

Professional achievements in medicine: Too many unresolved questions

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From pre-enrollment assessments, through medical education and post-graduate training, medical schools are trying to educate and facilitate the development of their students so that they become exemplary experts in their future fields. Yet despite the long history of medical education, scientific research has failed to provide correlations between medical schools' education processes and achievements of their students. Among the greatest obstacles for this is the primary definition of achievement, and, subsequently, its characteristics and measurement. In this review we present current findings related to medical education, discuss their implications and provide suggestions for medical schools on how to get the best out of their students while facilitating their personal growth.

Key words: Medical student, Collaborative learning, Social negotiation skills, Non-cognitive skills.

Introduction

The progress of all sciences, including medicine, lies on the achievements of creative and productive individuals and on dedicated, hard and demanding every-day work of those involved in the endeavor. In the last few decades societal expectations of medicine have greatly risen, especially concerning the quality and efficiency of medical care,

and the professionalism, competencies and knowledge its providers must possess (1). In order to both meet the existing standards of care and to improve upon them, societies, in the milieu of ever-growing population and its demands, are struggling to organize and finance medical infrastructure and to train professionals that will be able to meet and surpass its goals. The public often perceives

the quality of medical professionals to be representative of the entire health care system of a state (1), and the quality of medical education to be the main determining factor of their quality. However, the definition of a quality physician and the achievements on which he or she is rated as such are incredibly diverse, which makes specific prerequisites and long term outcomes of medical education, along with their measurements, an ongoing debate since the origin of medicine itself.

Medical students are selected on the basis of their pre-medical achievements and enrollment testing, after which they become distinguished by their achievements in medical school, and ultimately by their professional achievements (Figure 1). However, in most countries long-term monitoring of these achievements and their indicators is not conducted and the majority of the students are never followed up after their graduation. This leaves firm scientific correlations between the pre, during, and post medical school achievements lacking in their credibility. Furthermore, almost no research has been conducted on the cultural, political and economic factors of physicians' educational environment and their influence on the success and achievements of physicians.

Student Admission

Necessitated today by the excess of applications to medical schools, pre-enrollment assessments are meant to identify the best applicants so that they could be made best physicians. Today's most prevalent pre-enrollment assessments are knowledge-based tests in biology, chemistry and physics. These tests have been proven to moderately predict those who are most likely to finish their studies on time, and be among the highest scoring students and residents in their formal evaluation tests and aver-

age grade scores (2). However, their ability to correctly predict achievements beyond residency, or achievements of those who choose other professions following their medical graduation has not been proven. In other words, pre-enrollment tests only predict scores of other tests similar in nature. Yet they say nothing of physicians' honesty, integrity and conscientiousness. Or of their empathy, conversational skills and humanness, which patients value most (3).

In 1971, Price et al. after 20 years of research, proposed 87 positive and 27 negative characteristics which predict future physician's performance (4). In 1985, using these traits, Sade asked his colleges to rate those which they feel make a "superior" physician and to mark those that can be taught in medical schools. His findings identified the existence of 20 essential traits that cannot easily be taught, but should be the focus of pre-enrollment assessment (5). We have listed these traits in Table 1 to stress the qualities that can be said are valued universally, but are extremely difficult to both measure and compare objectively.

Table 1 Top twenty qualities of a Superior Physician by Sade et al. (4)

1. Emotional stability	11. Decisiveness when facing uncertainty
2. Unquestionable integrity	12. Conscientiousness
3. Honesty	13. Insightfulness
4. High enthusiasm	14. Dedication
5. Above average intelligence	15. Foresightfulness
6. Genuine care for the ill	16. Willingness to learn from others
7. Logical thinking	17. Alertness
8. Empathy	18. Adaptability
9. Innate idealistic motivation	19. Availability
10. Ability to inspire confidence in others	20. Creativity

In 1978, the *Newcastle Experiment* began in Australia. It involved admission of half of the students based on academic marks only, and half based on personal qualities tested by psychometric tests and an interview (6). After 9 years of students follow up, the Experiment showed that those students with highest interview scores had a greater likelihood of completing their studies and graduating with honors. However, it is important to note that the half admitted for their interview scores, were invited for an interview only after they passed the knowledge-test threshold. The Newcastle Experiment was then followed by a study on interns' performance which showed that those previously admitted for their interview scores showed the same clinical competence as those selected through their knowledge-test scores, and yet they displayed higher scores in personal characteristics deemed desirable for a successful physician (7). In 2011 Haight et al. found communication skills, extroversion, conscientiousness and empathy to be the best predictors of clinical achievement (8).

