

The establishment and roles of the Medical Education Department in the faculty of Medicine, King Abdul Aziz University, Jeddah Saudi Arabia

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Abstract

Medical Education departments oversee the process of medical education in medical schools and provide many educational services to support, evaluate and thus enhance the educational role of the medical school. Its roles revolve around research, teaching and providing educational support in areas of curriculum development and assessment. This paper provides a brief summary on the emergence of different medical education centers/units/departments around the world from a historical perspective. Special attention will be given to the process followed in establishing the Medical Education Department (MED) in King Abdul Aziz University (KAU). This paper also explores the roles that are currently played within the department with a reflection on documented roles of the medical education departments worldwide. Special emphasis will be given to explore the current challenges faced by KAU MED and proposed suggestions to improve these challenges will also be addressed.

Keywords: Medical Education Department; Role of Medical Education; Research; Saudi Arabia.

Introduction

Early medical education departments, particularly in the United States of America (USA), began as offices of research in medical education. In 1958, Hale Hamm at Case Western Reserve University started the first office of research in medical education, this was followed by George Miller at the University of Illinois at Chicago in 1959,¹ and Edwin Rosinski at the Medical College of Virginia.² In 2000, 61 medical schools in the USA had an office of medical education and their activities had expanded beyond research. In Canada, innovation in medical education with initiatives such as problem-based learning triggered the establishment of medical education departments in Canadian medical schools.³

In 1973, The Centre for Medical Education at the University of Dundee in Scotland was set up to support the undergraduate

curriculum at Dundee medical school and to provide a national resource in medical education.⁴ At the same time, during 1970s, there was an increased government funding that facilitated the reshaping of medical education in Australia and the implementation of successful innovations.⁴ In 1977, the Department of Educational Development and Research was established in the University of Maastricht.⁵ The World Health Organization (WHO) has played a leading role in establishing new medical education units worldwide. In the early 1970s, WHO regional offices supported the establishment of medical education units in countries such as Thailand and Sri Lanka.⁶

Leinster (2003) stated that during the 90s, there was a rapid increase in the number of departments of medical education in UK medical schools.⁷ New departments of medical education were also established in the Far East.⁸

Departments of medical education were established in the Middle East from the 1980s onwards.⁴ The first medical school in Saudi Arabia was established in 1967 at King Saud University. This was followed by the establishment of four medical schools over the span of thirty years (1967 to 1996). Since the beginning of the new millennium; 20 medical schools have been established (14) or planned for opening (6) in the coming years. This will bring the total number of medical schools in Saudi Arabia to 25.⁹

The expansion in the number of medical schools is intended to meet the shortage of Saudi-national physicians, estimated to be less than 17% of the total physicians in 2000 and to serve its population of around 28 million people and millions of tourists and pilgrims who visit Saudi Arabia annually.¹⁰

In 2004, the Department of Medical Education in College of Medicine, King Saud bin Abdulaziz University for Health Sciences (KSAU) was the first, and largest, formally established Department of Medical Education in the Kingdom of Saudi Arabia. In 1975, KAU was established. Many educational initiatives were implemented since its establishment but by 2007 a formal medical education department was established.

The first phase of medical education in Saudi Arabia lasted for over 3 decades. Within this era, the medical colleges followed the same 6-year traditional curriculum, which consisted of 3 years of basic and medical science courses, 3 years of clinical training, followed by a 1-year internship. There were minor differences between colleges in the arrangement of the subjects and disciplines.

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Teacher-centred learning strategies were the dominant form of instruction.

