Mentoring in Academia and Industry

Miguel A. R. B. Castanho
Gül Güner-Akdogan *Editors*

The Researching, Teaching, and Learning Triangle

Springer

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Biology is evolving rapidly, with more and more discoveries arising from interaction with other disciplines such as chemistry, mathematics, and computer science. Undergraduate and Graduate biology education is having a hard time keeping up. To address this challenge, this bold and innovative series will assist science education programs at research universities, four-year colleges, and community colleges across the country and by enriching science teaching and mentoring of both students and faculty in academia and for industry representatives. The series aims to promote the progress of scientific research and education by providing guidelines for improving academic and career building skills for a broad audience of students, teachers, mentors, researchers, industry, and more.

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Foreword

Aligning innovations in education with advances in sciences is a major concern to educators nowadays. Most university educators are also scientific researchers; concerned high school teachers have plenty of information available in news media, specialized magazines or diffusion through scientific societies and keep in touch with the forefront of scientific advancements.

It is impossible not to ask ourselves how to cope with the role and impact of scientific research in teaching and learning. It is not only a matter of updating the factual information that is transmitted to students with recent scientific discoveries; it is a matter of the benefits (or not) of incorporating scientific research activities in the curricula.

Figure 1 identifies four potential benefits for the students to have contact with scientific research and learn from experience (as a non-transferable skill) the scientific method:

1. Science is about producing knowledge and the way this goal is achieved (heuristics). This is essential in a lifelong learning perspective. The students will be able to potentially understand and keep in touch with scientific advancements throughout their lives.
2. Scientific knowledge relies on facts and decisions in science are made based in facts. Better decision makers are better professionals and better citizens in general. Encouraging students to fact-based decisions is another benefit from being in touch with scientific research during undergraduate courses.
3. More students in contact with science may mean more future scientists, with further contribution to all areas of science, which in turn implies societal and economic advancements.
4. Science-awareness will grow among future teachers, consolidating the teacher/researcher combination, which in our opinion is much more beneficial to education than having a teacher-only vs. researcher-only dichotomy.

However, there are dangerous drawbacks that may arise when students are in contact with scientific research (see the elucidating chapter two). Moreover, the logistics and practical challenges of bringing undergraduate students to a research environment are considerable, both in universities and high schools. Fortunately, we

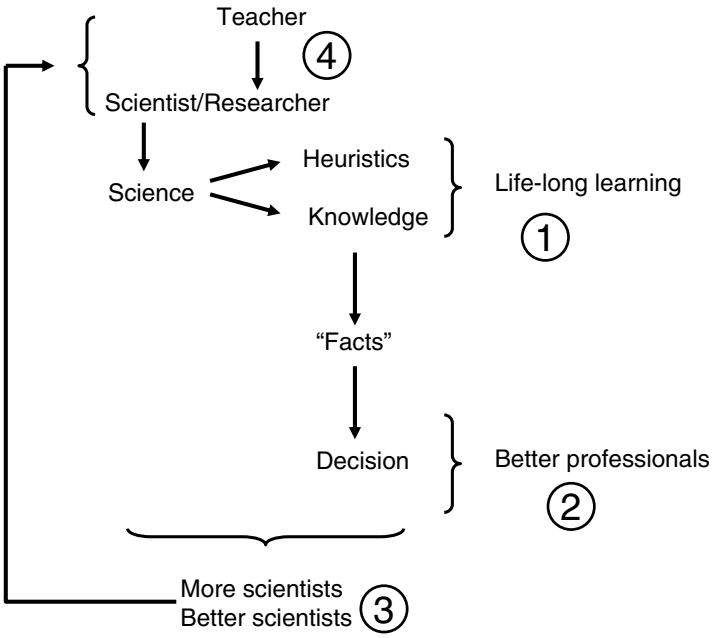

Fig. 1 The long-term impacts of integrating scientific research activities in undergraduate teaching and learning: (1) Learning about the heuristics of science helps during life-long learning; (2) Learning how to decide based on facts generates more conscious citizens and professionals; (3) Raises awareness for science and scientific careers, which in turn begins societal and economical benefit for nations; (4) Contributes to future generations of researcher teachers that will be better prepared to align innovations in education with advances in science

can learn from pioneering examples, some of the most significant are gathered in this book, from classroom-level initiatives to university-wide projects.

Although it is well accepted, at the present time, that training for research is a component of all stages of education, its peak is naturally reached at the postgraduate level. Successful postgraduate education is not just about "giving" information to passive students and "involving" them in a research project. Recently, many universities in different parts of the world have focused their attention on the "quality of post-graduate education". This wave has had a significant influence on lecturers, professors, and specially, the "supervisors". These concepts have been intensely discussed in widely ranging platforms. Supervision is no longer only a "science", but also an "art" of research training. The process of supervision has been subject to a shift of paradigm, and the role of the supervisor has evolved from that of a "teacher" to that of a "coach". The last chapters in the book focus on these stimulating ideas.

We hope you enjoy reading this book as much as we enjoyed preparing it with the help of the chapters' authors to whom we thank for their contribution.

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