

## Medical Education at the Crossroads: Which Way Forward?

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Ann Saudi Med 2007; 27(3): 153-157

Over the last 30 years, several changes have been introduced in medical education including the introduction of new contextualized approaches to instruction (e.g., problem-based learning [PBL]), the use of multimedia to enhance self-directed learning, the use of an integrated curriculum to address basic and clinical sciences, and the introduction of new formative and summative assessment tools that match with the curriculum changes. However, several challenges face medical education and need to be carefully researched. The list may be long and these challenges may vary depending on the needs of local and international health systems, the availability of resources, the vision of medical leaders and how they see these challenges and their impact. This paper discusses a number of challenges facing medical education including the selection of medical students and the validity of selection tools, students' learning skills, what makes a good medical curriculum, and the challenges facing a PBL curriculum.

“**M**edical education at the crossroads” was the title of an article published in the Proceedings of the Institute of Medicine of Chicago approximately 34 years ago by an American physician, Paul Rhoads.<sup>1</sup> This challenging topic emerges every 20 or 30 years to stimulate leaders and educators to assess the direction of medical education, the current needs of the medical profession and what medical education can do to fulfill these needs. Medical education is conceptualized as the complex process by which a medical student is changed from a medical school applicant to a medical school graduate. In other words, from unknowing to knowing, from unskilled to skilled, from layman to professional, from medical student to physician.<sup>2</sup> Although these changes were described by Socrates more than 400 years before the Common Era, it is of interest to note that since the time Dr. Rhoads wrote his paper, several changes have taken place in most medical schools. For example, dissection of the whole cadaver used to be an essential component of every medical curriculum. Discipline-based rather than an integrated teaching approach was used in most schools and teaching was mainly based on lectures. At that time, problem-based learning (PBL)

was only known in two or three medical schools and information technology and medical informatics were unknown. Furthermore, the importance of role models in medical schools was not clearly defined.

Medical education comprises complex processes including faculty selection of students, learning and acquiring information by medical students, teaching by the faculty members and governance by the education unit. How these processes are interrelated to form medical education as we know it today warrants critical assessment.

The aim of this article is to address key changes and critical issues facing medical education including: (1) the selection of medical students, (2) the art of learning, (3) what makes a good medical curriculum, and (4) challenges facing a PBL curriculum. A review of the medical literature shows that these issues are not adequately addressed. However, these issues should constitute a framework for medical educators and should stimulate researchers to target them.

### Selection of medical students

At a pre-conference workshop conducted at the Australian and New Zealand Association for Health

Professional Education (ANZAME; <http://www.anzame.unsw.edu.au>) annual conference, held in Australia in June 2006, the validity and reliability of the selection processes used in the Australian and New Zealand universities were addressed. The workshop covered different tools used in selecting graduate-entry students such as the Graduate-entry Medical Schools Admissions Test (GAMSAT; <http://www.gamsat.acer.edu.au/>) and standardized interviews. Also the selection of school leavers (students who do not have a prior university degree) by using the grade point average (GPA), the Undergraduate Medicine and Health Sciences Admission Test (UMAT; <http://www.acer.edu.au/tests/university/umat/>) and standardized interviews. The workshop raised a number of questions such as do we have evidence that those scoring higher in the GAMSAT and the interview will be better practitioners? Are we selecting students who will be good for the course or students who will be good for the profession and career after graduation? And what is the exact validity of the selection tools?

Medical schools in the USA and the Association of American Medical Colleges (AAMC; <http://www.aamc.org>) have undertaken some useful research addressing these questions. With the introduction of a revised Medical College Admission Test (MCAT; <http://www.aamc.org/students/mcat/>) in 1991, the Association of American Medical Colleges (AAMC) has been investigating the extent to which MCAT scores predict success in medical schools and how that could supplement the predictive power of the undergraduate grade point average (uGPAs). The study found that MCAT scores were better predictors of the United States Medical Licensing Examination (USMLE) Step scores than were uGPAs, and the combination did little better than MCAT scores alone.<sup>3</sup> The probability of experiencing academic difficulty or distinction tended to vary with MCAT scores. MCAT scores were strong predictors of scores for all three Step examinations, particularly Step 1. The author concluded that MCAT scores could replace the need for uGPAs in predicting Step scores. Once again there is no answer to the question whether these results guarantee that students will be better practitioners after graduating.

The question of who will be studying medicine in the future has recently been raised by the editor of *Academic Medicine*.<sup>4</sup> The Editor presents a case on the basis of the AAMC report<sup>5</sup> and argues that the cost and duration of a medical education could deter some potential medical school applicants from pursuing a career in medicine and these factors could affect students from families in lower socioeconomic groups including minority groups,

migrants, and aboriginal students. One of the solutions to this problem is to review the length of the medical school curriculum, which should be shortened by one year. Do we have evidence that teaching medicine in five or six academic years produces better doctors than those taught medicine in three or four years? The experience at McMaster strongly supports the notion of a three-year medical curriculum for graduate-entry students.<sup>6</sup>

How important is reducing the medical curriculum to three years instead of four or five? What is the economic impact of these changes? How important are these changes, particularly when there is a large demand and shortage in the workforce in Australia, the UK, USA and several other countries? What type of curriculum should be used as we reduce the number of academic years? What will be the ideal approach to select medical students to enroll in these courses?

