<u>Editorial</u>

Future Challenges in Medical Education

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<u>Abstract</u>

There have been many models proposed in the past decade on the best practices in teaching and learning processes, especially in medical education. The main trend is a major shift from tutor-centered system to student-centered learning processes with the aid of information technology and communications, more often called e-learning. The introduction of problem-based learning (PBL) and student centered team based learning SCTL) in the early 80's became a trend which spread like wildfire in most modern medical schools.

The acceptance of these new methodology received different reactions, mainly from the tutors, most of whom were split on whether the need of change was really necessary, asking the main question of "what is wrong with the traditional methods" or "have we produced inefficient doctors through the years of traditional system teachings". It seemed for some time that a significant number of older generation tutors were much more comfortable with the methods they were used to.

Considerable curricular changes were made by many medical institutes to implement the student centered learning system. This approach, however, necessitated the training of tutors and the creation of a learning environment, which was later found not to be too easy. The major consideration of a shift in techniques of teaching learning processes is the understanding of the trends in the younger generation of the Y2K century. A generation which prefers to express rather than listen, to research and find rather than being spoon-fed and a generation where knowledge is always available whenever they are connected to the internet. Hence the change of the role of tutors to be facilitators rather than content providers was seen to be more acceptable to the new generation of students.

The advancing information technology (IT) has been able to provide the necessary tools to achieve that objective. The students may be granted the opportunity to have more freedom in selecting their learning material and to enjoy a degree of distance-learning. The consequence of applying IT in medical institutes would, probably, enforce the trend towards moving to a student-centered learning environment, inducing hesitant tutors to become more compliant with the change. The future medical curriculum is anticipated to be more student-centered, more modular, more integrated, more PBL or SCTL-oriented and more inter-institutionalized, with less memorizing and with more learning about learning. In addition, medical education as a whole at least in part, would be, performed at distance. The future medical tutor may have to be more PBL-oriented, more qualified in learning strategies, competent in small group (probably single-student) learning, more of a 'mentor' or a 'facilitator' than of a 'teacher', able to train students at higher cognitive levels rather than being an 'authority' in its field. He has no choice but to be fluent in IT, and interactive with learning via other learning-collaborating institutions.

<u>*Key Word:*</u> Medical education.

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Introduction

For centuries, medical education has been based on apprenticeship and 'teacher know all' and "students only know what the teacher teaches" principles. The teacher had all the knowledge and only he knew the 'secrets of the profession'. He was the source of and, at the same time, the resource of the medical educational process. The teacher was the one to decide 'what' and 'how' to learn. Medical education and teaching learning processes in many institutions have been and may still remain to be individual centered. The objective of medical education was to make the student acquire an essential body of knowledge (in the form of facts, concepts and skills) and to train him on how to use that knowledge effectively in managing health problems (2). This however has depended on the existence of people of whom the contents exist. At present, with the rapid and vast expansion of medical knowledge, it has been becoming increasingly evident that it is not possible to teach everything. Even if such a goal were to be attained, the rate of change in medical knowledge is so high that it would make taught knowledge out-of-date within a few years after graduation. It is therefore very necessary for a review in the methodology of teaching learning processes in medical education.

Innovations in Medical Education Strategies

In the early nineties of the past century, the call for a change on the traditional system of medical education formed a wave in most western medical schools. A massive review on the effectiveness of the traditional system and the dependence on tutors (who were getting much less compared to the high numbers of students) was the main topic in most medical education meetings. The number of students was also a major limit to having a single centre of education and the need have distributed and long distance learning became a major necessity. New-sprung educational strategies started to evolve. The central theme was to move towards more 'student-centered' and distributed (multiple sites) medical education. The new generation of students is seen to be less able to concentrate on one way communication and were noted to be more adventurous and "eager to self discover" population and it seemed most appropriate to address them according to their preferences.

