BioCore (Integrating Concepts in Biology): What is so insanely great about this textbook?

Over the past 50 years, research in biology has become more quantitative and interdisciplinary, relying more heavily on other sciences. To understand large, rapidly changing ecosystems, or to make sense of massive amounts of data from the Human Genome Project, today's biologists must be able to use modern mathematical, statistical, computational, and technological tools.

Biology instruction has not kept pace with research into how people learn. Studies on learning reveal that: students learn best if they are actively engaged working both individually and in groups together constructing their own knowledge [this is also how scientists work]. The textbook *Integrating Concepts in Biology* takes advantage of these insights and enables you to better achieve your full learning potential by directly involving you in your own learning.

You will be asked to construct your own knowledge by analyzing and interpreting published data. As you gain knowledge, you will find you can learn more and retain new information more easily. Our classroom discussions will help you learn how to read text and scientific figures. The case study (scientific stories) approach in the textbook provides a context in which you can connect new information. You will be able to learn major concepts by reading about several examples in more depth. The textbook readings, online homework and in class discussions will guide you in interpretation and analysis, and will help you build your new skills and knowledge.

The textbook does *five things that experts*¹ have always said “should be done” in textbooks:

1. **Historical (HPS) data**: You are presented with questions and the published historical research data used to answer the questions. You interpret historical data that were analyzed by biologists in the context of answering each framing question.

2. **Hierarchy/Scale**: BIG biology (organismal) and little biology (molecular/cellular) is addressed together, integrated. The text integrates across the biological size hierarchy and scale.

3. **Big Ideas**: The text focuses on five big ideas, so that you learn that these big ideas of biology and levels do not exist in isolation.

   - 1) **INFORMATION**: Living system's mechanisms to store, retrieve, and transmit *information*.
   - 2) **EVOLUTION**: The diversity and unity of life can be explained by the process of *evolution*.
   - 3) **CELLS**: *Cells* are a fundamental structural and functional unit of life.
   - 4) **EMERGENT PROPERTIES**: Interdependent relationships give rise to *emergent properties*.
   - 5) **HOMEOSTASIS**: Biological systems maintain energy and matter *homeostasis*.

4. **Math**: Mathematics is used as an important tool and is intimately associated with each case. Self-contained Bio-Math Explorations (BMEs) help you understand how math is applied to answer questions and improve comprehension of biology. The math is readily accessible, ranging from simple arithmetic, algebra, and geometry, to more challenging examples in probability, statistics and modeling.

5. **HPS ethics**: Finally, the text raises your awareness about ELSI (ethical, legal, and social implications) topics your HPS instructors and Briggs College want you to consider. You engage with case studies of ethics and real-world implications of the biology students are learning.