Although we do not have definite answers to these questions and these issues were not addressed by researchers, we do need to start testing possible solutions and finding out what exactly makes a good graduate and how we can use the curriculum and undergraduate training effectively to assess the outcomes and the impact of these changes. Collaboration in this area is vital and we should learn from McMaster's expertise.

Another important issue in this regard is the responsibility of the Faculty of Medicine towards education in high schools and middle years. We cannot get good students just by having good selection tools. We need to invest in students who are willing to study medicine and we should share in the process of their education at an earlier stage. This type of partnership has been reported from several American universities.<sup>7,8,9</sup> Along these lines, over the last three years, we have undertaken a project with 6 schools in the eastern region of Victoria. This project represents a partnership between the University of Melbourne and six schools. The aim of the project is to introduce PBL in the middle years as a teaching tool and assess the usefulness of the project and its impact on students' learning and staff development.

### The art of learning

The effect of the rapid explosion of research publications in the literature over the next 10 or 15 years is well described by Miser. He stated, "If physicians would read two articles per day out of the six million medical articles published annually, in one year, they would fall 82 centuries behind in their reading".<sup>10</sup> One of the main objectives of PBL curricula is to enhance students' self-directed learning and construction of information. With the reduction in the number of lectures and the encouragement of students to deal with uncertainty

and discuss cases with no prior knowledge about case content, the need for self-directed learning becomes essential. However, how do we know if students are really searching for new information and have not asked students' from previous years to give them the learning issues of the cases? Some studies have reported that students' self-study has dropped constantly in the last 5 years following the introduction of PBL and students' preparation for tutorials have been below the desired standards.<sup>11</sup> For example, students tend to focus on the diagnosis rather than using the case as a learning vehicle. Do students really search for information? Should we give them the resources for each week or leave them to find their own resources? What evidence do we have that PBL curricula foster self-directed learning? Should we teach students how to search for new information?

There is evidence that different students have different styles for learning and medical students do use a wide range of learning styles during the medical course.<sup>12</sup> Understanding these needs is essential and course designers should include a wide range of teaching strategies that enables the learning needs of students e.g., PBL classes, seminars, lectures, computer-aided learning resources, online-resources, clinical rounds, practical classes, etc. It is important to consider these key principles as we discuss what will make students' learning more efficient; the following keys are proposed:

**Key 1:** Learning is more efficient when the gaps between theory and practice disappear. The combination of authentic learning and theory instruction should better enable students to relate theory to practice.

**Key 2:** Learning is more efficient when the learning experience has meaning to the learner and the learner is able to construct their new knowledge.

**Key 3:** Learning is more efficient when the learner is able to identify their learning needs and turn their learning practices into an enjoyable experience.

**Key 4:** Learning is more efficient when the learner receives constructive feedback that builds them up, enables them to deepen their understanding of new concepts, helps them to identify areas of weaknesses and strengths in their learning, and guides them to support systems available to them.

**Key 5:** Learning is more efficient when the learner is actively involved in the learning process and is motivated to share knowledge with others.

**Key 6:** Learning is more efficient when the learner is encouraged not just to master knowledge, use it and explore different aspects of new concepts, but also empowered to discover things and learn how to think in a creative way. The university should adopt a culture and learning environment that encourages students to discover new things.

**Key 7:** Learning is more efficient when the learner is able to see the big picture and the fine details, ask open-ended questions, provide justification for their views, weigh the evidence for different hypotheses, use evidence-based approaches and use communication effectively to achieve their objectives.

The faculty needs to invest more time in supporting students' learning. We need students to explore better ways of learning and supporting them on issues such as: How can I read a chapter from a scientific textbook? How can I get the best out of a lecture? How can I become an effective scribe in a PBL tutorial? How can I change my learning to become more strategic and deeper? How can I use a reflective journal to enhance my skills and change my attitude? What actions do I need to do to achieve my goals?

Usually the faculty spends more time on teaching disciplines in basic and clinical sciences, but not on students' learning and how they can develop their self-directed learning.

### What makes a good medical curriculum?

Is there a recipe for course designers to help them develop a good curriculum? What will make a good medical curriculum? Many find the term "curriculum" rather confusing. Different people perceive a medical curriculum in different ways depending on their role, the context in which the concept is used, and their perception of the scope of the term "curriculum". In fact, the term "curriculum" refers to a wide range of images and characteristics rather than a narrow definition. These characteristics may include:

- + Curriculum as a subject matter - a body of content to be taught.
- + Curriculum as learners' experiences
- + Curriculum as goals, objectives and outcomes.
- + Curriculum as learning culture
- + Curriculum as the individual capacity and opportunities to participate.
- + Curriculum as a framework for key concepts and principles.

