Teaching Philosophy and Development

I chose a career in ecology because I get genuine pleasure from learning about nature as well as broadening and inspiring the environmental perspectives of others, and because I greatly enjoy being outdoors doing field work. As a relatively 'mature' undergraduate student entering university at the age of 27, I was inspired by some great teachers who opened my mind to the natural sciences, and who conveyed their enthusiasm and drive for intellectual challenge. Without understanding the pedagogical basis at the time, I was repeatedly being treated to the fundamental sequence that underlies high quality education - the central tenets of A.N. Whitehead's Aims of Education: Romance, Precision, and Generalisation (Or Fostaty-Young's: Ideas, Connections, and Extensions). To quote Oscar Wilde - "Nothing that is worth knowing can be taught". Deep learning - that which leads to the potential for subsequent independent learning - happens when a teacher engages students with some broad question or problem, focusses the theme down into some central foundational concept or mechanism, and then inspires them to explore the implications of that concept or mechanism in a broader context. This approach is the essence of Bloom's Taxonomy of Educational Objectives which rates cognitive learning processes in advancing value from Remember → Understand → Apply → Analyse → Evaluate → Create. The ultimate goal is for the learner to gain not just factual, conceptual and procedural knowledge but also metacognitive knowledge – (i.e. an understanding of one's own thinking and learning processes, and a reflective awareness of one's intrinsic relationship to the subject matter).

My approach and practices

I am committed to education in the widest sense of the term - to stimulating interest and appreciation of the world around us, and our influences on it. For me, the primary role of a teacher and research advisor is to assist the student in developing his or her own independent, critical thinking skills. I aim to be a pedagogue in the ancient Greek sense – a servant who walked with the pupil to the place of learning. In essence, I see myself as a ***facilitator*** – someone who provides guidance rather than lectures to classes; someone who advises rather than supervises thesis students. For me, the process of learning how to logically approach and assess an issue or question is just as important as the product (i.e. the knowledge learned, or the research results obtained). My teaching uses 'active, student-centered learning' methods such as interactive question-and-answer sessions interspersed within more traditional lectures, student-led seminars, synthesis-focussed essay-writing that addresses topical arguments, synthesis-focussed original video production on course themes, and practical demonstrations. In addition, I try to seize every opportunity to get students actively doing experiments and measurements in lab practical sessions, and most of all, in getting students out into the field to see, do, question, reflect, and learn. The latter were the truly great experiences that excited and inspired me as a student, and therefore I am inherently driven to provide them now to my students. After each course, I reflect on what worked well and not so well, and record potential innovations for the next iteration in my Teaching Self-Reflection Journal. This regular reflection practice has really helped to develop my teaching methods and enhanced my own metacognition of the educational practices I have incorporated over the years, and how I relate to them.

Class teaching – empathy and connections

Over the past 5 years, I have come to realize that I greatly enjoy both the human and scientific/intellectual interactions involved in facilitating student learning, and that I have learnt a lot myself from both. My personal strengths include a very broad-ranging and moderately deep intellectual mind, as well as a strong urge to connect with, and genuinely empathize with, people. Accordingly, I spend a lot of time putting the educational material in context, and making links to bigger 'real world' environmental and life issues. Furthermore, I seek out and relish opportunities to make relevant connections to perspectives from the Arts. For example, I play Mozart at the start of a key 'stepping stone' lecture on the evolution of fundamental traits that underly biodiversity across the Tree of Life.

Mozart's arrival in the development of classical music was ground-breaking and had a pervasive influence on subsequent musical genres. Therefore, I suggest that it serves as a metaphor for the extraordinary leap in complexity and sophistication that the appearance of the nucleus and other cellular trait features (i.e. of eukaryotes) generated for subsequent evolutionary diversification potential across the Tree of Life. My weaknesses include an innate tendency to be rigorously principled and to take things too seriously, and a lack of self-confidence that constrains me from being spontaneous and 'running with' ideas or events. Together, these characteristics have undoubtedly influenced the way I approach teaching and advising.