Studies which followed personality traits of medical students over decades after their graduation found them to be stable through time (9). Those students, who during their education had high self-respect, were easy to adapt, were open to new experiences, had good relations to their parents, lower anxiety and depression, also felt good in their own skin as physicians in their middle or senior age. On the other hand, those who had lower characteristics previously mentioned and who experienced mental health issues during their studies displayed higher levels of burnout, substance abuse and suicide (10). Therefore it can be said that like knowledge-based tests, personality tests show considerable correlations with similar future personality tests.

Research on the predictive value of letters of recommendation is inconsistent. On one hand, due to the tendency of mentors

to be loyal to their protégées, letters of recommendation had very little influence on the job acquisition process in the USA and Great Britain (11). On the other hand, they were found to be the best predictors of residence's performance in certain medical specialties (12). As a pre-assessment method, however, they were never assessed as a sole or determining criterion.

Education during Medical School

Medical education most often stands for a transfer of scientific knowledge and skills aimed at the specific goals and competencies, and ultimately toward providing treatment. Such a process is perhaps better deemed as "training" than true "education" (13), and is found in many of today's medical schools' programs (14). True education would have to go beyond the skills, competencies and knowledge required by a certified profession, and educate reason, develop character, values and virtues, and enable realization and fulfillment of students' destiny (15). This however leads to the question of what should be assessed and how. The assessment of students' knowledge occurs throughout their study, yet the assessment of their traits, empathy, behavior, and professionalism does not, or rather is "included" in the former. In the end, though, this leaves students and their future employers without a precise description (mark) of the students' traits. Among the reasons for this is the problem of objectivity of such measurements, and the belief in the long-term development of personality. And so true education most often forms the *hidden curriculum*, the underlying ideals behind the training processes (16). Should it though, is the question that the medical schools must answer openly.

Students' critical thinking skills are in certain countries assessed as a prerequisite for medical schools through verbal reason-

ing tests that are taken alongside knowledge-based tests. These tests most commonly measure comprehension and reasoning based on a written text whose area of topic is outside the presumed person's familiarity. After the initial testing, development of critical thinking is pushed aside by over-packed curriculums and necessities of following protocols. Equated with clinical reasoning and scenario-based problem solving, its development often suffers in its narrowness of subject (17). It is too often strictly separated from the artistic, speculative, and their inquiry methods, and can lead to emotional detachment of students (18). Despite the positive influence that primary schools have on critical thinking development (19), and proven positive correlation of verbal reasoning tests with communications skills assessed by medical state exams (20); the development of critical thinking during medical education, and the influence of the medical school on the same, has still not been researched. In the last two decades, however, medical education has begun to consider and accept the humanistic perspective, self-awareness and reflection, emphasized by the field of medical humanities, as necessary for the development of critical thinking and ultimately success in medicine (21, 22). As physicians are more and more dependent on others in their work; and are often members of larger teams and constantly interact with recipients of their services, more and more emphasis is put on the development of their capacity to evaluate and self-reflect on their own emotional needs. Including on any suggestions, remarks and reprimands they receive from their colleges, patients and students, and on being able to provide the same to others.

The increase of knowledge and skills which the medical schools are trying to pass on, along with the rigorous methods of their evaluation, has strained the students' abilities, and shifted their focus toward tasks (course) oriented education, and made

them unable to differentiate between the essential (basic) knowledge and skills, and the advanced ones. This leaves students of today's modern programs, in times of their graduation, increasingly aware of their own inadequacies to prescribe basic medications and conduct small procedures despite being able to name and describe hundreds of rare diseases (23). With so many specialties and subspecialties in modern medicine, the core skills are being readdressed (24), and medical schools need to answer openly whether their programs educate a complete physician (general practitioner), or whether they are just a step in the process that will necessitate and obligate further formal education and training.