In the early 2000s, a call for change increased among the Saudi medical community, this was due to the raised concerns about the disadvantages of the traditional curriculum. Limited opportunities for more effective student-centred learning, overcrowding of the curriculum, and overemphasis on certain subjects and the inclusion of some less relevant subjects were among the stated disadvantages.¹¹

A vigorous debate began among Saudi scholars about the divergence between what is expected of medical graduates as new doctors and the content of Saudi medical programs.¹² This debate has stimulated a drive to reform the curriculum in most colleges towards a more student-centered learning.⁹

This second phase of medical education is witnessing a nationwide movement toward innovation in medical education programs, with a drive to excellence and recognition by international agencies and institutions. Most of the newly established medical colleges follow more innovative medical programs and have established international partnerships with elite educational institutes. The educational strategies adopted include a more integrated curriculum, a focus on problem-based learning and the development of community-oriented and community-based learning. For example, King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) includes both graduate and undergraduate entry to a problem-based learning program, while Qassim University (QU) follows a problem-based learning, community-oriented program. Older medical colleges have mostly undergone systematic reforms towards a hybrid, integrated, community-oriented, community-based or problem-oriented curriculum, such as at the medical colleges at Jazan University, King Abdulaziz University and King Saud University.¹³

Establishment of the KAU MED

In 1999 KAU Faculty of Medicine (FOM) undertook a major reform of its 6-year undergraduate program curriculum. It established a task force to work on developing a strategic plan to implement a new undergraduate integrated system based curriculum that emphasizes active and self-directed learning.¹⁴

In 2007, KAU FOM reoriented the medical curriculum from a teacher-centered model of teaching to a student-centered model of learning. Didactic lectures and structured classroom time were decreased.¹⁴ In response to these great educational developments, the medical education department (MED) was established in 2007. This establishment is a natural consequence as stated by Harden (2005), who documented that increased public expectations relating to healthcare, societal trends towards increased accountability, educational developments, increased interest in what to teach and how to educate doctors and the need to train more doctors, are some of the factors that affect the establishment of medical education departments.⁴ In the past and for a long time, expertise in teaching was assumed to occur naturally,¹⁵ this concept has been

challenged. According to General Medical Council (GMC), 1993 and Dearing, 1997; the introduction of new educational strategies, increased use of learning technologies, the development of new assessment tools and the increasing complexity of the curriculum have led to the recognition that all those who teach require some background and training in education. Harden suggested that this can be achieved through the MED where it could contribute to the required faculty training and provide training courses in medical education.^{16,17}

Organization and Characteristics of KAU MED

Since its establishment, the KAU MED was a separate entity. Albanese et al. (2001), found four different categories of the medical education unit titles: office, division, centre and department.¹⁸ During a literature search Harden (2005), identified 71 different designations used worldwide.⁴ It is important to stress that having a separate identity helped KAU to maintain a certain position within the faculty structure.

When appointing a leader for the department, the administration appointed a medically qualified assistant professor who has a master degree in medical education to assume the role of the chairperson of the department. Worldwide, many medical education units do have medically qualified directors, but this is not universal. In the North American setting for example, 67% of the directors had a PhD and only 6% had an MD.¹⁸

In his work, Albanese (2001) also addressed the title of the MED leaders. He found that in the North American context, there are different titles for the lead person in the unit but that most are headed by a director.¹⁸ Albanese also found that there are nine different administrative titles for the individual to whom the director reports, but usually it is a medical school dean, associate dean or vice dean.¹⁵ In KAU, the MED chairperson reports to the vice dean of Quality and Development.

Looking at the characteristics of MED leaders, Ramsden (1998) has identified the dimensions of leadership in education,¹⁹ and these dimensions were translated by Harden (2005) into the medical education context. Harden reported that the directors usually have a track record in medical education research. They should foster scholarly habits among the faculty, have a passion for teaching and a reputation for innovation and teaching development. Harden also stressed that it is important that the director can convey a sense of excitement about teaching. Motivating people to do more and setting a challenging climate for academic work is another trait that is needed.⁴ A director also needs to be a fair and efficient manager, thus requires having some management skills. Harden stressed on the importance of having interpersonal skills.²⁰

