

Medical education challenges in mainland China: the attractiveness of Problem-based learning

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Abstract

Background: In the recent years, the increasing health care needs and the stricter learning requirements for medical students have led to a mismatch between what is taught at medical school and the actual skills to provide health care service in China, which also have brought challenges to medical teachers and students. The Chinese medical educators, thus, are pursuing new teaching methods to overcome the mismatch and Problem-based learning (PBL) responds to the situation. The current model of medical education is urgently needed to change.

Methods: In this paper, we count the number of published articles according to PBL from mainland China and summary the current adoption situations and the typical challenges of PBL in medical education in mainland China.

Results: The number of published articles according to PBL from mainland China increases with time in this decade. There are still unresolved application issues from both tutors and students regarding the adjustment to this highly resource-intensive pedagogy

Conclusions: The number of colleges adopting PBL has been gradually increasing. This new learning model places hopes on Chinese medical educators who would optimize the educational outcomes based on a clear understanding of the PBL process, principle and practice. We expect that PBL can resolve the medical educational challenges in mainland China.

Background

Challenges of medical education in mainland China

Mainland China, contains approximately one fifth of the world's population[4]. Meanwhile, the aging population is at unprecedented levels, indicating the demand of aging-related health care is increasing[5]. Mainland China is the country which has the largest number of medical education institutions in the world. Although millions of students graduate from the medical schools every year, an imbalance still exists between people's increasing health needs and effective health service utilization both home and abroad[6].

Information explosion in the 21st century has brought many changes in diverse fields of knowledge, especially in medical sciences. Therefore, with the expeditious development of medical science in this decade, the content of medical education has been increasingly expanding as more knowledge has been dissolved in. Moreover, the credit hours for the required courses and elective courses in medical college of mainland China both are being constantly squeezed. The conflict between the limited credits hours and infinite medical knowledge has been gradually arousing. Furthermore, because of China's One-Child Policy and long-standing cultural ways of life, the only child in Chinese family is less compassionate, and lacking the sense of caring. Since current medical students seemingly usually overlook the importance of humanistic education in medical education, the Chinese educator has not highlighted enough

compassion compared with qualification in medical education. In modern medical education, most of the lecturers are clinicians, who teach on the basis of their own previous learning experiences. However, owing to the PBL's relative novelty, many clinicians are not acquainted with its process and this unfamiliarity can create a unique problem.

Social backgrounds of medical education innovation in mainland China

The hallmark of the development of modern medicine is the emerging of evidence-based medicine from experience-based medicine. The internet nurtures the progression of evidence-based medicine. At the same time, with the economy gradually ameliorates, the costs on computers decrease dramatically in mainland China. The computer ownership rate in families, especially students, increases significantly. In Tongji Medical College of Huazhong University of Science and Technology (Tongji), our investigation showed that the student's computer ownership rate increased to be 99.7% in 2012 and 92.5% in 2010 compared to only 66.0% in 2005. With science-technology progression, it is the moment for the medical education innovation in mainland China. And it's time for the medical students to prepare for the challenges of the globalized knowledge-based economy in the 21st century [7].

PBL in mainland China

Problem-based learning (PBL) as a student-centered pedagogy was pioneered in the medical school program at McMaster University in the late 1960s by Howard Barrows and his colleagues[8], and has now swept the world of medical education[8]. It has been advocated as a means of increasing student involvement and retention, as well as the capacity to apply knowledge and skills gained in tertiary education programs[9]. In mainland China in 1956, Shanghai Second Medical University and Xi'an Medical University were the first to introduce PBL for the medical education[10]. In 2000, the "Medical Education Innovation: Hong Kong's Experience" symposium was held at the Li Ka Shing Faculty of Medicine, The University of Hong Kong. The conference has hosted the Presidents of most of mainland China's medical colleges, who have predominantly brought back the conception of PBL to mainland China and have accelerated the development of PBL in medical education. Nevertheless, questions or debates regarding its feasibility, applicability, practicality and benefits remain unanswered and unresolved. In Tongji Medical College, we firstly adopted the PBL in medical undergraduates from Seven-Year Medicine Programme as a small-scale randomized controlled trial since 2004. With the expeditious expansion of PBL in undergraduates from Five-, Seven-, and eight-Year Medicine Programmes, Tongji constructed a PBL teaching building with 16 modernized classrooms in 2006. Moreover, we won two favorable academic praises, the Teaching Achievement Award of Hubei Province and the National Teaching Achievement Award. We conducted a survey in the students who received the PBL, and found that more than 85% of the students showed an obviously improvement in their ability of self-learning and