The Problem of Measuring Achievements

At the end of medical school, a grade point average, personality assessment, student's publications, and/or practical skills should be able to demonstrate the student's knowledge and competencies, and therefore serve as predictors of that student's further practice, training and individual work (7). Subsequently, an objective measurement should exist to describe the achievements physicians hold when appraised by those requiring their credentials, and to predict their possible higher or lower achievements in the future. But with so many possible indicators of achievement (Figure 1), their influence and association with one another, as well as their relation to the training/education received during medical school is still unknown. With such high reported correlations between the pre-enrolment assessment, be it knowledge-based or personality-based, and the later similar assessments of those already deemed to be the best, a serious question can be raised on the developmental credibility and success of medical education institutions.

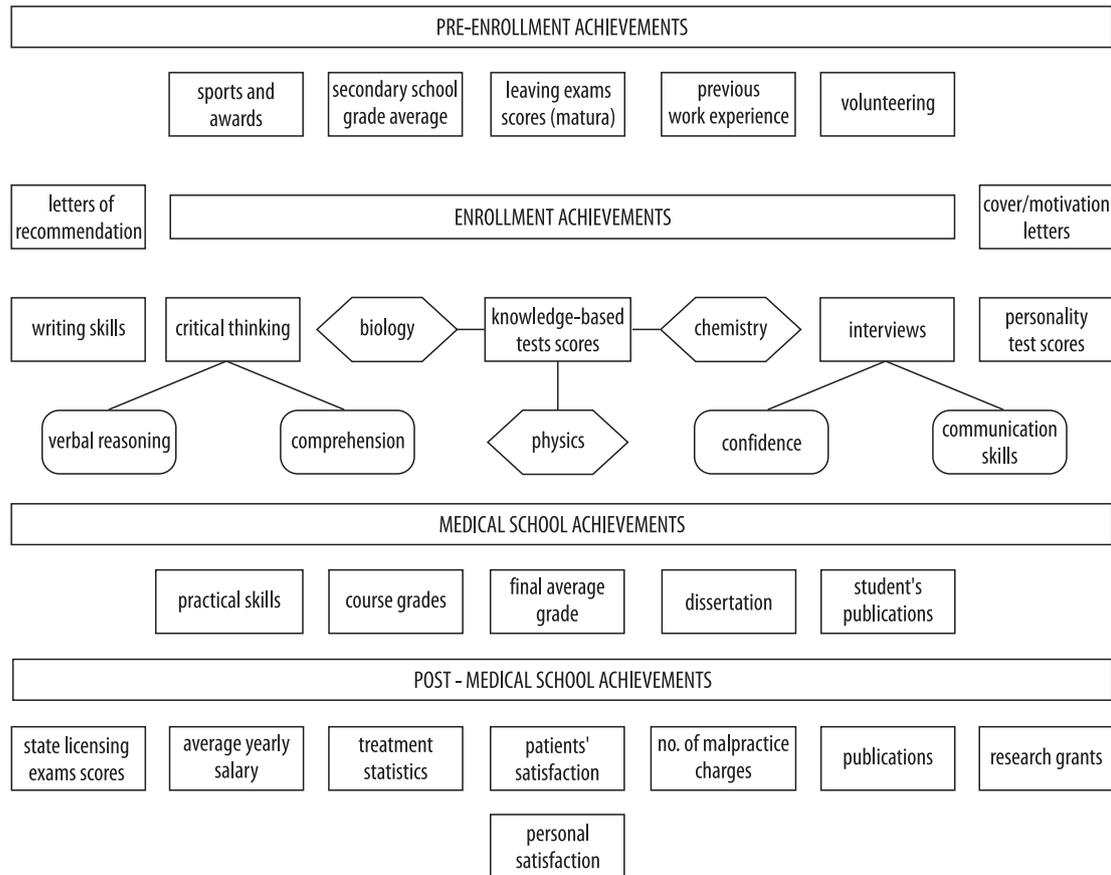


Figure 1 Achievements in medicine. Pre-enrollment achievements, achievements in medical school and post-medical school achievements have been mentioned in the literature but not together and interconnected. This scheme is a compilation of the elements of the three phases of achievements in medicine. However, many of them are not measured, and some of them cannot be measured; almost none can be objectively compared for different environments.