Many schools reviewed the long duration (mostly up to six years of undergraduate course) of delivery of learning materials and psychomotor training and felt that there could be a lot of innovations which could make the course relatively shorter and more practical towards the needs of the profession. The availability of contents via the rapid development of information and communication technology (ICT) was seen to be the best enabler for changes and progress in medical education. Novel concepts such as problem-based learning (PBL) and integrated curriculum started to spread among various medical schools, and a new era in medical education started. The new shift to student-centered medical education led to formulating curricula that limited pre-clinical knowledge which is only relevant to clinical practice. The curriculum was structured around meaningful entities such as organs/systems and in many institutions PBL was adopted on the understanding that it would promote students' intrinsic motivation and reasoning skills and to develop self-directed and independent learning aptitudes. PBL as a new educational strategy was envisioned as the 'tool' by which medical students learn material relevant to their future practice in a complemented/integrated manner and would better prepare them to continue acquiring advances in medicine after graduation (18).

To achieve the objective of introducing these new concepts, curricular changes as

well as reform of the teaching environment were required. What was really required was a change in the learning experience of students. Such demanded changes in tutor expertise, resources as well as in teaching/learning modalities. Many schools managed to make the appropriate changes. In some cases, however, the new concepts were applied to curricula without fully appreciating the goals for which they were originally introduced. However, the required changes became, in many instances, the aim of reform when they were intended to be the tools of change. Ron Harden, one of the authorities in the field wrote, "When applied they all too frequently represent only a thin gold veneer to a curriculum package."(8).

If the methodology was to undergo major changes, the basic principle however, should not. The vanguards of medical education formulated a "safety guard" which was to determine that the outcome of a well trained, competent and safe medical practitioner will not be compromised by these changes. Thereafter the need of having a clear "outcome based" curriculum is emphasized in every innovation in the learning systems. A well designed curriculum should "begin with the end in mind" i.e. the question of "what is our end product?" should be clear even at the beginning of the course. With the outcome clear in every part of the course, the teaching learning activities can be tailored to have objectives and core contents leading to achieve the outcomes. Methods and contents of assessments can also be referred to the outcomes at various levels of competency.

Most schools will include aspects of competency in the cognitive, psychomotor and psycho-social aspects as major outcomes of the course. However the spiritual, affective or soft skills aspect of character, leadership, interpersonal and communication skills; though may be embedded in the curriculum, are seldom included explicitly as a major expected outcome. The fear of subjectivity in assessment of the soft skills and inability to stop students' progression only based on character after a high score in the academic marks is a major hindrance to having these components as core curriculum content. A review on these aspects is long overdue as the major complaint against healthcare providers includes inability to address their patients as human beings with human feelings. The tendency of treating patients as mere infirm which need "repair works" and "a mechanical procedure is needed" is becoming rampant. Never ending complaints from healthcare givers of poor salary and poor working conditions reflects on the lack of spiritual self reflection on the nobility and selflessness of the profession, not included in their training. This aspect has clearly been neglected in all the innovations of the curriculum.

Trends Influencing The Future of Medical Education

Among the first schools to undergo these innovations and implement problem based learning (PBL) strategies include the schools of McMaster (Canada), Maastricht (Holland), Manchester (United Kingdom) and Newcastle (Australia). They were among the first medical schools to adopt PBL as an educational strategy. The principles used in these schools establish a good framework for shaping a new system of medical education. The cornerstone of the new educational philosophy was to offer relevant-to-practice learning material, which is delivered in an integrated way in a setting resembling that of real practice i.e. medical problems. In order to maintain the principles of medical education, the outcomes of the curriculum were clearly spelled out. The main educational objectives were to make students able to:

a. be lifelong and self-learners
b. acquire basic knowledge through studying medical problems

c. use learned knowledge to solve new problems
d. communicate effectively
e. work in a cooperative/team-based manner
f. practice evidence-based medicine
g. utilize all form of information and communication technology (ICT)

At present, there are more than 100 schools in developed and developing countries have adopted to the use of PBL and variants of PBL-based curricula with principles similar to the above. Such a trend may indicate that PBL is envisioned as one of the ways forward in developing future medical education (7).

Present Pressures

There are three major influences that have affected the trend in medical education. The first influence is the increase in the level of health awareness among patients. Patients of recent times will usually begin with consultation with the internet, for information about their ailments before consulting a physician. The healthcare provider will need to satisfy all their queries before being able to initiate any treatment. Therefore, whenever a healthcare provider is not up to date and appear to be less knowledgeable than the patient, he will not be able to secure the trust of his patient.

