationalists and the Dean of the School under the supervision of the University of Maastricht's Faculty of Health, Medicine and Life sciences.

In 2010 the parallel track was transformed into the International school of Medicine, is taught in English and is a very attractive to foreign students. Curriculum is divided in several interdisciplinary blocks (introduction to medical professions, from atom to cells, human body, mechanisms of diseases, functions and others). The main instructional methods are problem-based learning, investigating complexity, communication skills activities, observations in outpatient clinics and clerkships.

8. University of Foggia, School of Education

In 2005 a group of 6 faculty members of the School of Education, University of Foggia decided to introduce PBL for their 6 disciplines (anthropology, children literature, adult education, pedagogy, curriculum studies). They planned an interdisciplinary block lasting 4 weeks, wrote 4 cases, divided 130 students in 10 groups and led small tutorial groups,

planned and implemented integrative activities such as workshop, study visits, planned and implemented integrated method of summative evaluation.

In 2006 other faculty members joined the first group of teachers, teachers of psychology and law, and other two cases were added.

In 2007 the first group of teachers wrote a book about their experience [16].

In the following two years (2008 and 2009) PBL was introduced into the graduate school of Education only in one course.

The University of Foggia's experience with PBL was an action research, which lasted only 2 years in the undergraduate school (2005 and 2006) and two years in the Graduate programs. The programs ended when the leader moved to an another university. It is interesting to underline that it was the first time that PBL was introduced in a School of Education in Italy.

9. National Health Institute in Italy, International Master's in Health Services Management

In 2007 the Italian Health Institute developed a training module in Strategic Health Planning implementation and evaluation (SHPI&E) in the framework of the International Master's in Health Services Management, funded by the Italian Ministry of Foreign Affairs. The module was based on the Problem Based Learning (PBL) teaching method, for training health professionals. (17).

CONCLUSIONS

In 2010 *Lancet* published a paper "Health professionals for a new century: transforming education to strengthen health systems in an interdependent world".

The authors wrote that we can categorize our university curricula into 3 types: disciplines based, PBL based and competency based [18].

We can say that in Italy the majority of undergraduate medical and nursing programs are discipline based, but there are some experiences of PBL based programs, but that the way to a really competency-based program is far away.

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