At KAU, the MED chairperson did provide academic leadership for the department and his responsibilities included fostering faculty and curriculum development and establishing local, regional and international links. One of these links was with the Saudi Society of Medical Education (SSME), University

of Illinois in Chicago (UIC) and the Association of Medical Education in Europe (AMEE). Financial support came from university sources. At KAU, the support from the dean was an essential factor for the MED sustainability. Close communication with the dean's office reflected how much the dean was supportive and enthusiastic about medical education and this was essential for the successful implementation of the planned educational innovations.¹⁸

When it came to staffing the department, and because of the rarity of finding faculty members with degrees in medical education, only one of the first full time faculties was certified in medical education. The rest of the faculty, though also certified in medical education, some were affiliated with other departments. The non-affiliated faculty members provided a diverse team with a range of expertise. The fact that two of these faculty members were also the vice dean of basic sciences and vice dean of quality and development ensured the administrative support for the department.

To ensure its separate identity, the department had to have its own permanent space. At the first year the department was nested in the faculty clinical skills center. Later on, a specific space was allocated to the department. The space included offices for academics and secretarial staff; one faculty meeting room; two large seminar rooms: these areas were equipped with large round tables, data show, and flipcharts; a storage area where records and files of academic work were stored; a print area; and a small library.

Initial Duties of the MED

By analyzing the period after the initial establishment of the MED, one will notice that certain themes were followed especially when it came to the early activities of the department. In 2007, FOM had adopted a new curriculum and this required preparing its faculty to serve its objectives, thus the MED had to focus on faculty development programs. Continuing professional development and continuing medical education were the essence of this early phase. Faculty training was targeted through organizing workshops, short courses, conferences in medical education and offering courses that are accredited for continuing medical education. This is consistent with what was suggested by McLean and Van Wyk,²¹ where they stated that any successful curriculum reform requires considerable staff development. In order to ensure that its academic staff members are committed to the change, proper faculty development should be planned.

Later on, different roles started to emerge and necessitated the internal organization of department. For example in 2009, FOM started to prepare for the Liaison Committee on Medical Education (LCME) accreditation process. This task necessitated the development of the Accreditation Technical Support Unit (ATS) that was linked and served the Main Task Force Committee for Academic Accreditation. Through ATS and its members, the MED aimed to communicate with other departments and curriculum committees aiding in the accreditation preparation process.

The Roles of the MED

Recently, there has been a rapid development in medicine that is accompanied with great increase in awareness among patients. Medical curricula have become more complex with newer methods of curriculum delivery being innovated and adopted, as are new assessment methods. Medical education departments are therefore expected to have the ability to train their faculty members to develop new skills that correspond to these changes. This section of the paper defines KAU MED roles believing that once those roles are clear this will foster growth, prosperity, and advancement of FOM in particular, and KAU in general. This section will not only define the roles but will also shed light on some of the challenges encountered with each role and propose strategies to overcome such challenges.

1. Fostering Research Process Role

In order to be successful, the values, mission and vision of any department should be in alignment with those of the faculty and the mother institution. Creating a culture of research is considered a top priority for KAU. Research in medical education falls into either the qualitative or quantitative tradition.²² When it comes to the research in medical education, the research approaches and expectations should not be identical to scientific ones. For example, there are several factors that affect curricula where it is delivered with variable quality by different teachers.²³ In 1986, Harden discussed the different approaches required for meaningful research in medical education. Concerns have been expressed regarding the quality of research in education and it has been the focus of much recent attention and discussion.²⁴ Association for the Study of Medical Education (ASME) has emphasized on the importance of the contribution of medical education departments towards improving the quality of research in medical education.²⁵

Before 1970, important educational advances were largely adopted by persuasion and politics; since that time many educational changes are more likely to be initiated or accompanied by evidence. The Best Evidence Medical Education (BEME) collaboration was established in 1999 to make more explicit the impact that research findings can have on teaching and learning.²⁶ The incorporation of BEME in educational research represents a tangible recognition of the contributions that evidence based research can make to the practice of education.²³