Medical education needs to be tailored to produce graduates who are able to be constantly updated and have the ability to search for information whenever necessary and wherever they are. Seegrist (13) states that the characteristic features of the medical profession "are determined to a large extent by the attitude of society towards the human body and by the valuation of health and disease". Hence, medical education is not obliged primarily by the requirement of knowledge, but by the requirement of the medical profession (3). Therefore, Bloom concluded that, medical education is at the confluence of

three forces: the medical sciences, the medical profession and the society.

The second major influence to the quality of healthcare providers is the demand of a more personal and human communication and touch while providing care. The times when doctors are the "all knowing" and patients are only to obey commands and instructions and allow them to be treated are over. Every educated patient expects to see a caregiver who is passionate, good communicator and convincing in their competency. The availability of choice in treatment allows patients to look for alternatives whenever they are not satisfied with a particular doctor. Therefore, soft skills training, interpersonal communication and affective domain training must now be an integral part of medical education. Medical councils in many countries have emphasized that the quality of healthcare must include "customer satisfaction" and ethics of medical practitioners are now being a major element of concern in the healthcare system.

The third major influence is the appropriate use of technology in healthcare. Many new diagnostic and therapeutic methods have been introduced in the management of patients. These technological advances are subject to appropriate use and abuse. Many a times, when a healthcare provider is purely influenced by trends and advertisements, or peer group influences, treatment strategies may be misled to inappropriate use of technologies. Therefore, adequate exposure to the assessment on cost benefits of the use of technologies has to be included in the teaching learning programs. On the other hand, the ability to practice safe and competent medicine in situations where there are inadequate facilities will also need to be trained. A healthcare provider who is too dependent on highly sophisticated instruments will find himself useless in a rural healthcare system or in

times of disaster. The preparedness of a healthcare provider to perform competently in adverse situations has to be incorporated in their training as disasters and warfare are being a common occurrence of late. A resilient well trained graduate will find him very useful and relevant in all these situations of need.

At present, there are also other factors that can be considered as subsidiaries to the above-mentioned forces and are concurrently taking place on the medical educational arena. The most important are the expansion of medical knowledge and the new trends that are being witnessed in medical practice. Both would largely influence the pattern of future health care delivery (14). Other factors that may interplay to induce pressure on the traditional medical education system include: the increasing number of students whose educational awareness is raising progressively, the global interaction among institutes/students that is becoming a daily activity in many places, and the escalating cost of education.

The pressure of these factors has been already recognized by three international bodies responsible for the advancement of medical education worldwide, namely the World Federation of Medical Education (WFME), the General Medical Council in the UK (GMC) and the Association of American Medical Colleges (AAMC). It led these bodies to call for a change in the traditional medical education system (1,6,16); a change to a new system that would better prepare students for the future health care needs.

The Impact of Information Technology (IT) on Medical Education

Advances in computing and communication made a revolution in IT that subsequently led to the emergence of a new field in medical education viz. medical informatics (MI). MI is defined as "the rapidly developing scientific field that deals with resources, devices and formalized methods optimizing the storage, retrieval and management of biomedical information for problem solving and decision making" (12). The AAMC (1) states that the argument for MI being a central feature of medical curriculum rests in the following premise: "To support health care, life-long learning, education, research and management, medical students should be able, at the time of graduation, to utilize biomedical information for: formulating problems; arriving at strategies for solutions; collecting, critiquing and analyzing information; taking action based on findings; and communicating and documenting these processes and the results. "The impact of IT on medical education would not be limited to the above. IT is expected to remodel medical education in more than one aspect. Let us first speculate on the future impact of computing. Even with today's computer ability, virtual reality can imitate seeing, touching and smelling. In a few years computing would be very different from now, just as it is different now from a few years ago. Future computers will have a strong visual input, recognizing not only the user, but also many other things in the field of view.