In the past five years, I have definitely seen my confidence grow, and a much greater willingness to 'go out on a limb' intellectually and in terms of course content (e.g. see BIOL 510's historical development), and to share a laugh together with my students whenever possible (See below, and my Teaching Self-Reflection Journal for further details). Furthermore, in that same period, as part of a societal mindshift, I have become much more aware of the issues of Indigenization - Equity, Diversity, Inclusion, Accessibility, Anti-Racism (I-EDIAA), and see advances in these realms as not only morally necessary, but also as very positive steps forward for humanity that contrast with widespread concerns about the many negatives we are currently experiencing. For example, many people feel overwhelmed by severe global change anxiety at our civilisation's seeming incapacity to significantly move toward more sustainable living quickly enough to avert an environmental crisis. By contrast, the recent tangible progress in acknowledging, raising awareness, and at least attempting to comprehensively address many I-EDIAA issues is a huge leap forward for humanity. As part of my commitment to contributing to these positive advances, I have specifically included considerable Indigenous content in recent iterations of my courses (BIOL 510; BIOL 200; BIOL 416). Furthermore, as a biology professor, I feel an onus not just to highlight the extraordinary value of the scientific process, but also to position science within its larger context – as one of several important 'ways of knowing'. In addition, I recently researched and compiled a wide-ranging set of suggested specific teaching practices and resources to promote I-EDIAA awareness that were gleaned from a survey of faculty, teaching staff and graduate students of the Queen's Department of Biology in November 2021. This compilation (see document) contains a blend of both general and biology-focussed suggestions and therefore should be of potential use not just to myself and colleagues in Biology, but also to faculty in other disciplines.

Contemplative practices in teaching and learning

I first became aware of contemplative practices as a result of attending a special session at the Society of Teaching and Learning in Higher Education 2014 annual conference, and realised that there is now a growing body of pedagogical literature indicating that mind-calming and reflective awareness practices are very helpful for primary and high school students, but university-level applications are scarce. In particular, these practices are aimed at helping students to calm and focus their minds so as to actively engage with the concepts and ideas discussed in lecture/seminar, and therefore to promote deep learning. I began exploring their potential in BIOL 510 W2016, and was taken aback by how supportive and appreciative the students were. Since then I have been developing my practice and leading short mind-calming exercises at the beginning of each class in many of my courses (large as well as small), and have been doing detailed voluntary anonymous surveys with carefully worded neutral-value questions mid-way and at the end of each course to assess their effectiveness. The survey results have been so positive and significant from an educational perspective that I published them in a peer-reviewed pedagogical journal (PDF; see also video presentation of the mind-calming practice and the study's main conclusions). In summary, the results demonstrate that regular use of mind-calming exercises has multiple direct and indirect benefits that may contribute to more effective undergraduate learning and teaching. Accordingly, contemplative teaching and reflective learning (by both student and teacher) have now become a cornerstone of my teaching philosophy and practice.

Research thesis student advising (- a form of one-on-one teaching)

I have developed an interactive student-based lab group that has been mutually intellectually stimulating, and highly productive in terms of publications and awards. I particularly enjoy the one-on-one interactions associated with helping students to think critically, to develop hypotheses, and to evaluate and write up their results. As indicated above, I genuinely see my role as an 'advisor' rather than a 'supervisor', and try to guide students according to their own abilities and interests. My goal is to facilitate their intellectual development and scientific activities toward truly independent hypothesis-driven research projects that they can, and should, feel ownership of. In this regard, I have written an article (PDF) on the development and use of the scientific method as it applies to sciences like ecology. I also regularly reflect on the process of mentoring, and have published an article aimed at helping other research student advisors to improve their mentoring (PDF) that includes a self-reflection worksheet (PDF), and have given several departmental seminars to share my ideas with my immediate colleagues and all of our students.

In summary, my varied teaching and research advising experiences since 1987 have led me to develop a common philosophy for both formal teaching and student research advising. At the heart of this philosophy are four goals:

- To inspire students' perceptions and understanding of the world around them, and their influence on it.
- To develop students' intellectual capacities for independent learning, for evidence-based decision-making, and for questioning, critically assessing, and challenging assumptions.
- To promote students' capacities for developing original syntheses of ideas, concepts and facts, and to effectively communicating those syntheses orally, in writing, and in video media (see multiple examples on the BIOL 510 and BIOL 416 course web pages).
- To connect with students by empathizing with their concerns about reaching out toward independently-driven learning, about their perspectives on life and strategies for how they might cope with future adversity, and to share the little wisdom I have acquired.

It is my hope (and my rationale for tax-payers' support of educational institutions) that success in these goals will produce a cohort of citizens that will benefit both science and society.