analytical skills. However, 74% of the PBL instructors indicated that our PBL courses should be improved further.

Methods

To explore the current outline of the implementation of PBL in mainland China, we performed online searches of Chinese National Knowledge Infrastructure by using “problem-based learning”, “self-directed learning” and “inquiry learning”, cross-referenced against “medical education” as primary search terms, and constricting the author address as “China”. We collected the existing literatures on PBL in China and find out the problems in the procession. Eligible literatures were used to evaluate the effect of PBL interventions in the domains of knowledge, skills and attitudes. These papers refer to the conception, theory, philosophy, principle, approach, effectiveness, evaluation, cases, tutoring technical and application issues of PBL.

Results

The overview of PBL-related articles in mainland china

In our researches, the number of published PBL-related articles from mainland China increases with time in these past 20 years, especially since 2005 (Figure 1). The result involves more than 300 medical educational institutions in China, which is almost half of the total number. Specifically, PBL has been involved in almost all the courses of medical education in mainland China, including 1) 31 different disciplines of Basic Medicine: Histology and Embryology, Physiology, Pathology, Pharmacology, Biology, Anatomy, Immunology, Epidemiology and so on; 2) 15 different disciplines of Clinical Medicine: Stomatology, Surgery, Internal Medicine, Docimasiology, Ophthalmology, Otorhinolaryngolog, and so on; 3) Chinese traditionally medicine; and 4) Nursing.

The unresolved problems in the adoption of PBL in mainland China

There are still unresolved application issues from both tutors and students regarding the adjustment to this highly resource-intensive pedagogy.

For the tutors, 1) Compared with the traditional education model with 30 students in a class, PBL requires discussion in groups of 6-7 people. To ensure the quality of teaching, the demand of the faculty needs to be relatively increased. It is required that teachers need to have a high level of professional skills and rich medical knowledge while there are not many tutors with such executive ability in domestic medical schools. 2) character-shifting difficulties and inexperience contribute to the major problems, as tutors

prefer to lead the teaching process, are impatient to the less excellent students, even criticize them for their disadvantages which cause negatively expressed emotions and resistance of these students; 3) misunderstanding of the definition of self-centered learning, detailed as tutors over-consider PBL as tutorless, and are careless and unprepared to the PBL curricula. These behaviors usually efface student's positive motivation of PBL and decrease its effectiveness.

For the students, 1) PBL tutorials require an open discussion which may conflict with the more reserved Chinese communication style, defined as “unwilling to speak, not expressing as much as is known or felt” [11]; 2) there are different levels of preference about PBL among different students: students with high level of preference enjoy the PBL activity and benefit from PBL, however, students with low level of preference totally astrogate to the opposite direction; 3) to some extent, PBL emphasizes the self-learning ability. However, students are unwilling to participate as their trouble-fear and their consideration of PBL as a “time-killer”, although these students may criticize the drawbacks of traditional medical curriculum. Hence, the issues from the students can be concluded as unclear learning objectives and lack of motivation.

Moreover, the problems regarding limitation in studying resource, lack of teaching materials and classrooms can be resolved by the modernization of science, information technology progression and E-PBL creation. Last but not least, the evaluation system is not sound. We are forced to change the traditional assessment methods and encourage students to attach importance to the problems and be aware of self-learning. In this way, we can evaluate students' learning performance from other aspects more subjectively and comprehensively, rather than just relying on scores.