Users would communicate with the computer in the same way as they do with human beings, i.e. through words, body language and gestures, making it unnecessary to learn computer skills. Users would be, indeed, hardwired to the computer. Such advanced technology may, supposedly, allow the medical student to learn physical examination, surgical and other clinical skills, let alone acquiring facts and concepts, with less aid from the teacher or even the patient. Startlingly, the computer in the future would be a teacher of skills that were previously thought of as unimaginative to learn but from a 'master'. The call for more 'student-centered' medical education would be, undoubtedly,

much enforced with the inevitable use of MI through IT. Similarly, the learning objectives would be directed towards higher cognitive levels such as analyzing and applying information, problem-solving and making decisions rather than towards factual recall. Ultimately, the traditional role of the medical teacher as the 'source' and the 'resource' of information would largely recess, and a new role would be defined.

A Futuristic Plan for Medical Education

Reigeluth (11) depicted a comparison between the present system of education and the future analogue. The future system that is suggested by Reigeluth (11) explicitly indicates that future medical education would be exceedingly different from present system and in many aspects (Table 1). The future of medical education will most likely depend on the availability of information technology facilities and the ease of communication between a particular site and other parts of the world.

The effect of computing would, for the most, take place on the curriculum content, learning objectives, learning modalities, educational resources, as well as students and tutor roles. The earliest changes would, presumably, be seen on curriculum objectives and content and learning modalities. The availability of information via the World Wide Web and easy accessibility via mobile devices such as smart-phones and i-phones or lightweight palm/laptops will make medical education available "anytime and anywhere". The effect of advanced communication systems would probably facilitate globalization of medical education. The routine and regular inter-institutional contact made easy by advanced technology would eventually lead to a worldwide similar curriculum content, similar student's 'learning experience' and a similar' process of assessment. The need of a large localized space for teaching is being made less a critical requirement. There are already medical schools with over 200 campuses spread within a radius of 200 miles, mainly for the need of maximizing the use all the hospitals and healthcare facilities within the area. Twinning within branches of a university or between similar universities are made much easier and practical via the excellent communication using up to date technologies, even though a degree of variability between different schools is expected, which would, obviously, be dictated by a particular local environment.

There is hope that student exchange and transfers between healthcare centers of training and medical schools will be made

Table 1: A comparison between some of the features of the present system of education and the future analogue as modified from Reigeluth (11).

	Present System	*Future System*
Relationship	Adversarial learning	Cooperative learning
Delivery	Group based content delivery	Personal learning plans
Environment	Classroom	Learning centers
Objective	Memorization of facts	Thinking, application, problem-solving skills
Rating	Grade levels	Continuous progress
Contents	Covering the content	Outcome-based learning
Assessment	Norm-referenced testing	Individualized/Performance-based assessment
Tutor	A dispenser of knowledge	A coach or facilitator
Skills	Reading, writing skills	Communication skills
Tools	Books as tools	Advanced technologies as tools

easy and credible in the future and a world of medical schools without boundaries will be a reality.

Future Challenges

The main future challenges can be put in three main domains: curriculum development, tutor development and restructuring the learning environment.

Constant review and development of the curriculum

The future should witness that a constant, frequent and robust review of the medical curriculum based on constant feedback will not be a major exercise. The availability of content and system of the curriculum in soft copy and ICT, web based system will enable tremendous amount of improvement to be done quite easily. Online review and feedback can easily be made and information from students and stakeholders can be made available at all timed. Based on these, reviews and improvements can be made as often as seem necessary. Developing the medical curriculum will take place in light of future role of doctors, the student styles of learning and the available resources especially that is available online. As elaborated earlier, the outcome based curriculum is now being practiced in most modern schools. The main determinant of the curriculum will answer the question of "what is the end product of the course?"

The AAMC (1) identified five major roles for the future doctor as to be life-long learner, clinician, educator/communicator, researcher and manager. If these roles are accepted, then the curriculum should be steered in this direction. Accordingly, present curriculum content should be rigorously revised. The GMC (6) suggests that there should be less emphasis on the basic sciences and more on ethics, communication skills, and social sciences, with the earlier exposure to patients and their families. An example to urge such a move is what was mentioned by Weatherall (17) when he made a comment on teaching anatomy for two years to medical students. He stated that "few people would disagree that two years spent in the company of a corpse is not the most imaginative introduction to a profession that more than any other, needs to develop the skills of talking to distressed people."