Globally, the following broad research domains have seen real progress: basic research in the acquisition of expertise, problem based learning, advances in assessment methods, as well as continuing education, recertification, and relicensure.²³ Looking at the challenges facing medical education research in general, Whitcomb (2002), who worked as an editor for the Academic Medicine journal and read every manuscript submitted to the journal during his work period reported that medical education researchers did address many critical questions. Whitcomb also added that too much of the research conducted is focused on questions of only marginal significance, and the scope of the

research being conducted was too narrow. Whitcomb specified that what is most lacking are studies exploring how the design and conduct of medical education programs affect the clinical outcomes produced by doctors.²⁷

This is consistent with what is taking place at KAU, where few researchers were able to research the attributes and effects of the current curriculum. This might be due to the fact that the first batch of students of the new curriculum will graduate in 2012. Meanwhile faculty members should focus more on research projects that assess the curriculum objectives, teaching strategies and assessment methods.

MED should also realize that its role involves acting as a source for its faculty members to keep them abreast of the medical education literature and draw their attention to articles or work, particularly relevant to their own context or to problems that they are currently facing in their own departments. Another important research scope for MED is to address the linkages between medical education and healthcare outcomes. Research studies should be designed to explore the relationships between specific medical education interventions and the clinical outcomes produced by practicing physicians. Almost 35 years ago, the Work Group on the Education of the Health Professions and the Nation's Health, which was established by the director of the National Center for Health Services Research in 1976 published a detailed medical education research agenda that addressed such studies in the *Journal of Medical Education*. In the years that followed, Christine McGuire and other leaders of the medical education community reiterated the importance of conducting studies designed to link medical education to health outcomes. And yet, almost no research results have been published to meet that need.²⁸

It is important to realize that when planning for such research, the MED should encourage research projects that shift away from the education of medical students to the education of resident physicians. Whitcomb did address this shift and recommended the use of studies that are designed to determine how well graduate medical education programs are preparing their residents to deliver high-quality medical care. Researchers should also seek to identify educational interventions that will improve the clinical outcomes produced by graduates.²⁷

Whitcomb stressed on the importance of interdisciplinary cooperation. He stated that cooperation with other disciplines, particularly those in the health services research community who are experienced in conducting outcomes research. Recently, interdisciplinary collaboration has been initiated at KAU. The FOM have formed a research committee to spread the culture of research and encourage interdepartmental collaboration among its faculty.

One of the major challenges facing research in MED is the ability to publish in peer reviewed journals such as *Medical Education*, *Medical Teacher*, *Academic Medicine*, *Advances in Health Science Education and Education for Health*. KAU encourages publications in peer-reviewed journals and consider it a critical component in advanced promotions. The deficiency

of publishing in such journals may be because these publications are not officially linked to faculty appraisal, the complexity of the process and lack of international collaboration initiatives. KAU can overcome such challenges if it linked publishing in peer reviewed journal to promotions and financial incentives. MED should act as a resource center that helps researchers navigate the process of publishing in peer reviewed journals through educating researchers in regard to their obligations as authors and providing information about the steps from submission to publication.

Collaboration with external researchers is also highly needed and should be sought. Since its establishment, KAU planned and collaborated with several reputable national and international institutions. This collaboration lead to forming a network with faculty working in those institutions. This network should be morphed into a form of research collaboration.

2. Investing in Faculty and Staff Development Role

Harden descried medical education departments as service providers. He went further and explained that this involved: helping faculty members in other departments within the institution with aspects of teaching and learning; advising on the development of the curriculum in accordance with best evidence medical education; providing expertise in student assessment and curriculum evaluation; and offering support in the development of instructional materials and student study guides, online learning materials and other resource materials. In KAU, service responsibility as previously mentioned was the first role assumed by the department and might be the main rationale for its establishment.⁴

