



## Chapter 1 Introduction

### How to Learn, Retain and Communicate Biology

A university education is meant to be a process of independent learning, that is, the ultimate goal of a university experience should be to develop the ability to know how to learn on one's own. However, it is very difficult to teach undergraduate students the fundamentals of an academic field (Biology, for example) as well as to teach the students how to learn it at the same time. With such a time-limited emphasis on content and course material, little class time is left to discuss the different ways by which we can learn our material, retain the information and effectively communicate it to another person.

It is the latter of the three intended outcomes that is how students are going to be evaluated at university, that is, the ability to communicate learned knowledge back to their peers. While we understand that students tend to view evaluations as a burden or alternatively as a means of accumulating points towards their degree, as university professors we emphasize that the evaluation hurdles thrown at the undergraduate students (tests, essays, presentations etc.) are best realized when treated as exercises in scientific communication.

Communication is fundamental to the working and the development of science at all of its levels. At the most basic level of scientific research there is the intra-disciplinary communication that occurs among and between scientists of a given specialization and this discourse is held mostly through the medium of peer-reviewed journal articles that make up the primary literature and at specialized academic conferences and professional meetings. At the next level comes the inter-disciplinary communication that occurs between scientists that differ in their areas of specialization, a discourse that is held in the secondary literature of review articles that can be found in synthesis or bridge journals, as well as at academic conferences of a more general, inter-disciplinary level of interest. The third level of scientific communication is at the pedagogical level, wherein seasoned scientists communicate their knowledge of the procedures and findings of science in the classroom and in scientific textbooks, with the goal of educating and training a new generation of scientists. Lastly comes the scientific communication at the popular level, wherein members of society at large are themselves brought into the scientific conversation by scientists.<sup>1</sup> This last level, which is meant to engage the public's interest in scientific issues, mostly emphasizes the potential impacts on public health, the environment, technology and the economy. Professional scientists have a responsibility to participate in all of these levels of scientific communication and, therefore, must develop skills aimed at optimizing their effectiveness in each scenario.

<sup>1</sup> - Cloitre, M. and T. Shinn. 1985. In *Expository Science: Forms and Functions of Popularisation*. Shinn, T. and R. Whitley (eds.). D. Reidel Publishing Co., Boston. pp. 31-60.

There are many types and forms of venues and/or platforms through which scientific communication occurs but they can mainly be broken down into written and oral presentation. As part of any undergraduate education, an expected outcome is the ability to communicate scientific information orally and in written format, both to specialist, peer audiences and to non-scientific people at various levels of the general public (e.g. high school auditorium, town hall meeting, special interest groups, government agency). The ability of undergraduate students to communicate scientifically is measured and evaluated in a number of different ways over the course of their education, notably through quizzes, exams, reports, essays and presentations.

The goal of this Student Guide is to provide undergraduate students of Biology with an overview of the process of scientific communication, with some tips on maximizing your learning and retention potential. It will mostly touch on the various types of communication and the way university professors may evaluate the undergraduate students on their scientific communication.