Training future doctors should be directed towards meeting the multifaceted need of the patient, not only medical sciences. The future role of doctors may be radically redefined in such a way that may even supersede the expectations of the GMC and the AAMC. Lipman (9) even suggested that general practitioners might not have a clinical role altogether in the future. The general practitioners of the future, he stated, may be "...highly skilled medical generalists and information specialists..." The general practitioner, he believed, will play "a key role in helping patients makes complex decisions about diagnosis and management..." Everything else, he stated, "...will be done by nurses, technicians and robots." Indeed, in some European countries, pharmacists, at present, are granted the responsibility of managing chronic disease by national health authorities (4).

In addition to the future role of doctors, there are two other determinants of curriculum development, namely student learning styles and available resources. The future generation of students will appreciate "experiential learning" rather than rote learning styles of the past. Memorizing will be seen as a nuisance as information is now available in milliseconds via communication tools. Networking and team based learning will be seen as more enjoyable and practical than solitary thinking and "mugging". Discovery through research and fact finding activities will be the choice of the future generation.

For a curriculum development to be realistic, it has to balance between its inspiration and the feasibility of its delivery. Defining students learning styles and competencies is an essential component for selecting the educational modality, which would be used to deliver the content. Similarly, tailoring these to the available resources should also be intersected. Three main features would tinge the future medical curriculum. It would be integrated (basic-to-basic basic-to-clinical sciences and clinical-to-clinical both vertically and horizontally) and delivered in units (modules) with PBL being utilized. The rationale behind this assumption is that, integration reduces fragmentation of the curriculum, motivates students, improves effectiveness of teaching, attains higher level learning objectives, promotes staff collaboration and rationalizes resources (8). That is how integration appears to be a must for the future. An integrated curriculum prerequisites 'modular' approach; hence the curriculum has to be delivered in 'modules'. The PBL-based delivery would be needed to make student 'learning experience' relevant to real clinical practice.

A new education system requires a new method of assessment. The traditional educational system is not designed for 'learning'; rather it is designed for 'selection'. To emphasize learning, the future system must no longer hold time constant and allow achievement to vary (11). 'Ranking' by normative assessment cannot be considered as the best evaluation tool of the lifetime-learner. Instead, 'achievement' measured in the form of 'attainment' of a particular number of 'competencies' would, probably, be the future assessment tool. 'Higher level of attainment' rather than 'higher score' would formulate the basis of selection allowing time for learning to vary from one student to another. This, in turn, would lead to more 'individualized' learning.

Training and development of futuristic tutors and teachers
The tutor was, is and will be the backbone of the educational process. The availability of content and information does not nullify the role of tutors. However the major role of tutors will change from the content provider to a guide or a facilitator. There is a popular quote that will touch the hearts of any tutor of the future. "A mediocre teacher tells, a good teacher explains, a superior teacher demonstrates but a great teacher inspires..." The role of a tutor will move upwards in the blooms taxonomy, to inspire students to excel in lifelong learning and for every student to be independent learners do not at all reduce their role in education.

In the traditional educational systems, there is usually, a form of 'resistance' among teachers who use didactic teaching modalities to move towards a student-centered system. In the future analogue, it would be imperative for the teachers to accept the fact that their role as 'teachers' is not needed as much as their role as 'facilitators' and 'mentors'. The future challenge that tutors would face is how to make the student as a self-reliant 'learner' more than how the tutor prove to be an authority dispensing information to students; and how to enhance students aptitudes towards higher cognitive levels more than training them on factual recall.

Development of tutors should be based experiential learning, small group work, and training on PBL (10). This requires them to learn more about educational strategies and small group/individual learning so that they become confident and component in delivering the curriculum. The tutors should become fluent in using advanced ICT products and be active in collaborating with other institutions. Tutor development should be a continuous process not limited to the start. In fact, for the tutor to be successful in coaching his

students to become lifetime-learners, he himself should become one.

Creating a conducive and progressive educational environment

To meet the new curriculum objectives and to encourage students to mature as a self-learner and the teacher to become a facilitator, it is crucial to prepare the educational environment for these goals. Students and teachers, rather 'learners and facilitators', should have a 'comfortable' access to various ICT products and technologies. Classrooms and lecture halls may be replaced by learning centers, and collaborative programs with other institutions may become the norm.