Until recently in contemporary medical education, faculty members teach as they were taught. No formal training programs for teachers existed. In KAU a great number of the academic faculty joining FOM are not really trained to teach. Hence, the MED has a great responsibility to introduce its faculty members to the principles of teaching and learning. Efforts that aim to aid the professional and intellectual growth of faculty members is considered as efforts that lead to faculty development. Jolly (2002), defined the term "faculty development" as a term that describes the activities undertaken by academic staff in educational institutions. Simply stated, it includes all activities taken up by the faculty in an institution targeting their all round development, personally or professionally; and finally implying the growth of the institution. More recent descriptions include institutional growth as well, and most definitions of faculty development in literature reflect the role of the institution in the process in form of free time or fees.²⁹

MED was keen on investing in faculty development programs by providing workshops and seminars that allow the faculty members to understand the essential skills needed for medical educators. Throughout the academic years, specific emphasis was given to prepare faculty to develop course specification that include defining the intended learning objectives. Through defining these objectives, MED helped faculty members to realize and determine

both the teaching and assessment strategies that they will use in their courses. Meanwhile, several workshops were given to educate the faculty about different teaching strategies and assessment techniques. Having a concrete teaching-learning experience planned by faculty members was a strategy recommended by Ramani (2006) to help medical teachers excel at teaching. Among other strategies suggested by Ramani was the use of BEME, where access to educational research will be made available to faculty members to guide them to the applicability of the recent changes in teaching-learning methodologies.³⁰

To improve the faculty teaching ability, KAU with the help of MED needs to evaluate faculty teaching and the impact of their teaching on students. This step should be planned carefully and preferably done away from administration supervision. MED can help develop a feedback system where faculty members will debrief each others on their teaching. This feedback system could also be carried through a senior-junior mentoring relationship where a senior faculty member can guide the junior faculty member about the intricacies of teaching.³⁰

It is very important for MED to anticipate that a lot of its clinical faculty will not be able to participate in the faculty development workshops. One of the reasons for that is their additional clinical duty.³¹ In order to attract the clinical faculty members, the workshops should match their ambition and should possess high standards. Workshops should be interactive and focus on certain specific problems faced by the clinical faculty members. Solutions for these problems should also be generated through such workshops. Needs assessment surveys could be distributed to all departments to determine the topics/challenges facing these departments. An open channel between MED and other departments is a must. This channel will help the clinical faculty members to share their own problems and thus customized workshops will be developed.

The importance of recognizing different levels of interest and commitment among faculty towards medical education was highlighted by Miller (1969). He emphasized the need to design a series of training opportunities tailored to varying needs.¹ In order to reach the maximum number of clinical and non clinical faculty members, MED might want to consider publishing a monthly/quarterly periodical. These periodicals should focus on issues related to recent trends in medical education, explaining innovations in medical education and provide tips for improvement, updates on changes and successes stories in KAU.

3. Supporting Curriculum Development Role

Curriculum developments act as a cornerstone to any educational program. The curriculum development process requires attention to at least five major elements namely: aims, objectives, outcomes or statements of intent; content; teaching and learning activities; assessment methods; and processes for monitoring and evaluation.³²

Each medical school in Saudi Arabia decides internally,

through curriculum committees, on the details of the curriculum and the educational objectives. Similarly, each medical school independently determines the instructional methods to be used to deliver the curriculum. The spectrum of educational strategies ranges from a lecture-based/teacher centered to problem-based/student-centered approach.⁹⁻³³

At the second half of the twentieth century, a major reform of study was developed: Problem based learning (PBL). PBL was developed in the late 1960s at McMaster University, Canada, in response to the limitations of the traditional didactic teaching methodology which was believed to limit the development of students' critical thinking and integrated learning.^{34,35}

PBL is a method of teaching that uses hypothetical clinical cases, individual investigation and group process. Among many of its advantages, PBL allows students to learn material by applying processes of reasoning rather than memorization of facts. Since its genesis, this teaching method has been the subject of considerable interest and debate. Recently in medical education, PBL has increasingly been adopted as the preferred pedagogy in many countries around the world. This is particularly so in the early academic years where PBL is an effective vehicle for covering the basic sciences. It is frequently claimed by medical schools to be a marker of the degree of innovation in their programs. PBL has influenced medical educators to focus on learning rather than exclusively on teaching and to focus on enquiry-based methodologies.³⁶

The new curriculum at FOM KAU is an integrated curriculum which incorporates the organ-system and partial PBL. The new curriculum was intended to replace the old curriculum, a traditional curriculum, where separate courses were taught by single departments. FOM KAU wanted to provide a learning environment in which competence is fostered not primarily by teaching to impart knowledge, but through encouraging an inquisitive style of learning.