Today, medical schools and universities are often ranked based only on their faculty members' scientific achievements and success (25). Yet, students' indicators along with other faculty indicators cannot be ignored if objective rankings are to be made (Figure 2).

Schools, on their web-pages and in their promotional packages, often list their grant holders, innovators, Noble-prize winners and alumni as their own successes, irrespective of whether those who achieved those prizes were actually educated at their school, or are/were there only employed. Irrespec-

tive in other words, of what educational impact they had on that person in question, and on the success he or she achieved. As the quality of both the student enrolled in a certain medical school, and the school's itself, are dependent on multiple factors (Figure 3), a true comparison between students/physicians of different states, between their achievements, and subsequently between medical schools, must fail due the social, political and cultural differences and environments in which they operate.

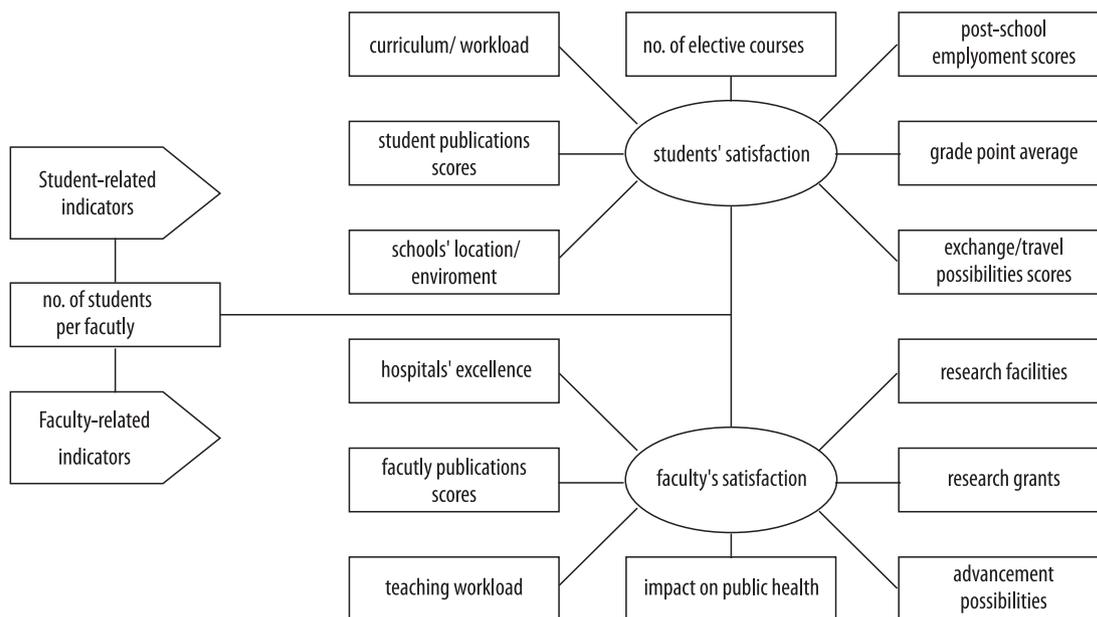


Figure 2 Indicators of medical schools' rankings (achievements). These indicators can be narrowed down to students' and faculty's satisfaction, albeit none of them can directly be measured or be associated with students' and faculty's satisfaction. Cultural, economic and other differences of different environments make reliable comparisons impossible.