Learning would not be restricted to a particular time, site or institution. Distance-learning and collaborative inter-institutionalized or distributed teaching learning activities may be adopted as the most cost-effective means of curriculum delivery. As a result, the 'learners', the 'facilitators' and their institute would be exposed to the world at large not only in curricular delivery but also in assessment. This exposure would lead to worldwide rising of educational standards. If this is practiced, the product (doctors) will have a more standardized high quality outcome and better qualified to practice worldwide.

Spirituality in medical care

Believing that everything can be explained with science and logic has always been met with major challenges and questions. While making the best effort in finding "evidence" and proof for all conditions, one will not deny that there will always be moments that reflects that the cure of diseases come from The Ultimate Being, the Creator of mankind. Between imposing religious belief and making medical education universal and acceptable to all race, creed and religion, there is a

clear need for all those who believe in God to appropriately address His presence and power to cure all diseases. It will therefore be essential and important for the medical education curriculum to integrate training of spirituality and godliness in all aspects of the training, throughout the curriculum, horizontally and vertically. This is a component that has always been and will always be relevant to medical education for all healthcare providers.

Conclusion

Producing a better medical practitioner who will be relevant and competent for the present and ready for the future should always be the objective of medical education. Total dependence on knowledge and content must be seen from a new angle. Knowledge is either a mountain of facts or a constantly flowing stream of theories and new concepts. The present educational system is failing to balance between these two approaches. "Unless we begin to confront this imbalance soon, our future physicians and researchers will not be adequately trained for the emerging health care environment." (5). The present educational system, as a learning-experience or in its objective is not ready to meet the future needs of medical education. The new ICT has not only made a new educational system necessary but has also made it possible (11). The question to be asked is how much involvement and commitment do we wish to have? The consequences of realizing these changes and progressively adapting to these changes too late may result in significant incompetency in the future healthcare providers, some of whom may be responsible for the care of our present generation. Surely we do not wish to be deprived from the best of care. For this we need to invest and progress now or face the consequences in the future.

References

1. AAMC, http://www.aamc.org. 1999.

2. Barrow HS and Tamblyn RN: Problem-Based Learning: An Approach to Medical Education. Springer: New York, 1980.

3. Bloom SW: The place of science in the health profession. Med Educ, 29:76-78, 1995.

4. BMJ News: BMJ, 318:1308, 1999.

5. Detmer DE: Knowledge: A Mountain or a Stream. Editorial, Science, 275:1859, 1997.

6. General Medical Council: Tomorrow's doctors: Recommendations on undergraduate medical education. London: Keith and Reed, 1993.

7. Hamilton J: Training for skills. Med Ed, 29:83-87, 1995.

8. Harden RM, Sowden S and Dunn WR: Educational strategies in curriculum development: The SPICES model. Med Educ, 18:284-297, 1984.

9. Lipman T: Is there a clinical future for the general practitioner? BMJ, 318:1420, 1999.

10. Maudsley G: Roles and responsibilities of the problem based learning tutor in the undergraduate medical curriculum. BMJ, 318:657-661, 1999.

11. Reigeluth CM: The Imperative for Systemic Change. In: Systemic Change in Education, ed by NJ Englewood Cliffs, Educational Technology, 1994.

12. Shortliffe E: What is medical informatics? http://camis.stanford.edu/whatisinformatics.htm

13. Sigerist HE: The Physician Profession Through the Ages. In: Henry Sigerist on the History of Medicine ed by F Marti-Ibenez, p 3 MD Publications, 1960. (Cited in Bloom 1995).

14. Tanira MOM: Thoughts for the future. Editorial SQU J Sci Res-Med Sci, In press, 1999.

15. Vernon DTA: Attitudes and opinions of faculty tutors about problem-based learning. Acad Med, 70:216-223, 1995.

16. Walton H: Proceedings of the 1993 world summit on medical education of the World Federation for Medical Education. Med Educ, 28:1-17, 1994.

17. Wheatherall DJ: The Inhumanity of medicine. Editorial BMJ, 309:1671-1672, 1994.

18. Schmidt HG: Personal communication during summer course on Problem-Based Learning. University of Limburg, Maastricht, the Netherlands, 1991.

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