The direction of PBL development in mainland China

Although PBL is gradually globalizing, in mainland China, particular endeavor should be made to this educational method to improve its effectiveness as some students are lacking motivation and some tutors are experiencing interest deficiency just like other Asian countries. Some educators even debate about whether PBL is suitable for Asian students, perhaps Asian students are not suitable for PBL [12].

For the educators in mainland China, we have to address these questions: 1) whether China needs a major shift in the medical educational paradigm, 2) whether China needs PBL, 3) what leads the ineffectiveness of PBL curricula in mainland China, 4) whether there is any educational method fitting China better than PBL, and 5) how can we learn from advanced foreign teaching experience. Definitely, the major medical educational paradigm shift is required for students to meet the “knowledge big bang” in this century. PBL, then, represents a students self-directing learning paradigm that has shown its significant efficiency globally. The fluctuating availability of PBL in mainland China may attribute to its “examination-oriented education” and “passive acceptance learning” educational background, learning objectives unclearness and motivation deficiency of the students, and relatively reserved Chinese communication culture.

Discussion

PBL is expanding rapidly among China mainland's medical colleges. The 7th Asia-Pacific Problem-Based Learning Conference (July, 2008 in Shenyang), with the theme of "International Perspectives and Local Adaptations of PBL", welcomed educators from 58 medical colleges of mainland China. The Chinese PBL education alliance was formally established on the 8th February, 2015, which is helpful to promote the development of the emerging education model and even the Internet education model. And in 2018, from December 6th to 8th, the third Chinese health and medical education PBL alliance conference was held in Shanghai, sponsored by Shanghai medical association medical education branch. Well-known experts from other countries and representatives from more than 30 medical colleges and hospitals from all over the country attended the meeting. It marks the standardization of Chinese medical PBL teaching. The original combination of simulation teaching and PBL will surely spark the medical education reform and promote the continuous improvement of medical teaching quality and level in China.

PBL has been demonstrated to successfully sculpture "competent, caring, and ethical healthcare" professionals from desired "habits of mind, behavior, and action" generations[13]. At present, the employment situation of college graduates is very serious in our country. Compared with traditional graduates, PBL students have certain advantages in professional ethics, professional ability, humanitarian spirit, individual psychological quality and lifelong learning ability. It can enable medical students to successfully complete the transition to the role of doctor and have the ability to face the complex and changeable medical life in the future, which has an obvious incremental effect on employment reserve.

PBL can make curriculum content relevant by building learning around clinical, community or scientific problems, focusing learning on core information relevant to real scenarios and reducing information overload. Besides, it can foster the development of valuable transferable skills useful throughout lifelong learning including leadership, teamwork and communication as well as problem solving[14].

Conclusions

In summary, PBL serves as a more holistic and quality education to motivate student learning in the modern medical professions. What is needed now and in the future is research that focuses on the theoretical concepts underlying PBL and is aimed at a clearer understanding of how PBL does or does not work and under which circumstances. What is needed is research that bridges theory and practice and extends knowledge about developing and improving PBL in everyday practice[15]. To do PBL correctly and to master the conception of the PBL process, we suggest that mainland Chinese medical educators

pay more attention to principle and practice in order to derive the optimized educational outcomes from PBL curriculums.

Abbreviations

PBL, Problem-based learning; Tongji, Tongji Medical College of Huazhong University of Science and Technology

Declarations

Ethics approval and consent to participate

The procedures in this study were in accord with the standards of the Committee on of the Tongji Medical College, Huazhong University of Science and Technology. A copy of the written consent is available for review by the Series Editor of this journal.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions:

NX, KG, JL, YP, DG, JH, YH contributed to the conception and design. NX, KG, JL, YP, YH took care of the data collection. NX, KG, JL, YP, DG, YH coordinated all the analysis and helped to draft the manuscript. All authors read, revised and approved the final manuscript.