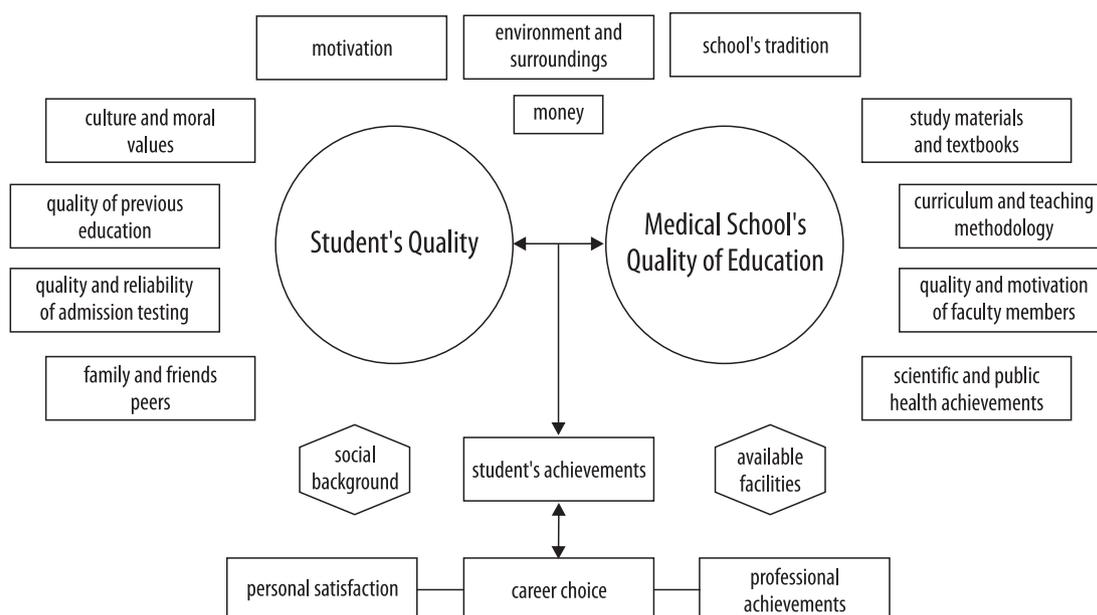


Figure 3 Summary of factors related to student's and medical school's quality. Analysis of listed factors reveals that reliable comparisons are impossible on both institutional and individual levels.

Discussion and Conclusion

The path to medical success is paved with uncertainty. The influence of motivation and personality traits on the success of knowledge-based pre-assessment tests and on the long term medical achievements is still unknown. As is the question of who should measure physicians' achievements, and where should they be listed. Schools must ask themselves whether the cheaper to conduct knowledge-based tests should be used as their sole method for the enrollment of students, despite their possible weakness of excluding a number of top achievers (6). And how does any sole method thus used, fulfill the notion of equity and justice on which it is allegedly based. It is also time to consider, how public needs meet individual success, and which role should the medical schools play and endorse to achieve their recognisability beyond the student satisfaction and the scientific output. Furthermore, the perceived quality of medical professionals as a substantial indicator of health care quality is being brought into question when no clear measurements exist to support it.

Every evaluation implies comparison, and comparisons of medical schools' or physicians' achievements are firmly tied to the characteristics of their environment. Without considering these factors, the true value and influence of medical schools on their graduates and physicians will never be objective or even fair, except, perhaps, if limited to an area or at most a state.

We believe that when medical schools pass the bad education threshold and enter quality education, they need to focus on individual mentoring of students and fostering of a culture in which reflection and self-reflection are imperative, and in this way leave an educational and developmental mark on their students that goes beyond that of a grade point average. Mentoring was proven to shape and incite professional and

personal development, and to grant greater insight into students' competencies, personality traits, learning habits and carrier plans (26). However, it requires a facilitating environment of the whole institution (27), ideally includes every enrolled student paired with an equally competent mentor, and relies on a personal face-to-face contact. This can lead to an increase of expenses per student for the universities, but still we believe it must be attempted if the students are the true goal of an institution. Personal friendships among students aside, the influence, gratitude and acknowledgment of mentorship during ones education should be among the top achievements listed by any school and university.

Critical thinking of students should be strengthened and broadened by including medical humanities courses within the core curriculum, and paralleling them with science methodology courses. Broadening the topics and availability of student electives may also serve this purpose, but should not be the only method, as it will not include the majority of students. Through structuring and developing of strong alumni activities and projects, medical schools need to devise measurements of their own graduates' achievements beyond the today's prevalent knowledge-based testing, and be included in the process of designing international rankings of the same. Without these, a true success of an educational institution cannot be demonstrated, and will further force the focus of institutions toward rankings that fail to show their worth.

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