

# Is Medical Education Changing? Five Challenges for the Near Future

## Está a Educação Médica em Mudança? Cinco Desafios para o Futuro Próximo



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Acta Med Port 2020 Jun;33(6):365-366 • <https://doi.org/10.20344/amp.13063>

**Keywords:** Computer Simulation; Data Analysis; Education, Medical; Evidence-Based Medicine

**Palavras-chave:** Análise de Dados; Educação Médica; Medicina-Baseada na Evidência; Simulação por Computador

Nowadays it is trendy to look at Medical Education as the basis to transform medical students into expert clinicians. But this was not always the case.

Although the art of teaching and learning medicine cannot be dissociated from the concept of Medical Education, the creation of the Johns Hopkins School of Medicine in 1893 (at the time with William Osler as the head of Internal Medicine), was a pivotal moment for the establishment of Medical Education as an entity. At the time, the implemented curriculum was based on the ideal of pre-medical training being taught by full-time researchers, followed by training in university hospitals provided by clinical experts. The validation of this model occurred in 1910 by the Medical Education Council's Flexner Report. It considered this pedagogical approach as an outstanding example and the gold-standard for future medical schools. Besides promoting the integration of the scientific knowledge into clinical practice (evidence-based medicine), the report predicted the exponential growth of biomedical and social sciences knowledge, as well the need for integration in the medical curriculum.<sup>1</sup>

Based on the analysis of this report and alongside with the exponential biomedical knowledge, the development of medical technology and rise of the student-centered approach, the 20<sup>th</sup> century was marked by profound reforms in medical curricula as well as in assessment and pedagogical processes.

The turn of the millennium brought new challenges to Medical Education systems worldwide.

### Current challenges in Medical Education

#### 1. Distributed Medical Education: how to approach doctors to the current population?

The increase of the world's population as well as improvements to health care systems and services aggravated the demand for physicians worldwide, as was already predicted by the Edinburgh Declaration ("Ensure admission policies that match the numbers of students trained with

national needs for doctors").<sup>2</sup> Alongside the world's population increase, the asymmetry between rural and metropolitan communities has been growing. The described realities contributed to the awareness of the importance of tailoring doctors' communication and soft skills competencies to population needs, especially from a rural background. Indeed, the aforementioned scenario favored the rise of the "Distributed Medical Education" principles, namely, to teaching and learning beyond the traditional largely tertiary care-based settings. Besides the attenuation of training pressure in the traditional tertiary care university hospitals, the increase in the pool of training settings allows for a more diverse subset of patients and addresses the disparities between locations of physician practice and population clinical care demand.<sup>3</sup>

#### 2. Virtual simulation: training medical skills without compromising patients

Along with the growth of the world's population and with the easiness to spread information, there was a simultaneous change in the social and cultural values of society along with the liability risks, which increased the regulation and contributed to increased awareness regarding patient safety. In fact, ethical concerns regarding patient safety presently occupy a paramount status not only in the delivery of healthcare but also in teaching and medical training. The presented scenario contributed to the implementation of medical simulation as a standard in Medical Education training.<sup>4</sup> With the turn of the century, the virtual reality simulation became more portable and accessible to worldwide use, in particular for Medical Education simulation, providing an environment where learners could train clinical examination skills, non-technical skills and assess their medical knowledge.<sup>5</sup>

#### 3. Medical Education and technology integration

Medical Education and technology are indissociable. On one hand, in terms of educational level, core teaching and learning processes are increasingly relying on technological

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Recebido: 04 de novembro de 2019 - Aceite: 19 de fevereiro de 2020 | Copyright © Ordem dos Médicos 2020



support systems regardless of the educational field. In fact, the introduction of student information systems and learning management systems such as Blackboard® and Moodle®, also known as virtual learning environments, created a new era of digital e-learning and e-assessment in Medical Education.

On the other hand, the dissemination of medical technology and its impact on clinical practice pushes Medical Education to incorporate different dimensions in its approach. In this regard, different examples can be mentioned, since new technologies such as robotics introduced in surgery, new imaging procedures and interpretation based on artificial intelligence, or new biological/ synthetic production procedures (as 3D printing or tissue engineering), impact the learning process in Medicine.

Technology is also favoring the data collection and portability of Medicine.<sup>6</sup> One can argue that the biggest challenge of Medical Education is to provide skills to future doctors to be able to cope with the increasingly amount of data to interpret in real time.

#### 4. Learning Analytics: the relevance of data 'footprints' for optimisation of Medical Education

The new era of Medical Education is characterized by the automatization of the core processes of teaching and learning, favoring the collection and management of information created by these processes.

As Tullock stated: "If you torture the data long enough, it will confess".<sup>7</sup> With that thought in mind, many fields of society such as finance, sports or defense have profited from data analytics. In similarity to other fields of society, including Medicine, the increasing capacity to collect and store data favored the implementation of Big Data principles in Medical Education and associated healthcare. Likewise, Medical Education is also timidly taking the first steps into the Learning Analytics era. According to the Society of Learning Analytics Research, Learning Analytics advocates the measurement, collection, analysis, and reporting of data on learners and their contexts, to understand and optimize the learning process so as to optimize and personalize the learning experience.<sup>8</sup> Then, students' abilities, profiles and learning patterns which favor learning and knowledge acquisition can be traced, with the intent of creating learning strategies that will adapt to or improve students' abilities.

Every step that each learner takes leaves a footprint behind and each footprint has content that can be used to im-

prove his/her performance. Learning analytics aims to improve knowledge and success by analyzing these footprints and predicting issues and challenges in order to anticipate interventions, which then leads to the implementation of technology-enhanced learning strategies in Medical Education, and namely to the personalization of the learning process.

#### 5. Cost-effectiveness: Medical Education has costs... and someone has to pay for it.

In line with the current society paradigm, and specifically with Medicine, Medical Education has also faced growing pressure to incorporate cost-effectiveness practices in its approach. Medical education is a long and complex process, and educators are trying to educate young medical students to become fully qualified physicians, that the country will need in the next decade. In this process there is a question that frequently arises: who bears the costs of healthcare professional education? Should this question be posed at the individual (learner), institutional or at the governmental level?

As stated by Walsh, "Medical Education is expensive".<sup>9</sup> Thus, achieving favorable cost benefit or cost utility ratios in Medical Education is becoming a priority, and a culture in which the economic evaluation of the undertaken pedagogical interventions is implemented will be gradually developed.

#### CONCLUSION

As Andy Dunn once stated: "*Passion provides purpose, but data drives decisions*".<sup>10</sup>

In the future, Medical Education will increasingly make data driven decisions integrate its core processes, thus transforming the role of both medical teachers and students. Over time, the role of the teacher will be reshaped to give way to teachers as facilitators, enabling and pushing medical students to become active agents in the acquisition of knowledge.

#### CONFLICTS OF INTEREST

The authors have no conflict of interest to declare.

#### FUNDING SOURCES

No funding was received in the preparation of this manuscript.

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