1.0 TEACHING PHILOSOPHY STATEMENT

> "Learning results from what the student does and thinks and only from what the student does and thinks. The teacher can advance learning only by influencing what the student does to learn."
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> — Herbert A. Simon
> (Ambrose et al. 2010)

This quote from Herbert Simon concisely summarizes my core teaching belief. How I came to this conclusion was the result of a teaching practice that has evolved since I arrived at the University of Calgary in 1998.

Over the last fifteen years, I have taught in and coordinated labs for first-year biology courses as well as a third-year course on fungal biology. Early on, my teaching focused on what I could do to help students understand the concepts and points of critical importance in the course material. I developed clear explanations and examples. When students didn't understand, I clarified the explanations and created what I believed to be better models. My teaching evaluations were very positive, students enjoyed my classes – I was a "good teacher."

However, as students I had taught in the first-year biology courses began showing up in my third-year course, I was struck by their lack of understanding of key biological concepts, the very concepts I believed I had taught them just two years prior. At first, my response was to put even more effort into my lectures but my concern about students' struggles with material that they should have understood also gave me the impetus to read the literature on student learning more deeply. Through this reading, as well as discussions with colleagues, my understanding of what makes for effective teaching and learning evolved. As I reflected on how I myself learned, I realized my understanding of the course material had expanded as I prepared my lectures and wrestled with connections between the concepts and developing the examples and analogies. If this was the process that helped me learn the material, would it not then follow that my students needed these kinds of activities to achieve deeper, lasting understanding of the material? I began to experiment with innovative teaching approaches that incorporated peer instruction and active learning in the classroom. My early efforts were generally met with enthusiasm from the students but I did not assess the effectiveness of these changes beyond asking students for informal written feedback and reviewing the end-of-term teaching evaluations. So I usually ended up with just an overall impression of "That worked OK" or "I won't do that again". My "Eureka" experience, the one that consolidated all that I'd read and implemented to that point and ultimately led me to take a more scholarly approach to my teaching practice occurred five years ago.

In 2008, I agreed to lead both the departmental committee tasked with designing two new introductory biology courses and the teaching team that developed all class and laboratory materials for the first course BIOL 241. The goal of these foundational courses was to have them promote deep understanding of key concepts rather than a superficial understanding of isolated

facts. To ensure student-learning success, how we taught the courses would be as important as what we taught.

Leading the committees through this development process required me to meld what I'd learned from course- and curriculum-design literature with science education research on active learning and concept-based learning. As well, the need to demonstrate to the Department that the new approaches being taken in these courses meant that our teaching team needed to assess student learning in terms of whether we were successful in promoting deep learning. Another member of the teaching team, Dr. Cindy Graham, led this research project but my involvement prompted me to reflect on the need for a more scholarly approach to my other courses. I sought out opportunities to learn more about teaching science scientifically such as the National Academies Summer Institute in 2012 and the C-LAB program at the University of Calgary (2013-2014). These experiences, along with discussion with colleagues and further reading in the scholarship of teaching and learning, helped me refine and implement a suite of effective, research-based teaching strategies into my own teaching practice.

My research and experimentation gradually transformed me from a teaching-focused approach to a student-focused approach. My teaching philosophy is now grounded in the understanding that it is my responsibility to create a climate that supports and encourages student learning. And I believe creating and maintaining this climate requires the following elements.

A collaborative class structure and culture. In all classes, including those in very large lecture halls, I start the term by having students introduce themselves to near-by classmates and work together to answer some questions related to background knowledge. This collaborative approach continues throughout the term, with many opportunities for peer instruction and small group work. In one class, I have recently incorporated team-based learning, a strategy that builds on a foundation of students working together to apply course concepts. I am conducting a research project to assess the impact of this approach on student engagement and learning. Another aspect of collaboration that I have introduced into all of my classes is the role of class representatives, student volunteers with whom I meet weekly to discuss all aspects of the course.

The incorporation of teaching strategies that give students more responsibility for learning and the opportunity to apply what they have learned to authentic problems. I have incorporated some elements of "flipping the classroom" into my classes such as pre-reading assignments, in which students read assigned sections of the textbook and/or other resources prior to coming to class where they complete a short quiz. These quizzes not only makes students responsible for learning foundational material such as definitions and vocabulary but also gives them the chance to think about the material at their own pace. The results of the quizzes indicate the topics that students find particularly challenging, which we can then focus on during class. Quiz material is not repeated in class but instead is used as the foundation for in-class assignments that involve students working with real data and situations that practicing biologists face. Using authentic problems help students move from novice to expert thinking and increase their motivation and engagement with the material.

A dialogue between students and instructor. I believe that effective teaching is based on a dialogue between students and instructors, rather than the traditional one-way flow of content from instructor to students. I need to know about the prior knowledge students bring to class, as well as where they are getting stuck as we continue through the course. This is accomplished through student self-assessments, one-minute papers on the muddiest point, and formative assessments on

course topics. Students need feedback from me on these assessments so that they will know how well they are meeting expectations.

An understanding of teaching as a practice that requires reflection and feedback as well as engagement with teaching and learning communities. Teaching, like student learning, is a process that requires practice and feedback. As I explore new approaches, I get formative feedback from my students as well as from colleagues through discussions, presentations or workshops. A strong teaching and learning community has recently developed in my Faculty and participation in the seminars and workshops has strengthened my practice and inspired me. I have also found involvement with science education societies invaluable in helping me refine my teaching practice.

Ambrose SA, Bridges MW, DiPietro M, Lovett MC, Norman MK. 2010. How learning works: seven research-based principles for smart teaching. Jossey-Bass.