When developing its curriculum, KAU FOM used the outcome based approach. This is consistent to what Harden and others at the University of Dundee argued about. They recommended the use of an outcomes approach to curriculum development where curriculum development proceeds through a process of "designing down" from clear statements of outcomes.³⁷

In 1991, Maison suggested that in order to embark on major curriculum change an institution must have a small core of faculty members interested in promoting medical education and ready to learn or deepen their basic understanding of education. The commitment and enthusiasm of these people ought to be reinforced by the authorities.³⁸ This is similar to what FOM followed in terms of establishing a group of enthusiastic faculty members that acted as a core group for advancing medical education in FOM KAU.¹⁰

MED recognized the importance of preparing a cadre of qualified faculty members to assume the role of PBL tutors. Since the induction of the PBL facilitation workshop program in 2007, substantive progress has been made. By 2010, MED was able to train 50% of its faculty members to attain the role of PBL tutors

in the three years covered by this study. At the same time, MED established a PBL facilitation program that ensures an increase in the pool of available tutors.¹⁴

Conclusion

Though the medical education department at KAU has been established recently, it was able to fulfill some of the internationally agreed upon roles. Room for development and growth is still available and needed. A well planned strategic action plan that includes; professional development, adopts interactive techniques of training, strengthens evaluation and promotes research is required. This plan requires not only efforts from medical educationists, but also from institutional support.