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Figures

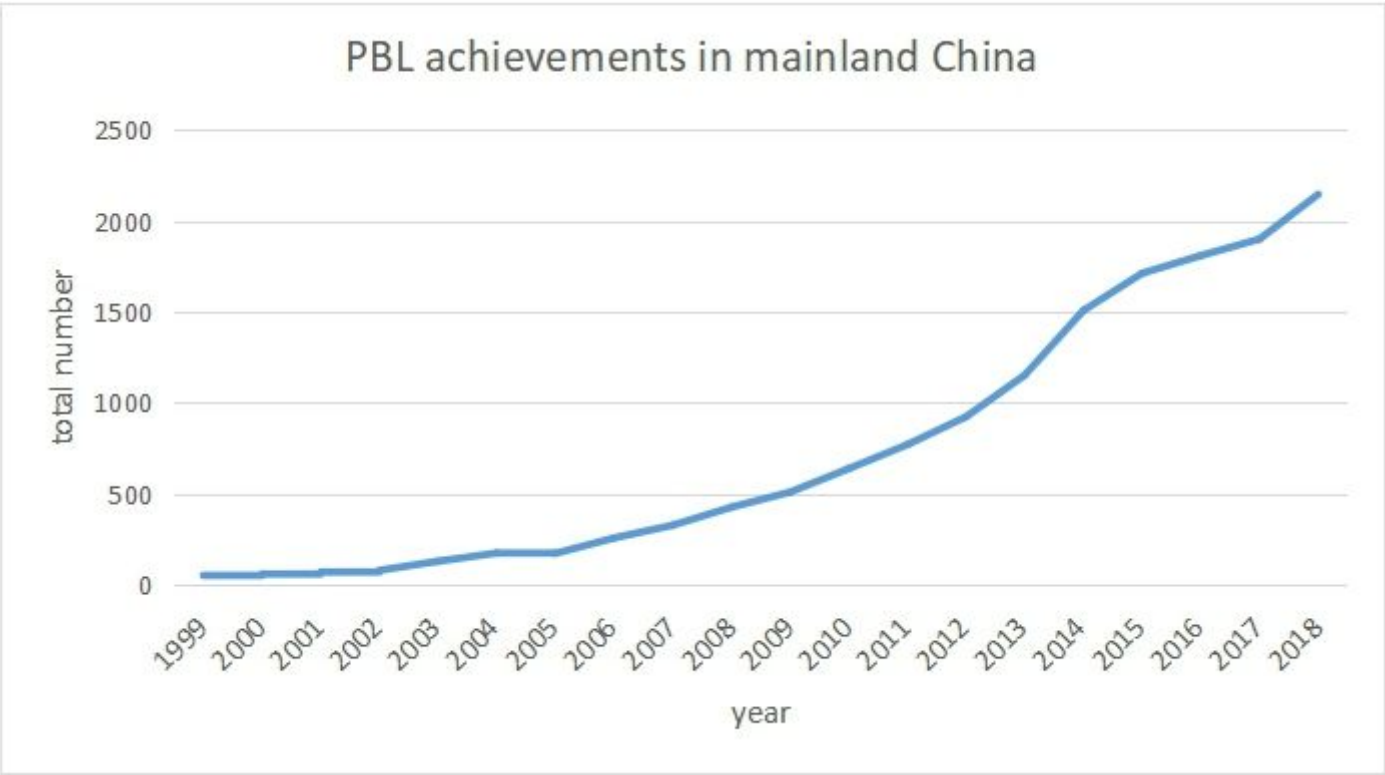


Figure 1

Published PBL-related papers in China The number of published articles according to PBL from mainland China increases with time in this decade. The databases National Center for Biotechnology Information and Chinese National Knowledge Infrastructure were searched using “problem-based learning”, “self-directed learning” and “inquiry learning”, cross-referenced against “medical education” as primary search terms, and constricting the author address as “China”.