- Curriculum as skills, attitudes and competencies to be achieved by learners.

Curriculum is also complemented by staff training and development, student support programs, evaluation and feedback, formative and summative assessment and research projects to enhance different aspects of medical education.

A good curriculum focuses on main concepts. It allows students to engage in a number of activities and learn through case scenarios. It enables students to receive feedback and reflect on their learning experiences. It also provides an opportunity for learners to enhance their competency in clinical skills, enables the integration of medical humanities<sup>13</sup> and provides learners with keys for professional success. A good medical curriculum covers patients and community needs, and prepares students for the challenges they will face when they graduate, such as the need for continuing medical education, effective use of medical informatics, contribution to professional development and the ability to pass medical licensing examinations and practice medicine in other countries. The use of clinical cases such as the one mentioned in this article is useful in complementing undergraduate medical curricula, particularly when they are written with specific educational objectives.

### Challenges facing PBL curricula

The effect of PBL on the professional competencies of its graduates has recently been demonstrated<sup>14</sup>; graduates of a PBL course considered themselves to have much better interpersonal skills, better competencies in problem solving, self-directed learning, information gathering, and better task supporting skills. The findings of this study suggest that PBL not only affects the PBL-related skills and cognitive domains, but also the more general work-related skills that are deemed essential in professional practice.<sup>14</sup> Two other studies are consistent with these results and have demonstrated that graduates of PBL schools display better interpersonal skills.<sup>15-16</sup>

However, a comprehensive review by Moust et al<sup>11</sup> raised a number of challenges facing PBL at Maastricht University. Reviewing the literature shows that a number of other researchers have raised concerns about similar issues.<sup>17-20</sup> These challenges could be summarised as follows:

- \* Students tend to deviate from PBL in the analysis of problems and synthesis of information or similar cognitive actions. They sometimes use shortcuts that interfere with the learning process. These changes, if not reversed by their tutors, have serious negative ef-

fects on the learning process and outcomes.

- Tutors in some courses move away from questions that challenge students' thinking process. They replace them with straightforward short lectures. In these courses, reflections about how to proceed in analysing or synthesizing the information become gradually ignored.

- Briefing sessions and tutor guides have become less process-oriented and more subject-matter focused. As a result, the facilitation questions in the tutor guides have become more focused on fine detail and factual knowledge. These changes have affected the discussion in PBL tutorials and turned tutorials to question-answer sessions. Consequently, students in these courses have become interested in gaining a copy of the tutor guides rather than using the tutorial time to discuss key issues in the case, ask good open-ended questions and identify their learning issues.

- Assessment does not match with the PBL philosophy and is more focused on factual knowledge rather than testing understanding, cognitive skills (e.g., generating hypotheses, providing justification, making decisions on the basis of available evidence), interpersonal and communication skills as well as self-directed learning. What tools could we use in the assessment of non-cognitive competencies such as interpersonal skills, empathy, integrity and effective communication?

- Because of an inadequate staff-student ratio, the number of students in the tutorial group has increased in some courses to 19 students per group. This increase in the group size could adversely affect group dynamics, the contribution of students to the discussion, and the learning process. As a result, the process of hypotheses generation becomes less fluent and case discussion more superficial.

These challenges necessitate proper management actions. Directors of medical education should be prepared with preventive measures. For example, they should introduce refresher courses covering these challenges and hands-on facilitation skills<sup>21</sup>, continuous mentoring of PBL tutors and providing constructive feedback, and use the briefing/debriefing sessions as an opportunity to discuss the facilitation processes, how tutors manage difficult situations and how they could enhance their facilitation skills. The use of good role models in PBL courses has been shown to be useful in constructing a learning environment and should be encouraged by leaders in medical schools.<sup>22</sup> Medical

directors who have successfully introduced PBL into their courses should be aware of these challenges and should give priority to the maintenance processes and measures that keep teaching and tutor facilitation skills up-to-date and of high quality.

### Conclusion

Although significant changes have been introduced to medical education in recent years in most medical schools, there is evidence that a number of challenges have not been adequately addressed. These emerging issues/questions may include the validity and reliability of tools used in the selection of medical students. What evidence do we have that PBL curricula foster self-directed learning? What will make a good medical curriculum? What actions should we take to ensure

better learning in the PBL structure? What is the use of good role models in teaching? What tools could we use in the assessment of non-cognitive competencies such as interpersonal skills, empathy, integrity and effective communication? These emerging challenges are not answered by current medical literature and represent gaps in our knowledge that need to be adequately addressed by research.

*The author would like to thank Dato' Seri Professor Dr. Ibrahim Abu Shah, the Vic Chancellor and Dato' Professor Dr Khalid Yusoff, Dean of the Faculty of Medicine, the Universiti Teknologi MARA, Malaysia, for inviting me as a keynote speaker to address the International Congress of Medicine on current challenges facing medical education.*

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