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References

1. Miller GE. The study of medical education. *Br J Med Educ* 1969 Mar;3(1):5-10.
2. Rosinski EF. The Society of Directors of Research in Medical Education: A Brief History. USA, Society of Directors of Research in Medical Education. 1988.
3. Regehr G. Report to Canadian Institutes of Health Research Committee: Research in Medical Education Fund, Association of Canadian Medical Colleges. 2001.
4. Davis MH, Karunathilake I, Harden RM. AMEE Education Guide no. 28: the development and role of departments of medical education. *Med Teach* 2005 Dec;27(8):665-675.
5. University of Maastricht. Department of Educational Development & Research; 2003. Available at: <http://www.educ.unimaas.nl>.
6. Miller GE. *Educating Medical Teachers*. Cambridge, MA: Harvard University Press; 1980.
7. Leinster SJ. Medical education in the real world. *Med Educ* 2003 May;37(5):397-398.
8. Huang J. Medical education and medical education research and development activities in modern China. *Med Educ* 1992 Jul;26(4):333-339.
9. Khalid BA. The current status of medical education in the Gulf Cooperation Council countries. *Ann Saudi Med* 2008 Mar-Apr;28(2):83-88.
10. Mufti MH. *Healthcare development strategies in the Kingdom of Saudi Arabia*. New York: Kluwer Academic/Plenum; 2000.
11. Elfaki EA. Undergraduate curriculum reform in Saudi medical schools. *Saudi Med J* 2000 Oct;21(10):988.
12. Shawky S, Soliman NK. Going beyond the curriculum to promote medical education and practice in Saudi Arabia. *Saudi Med J* 2001 Jun;22(6):477-480.
13. Telmesani A, Zaini RG, Ghazi HO. Medical education in Saudi Arabia: a review of recent developments and future challenges. *East Mediterr Health J* 2011 Aug;17(8):703-707.
14. Al Shawwa L. Preparing Faculty Members as PBL Tutors in King Abdul Aziz University, Jeddah Saudi Arabia. *Med J Cairo Univ* 2011;79(1):185-191.
15. Irby DM. What clinical teachers in medicine need to know. *Acad Med* 1994 May;69(5):333-342.
16. General Medical Council. *Tomorrow's Doctors: Recommendations on Undergraduate Medical Education*. London, GMC; 1993.
17. Dearing R. *Higher Education in the Learning Society: National Committee of Inquiry into Higher Education. Main Report: the Dearing Review; 1997*. Norwich, HM Stationery Office.
18. Albanese MA, Dottl S, Nowacek GA. Offices of research in medical education: accomplishments and added value contributions. *Teach Learn Med* 2001;13(4):258-267.
19. Ramsden P. *Learning to Lead in Higher Education*. London, Routledge; 1998.
20. Davis MH, Harden RM. Leadership in education and the strategy of the dolphin. *Med Teach* 2002 Nov;24(6):581-584.
21. McLean M, Van Wyk J. Twelve tips for recruiting and retaining facilitators in a problem-based learning programme. *Med Teach* 2006 Dec;28(8):675-679.
22. Majumder MA. Issues and priorities of medical education research in Asia. *Ann Acad Med Singapore* 2004 Mar;33(2):257-263.
23. Norman G. Research in medical education: three decades of progress. *BMJ* 2002 Jun;324(7353):1560-1562.
24. Harden RM. Approaches to research in medical education. *Med Educ* 1986 Nov;20(6):522-531.
25. ASME. Improving the quality of research in medical education: report of the workshop held on 12-13 May, 2003, Windsor, UK. Available at <http://www.sbm.ac.ir/Journal?MedEdu/spring2001/Med.education1.htm>.
26. M Harden Janet Grant Graham Buckley I R Hart R, Grant J, Buckley G, Hart IR. BEME Guide No. 1: Best Evidence Medical Education. *Med Teach* 1999b;21(6):553-562.
27. Whitcomb ME. Research in medical education: what do we know about the link between what doctors are taught and what they do? *Acad Med* 2002 Nov;77(11):1067-1068.
28. McGuire CH. Contributions and challenges of medical education research. In: *Research in Medical Education. Proceedings of the Thirty fifth Annual Conference. Academic Medicine*. 1996; 71(10 suppl):S121-S126.
29. Jolly BC. Faculty Development for Curricular Implementation. In *Normal GR, Vleuten CPM, Newble DI. International Handbook of Research in Medical Education*. Dordrecht, The Netherlands: Kluwer Academic Publishers; 2002. p 945-963.
30. Ramani S. Twelve tips to promote excellence in medical teaching. *Med Teach* 2006 Feb;28(1):19-23.
31. MacDougall J, Drummond MJ. The development of medical teachers: an enquiry into the learning histories of 10 experienced medical teachers. *Med Educ* 2005 Dec;39(12):1213-1220.
32. Eraut M. Some perspectives on curriculum development in teacher education. *Education for Teaching* 1976;99:11-21.
33. Alshehri MY. Medical curriculum in Saudi medical colleges: current and future perspectives. *Ann Saudi Med* 2001 Sep-Nov;21(5-6):320-323.
34. Neufeld VR, Barrows HS. The "McMaster Philosophy": an approach to medical education. *J Med Educ* 1974 Nov;49(11):1040-1050.
35. Chakravarty M, Latif NA, Abu-Hijleh MF, Osman M, Dharap AS, Ganguly PK. Assessment of anatomy in a problem-based medical curriculum. *Clin Anat* 2005 Mar;18(2):131-136.
36. Albanese MA, Mitchell S. Problem-based learning: a review of literature on its outcomes and implementation issues. *Acad Med* 1993 Jan;68(1):52-81.
37. Harden R, Crosby J, Davis M. An introduction to outcome-based education. *Med Teach* 1999;21(1):7-14.
38. Grand'Maison P, Des Marchais JE. Preparing faculty to teach in a problem-based learning curriculum: the Sherbrooke experience. *CMAJ* 1991 Mar;144(5):557-562.