Problem-based Learning: A Strategic Learning System Design for the Education of Healthcare Professionals in the 21st Century

Matthew Choon-Eng Gwee
Medical Education Unit and Department of Pharmacology,
Yong Loo Lin School of Medicine, National University of Singapore, Singapore.

Problem-based learning (PBL) was first implemented by McMaster University medical school in 1969 as a radical, innovative, and alternative pathway to learning in medical education, thus setting a new educational trend. PBL has now spread widely across the globe and beyond the healthcare disciplines, and has prevailed for almost four decades. PBL is essentially a strategic *learning system design*, which combines several complementary educational principles for the delivery of instruction. PBL is specifically aimed at enhancing and optimizing the educational outcomes of *learner-centered*, *collaborative*, *contextual*, *integrated*, *self-directed*, and *reflective learning*. The design and delivery of instruction in PBL involve peer teaching and learning in small groups through the social construction of knowledge using a real-life problem case to trigger the learning process. Therefore, PBL represents a major shift in the educational paradigm from the traditional *teacher-directed (teacher-centered) instruction* to *student-centered (learner-centered) learning*. PBL is firmly underpinned by several educational theories, but problems are often encountered in practice that can affect learning outcomes. Educators contemplating implementing PBL in their institutions should have a clear understanding of its basic tenets, its practice and its philosophy, as well as the issues, challenges, and opportunities associated with its implementation. Special attention should be paid to the *training and selection of PBL tutors* who have a critical role in the PBL process. Furthermore, a significant change in the mindsets of both students and teachers are required for the successful implementation of PBL. Thus, effective training programs for students and teachers must precede its implementation. PBL is a highly resource-intensive learning strategy and the *returns on investment* (i.e. the *actual* versus *expected* learning outcomes) should be carefully and critically appraised in the decision-making process. Implementation of PBL can be a daunting task and will require detailed and careful planning, together with a significant commitment on the part of educators given the responsibility to implement PBL in an institution. PBL can offer a more *holistic*, *value-added*, and *quality* education to energize student learning in the healthcare professions in the 21st century. Successful implementation of PBL can therefore help to nurture in students the development of desired *"habits of mind, behavior, and action"* to become the competent, caring, and ethical healthcare professionals of the 21st century. Thus, PBL can contribute to the improvement of the healthcare of a nation by healthcare professionals, but we need to do it right.

Key Words: challenges, issues, opportunities, outcomes, problem-based learning
(*Kaohsiung J Med Sci* 2009;25:231–9)

Address correspondence and reprint requests to: Dr Matthew C.E. Gwee, Medical Education Unit, Yong Loo Lin School of Medicine, 10 Medical Drive Block MD 11, National University of Singapore, Singapore 117597.
E-mail: phcmgce@nus.edu.sg

ELSEVIER

The Dark Ages of Medical Education

Throughout the 19th century, and until about the last 2–3 decades of the 20th century, the design of the undergraduate medical curriculum was highly discipline-specific with little cross talk across disciplines. The delivery of instruction was then highly teacher-directed (teacher-centered) and also highly lecture-based. This was the era of the instructional paradigm in which the *student role* in the teaching/learning process was mainly that of a *passive recipient* of abundant content knowledge (or information) delivered by the teacher (*"sage-in-center stage"*).

What then can we expect as the educational outcomes from such a traditional educational environment? Several major limitations [1,2] have already been identified, including:

- *Information overload* resulting from student acquisition of abundant content knowledge (*"…information that taxes the memory but not the intellect."*) [1].
- Development of *rote-learning habits* by students through MRR (memorize, recall, regurgitate)—often abetted and intensified by tests on recall of factual content knowledge (information).
- *Teaching inputs* as the primary focus of instruction with little attention to student learning outcomes.
- *High dependency* of students on teachers for their learning needs, including what, how, and when to learn.
- Inadequate attention to student acquisition of more enduring *educational process and life skills*, including: *higher-order cognitive (intellectual) skills* (critical thinking, reasoning, and problem-solving); and some *generic "soft" skills* in the attitudes (affective) domain of learning (interpersonal, communication, teamwork, and leadership).

The McMaster University Initiative: Setting a New Trend in Medical Education

"In the mid-1960s, an exceptional event occurred. McMaster University gave birth to a medical school so different it sent ripples of astonishment throughout the educational world" [3].

In the 1960s, the Canadian government identified a need to establish a medical school in McMaster University in Hamilton, Ontario. At the outset, the educational planners responsible for this project declared that they intended to take a radical (*"fresh and new"*) approach to the design and delivery of their medical curriculum to *"…get away from the standard building-block structure…from shoving a lot of content down their throats because they don't retain it very long anyway. Let's try and get them actively involved…"* [3].

Indeed, in 1969, McMaster University Medical School implemented its new medical curriculum, which set a new, radical and innovative trend, and offered an alternative pathway for learning in medical education. The McMaster curriculum was implemented as *problem-based learning* (PBL), primarily aimed at overcoming what the educational planners perceived to be the many shortcomings of the then current (traditional) medical curriculum [1–3]. In fact, even after almost three decades, Boud and Feletti [4] still consider PBL as *"…the most significant innovation in education for the professions for many years. Some argue that it is the most important development since the move of professional training into educational institutions."*

What is PBL?

PBL is, essentially, a *strategic learning system design*, which combines several complementary educational principles for the delivery of instruction. PBL is specifically aimed at enhancing and optimizing the educational outcomes of *learner-centered*, *collaborative*, *contextual*, *integrated*, *self-directed*, and *reflective learning*. Barrows and Tamblyn [5] provided a simple operational definition of PBL as *"…the learning that results from the process of working toward the understanding or resolution of a problem. The **problem** is encountered **first** in the learning process."*

PBL: What are its Key Features and its Learning Strategy?

An important and basic tenet of PBL is that it is *problem-first learning*, i.e. students attempt to problem-solve a medical case even before receiving any formal learning on the subject matter. Usually, a real-life medical case (a *problem*) *triggers the learning process* for students, i.e. the problem serves as the starting point for learning relevant content knowledge required to