

University of Calgary Teaching Awards

Teaching Philosophy Statement by David Hansen

Overall Teaching Goal- *To help students/learners gain a deep understanding of core concepts and provide them with the tools that will assist them in building upon these.*

I am passionate about teaching. I enjoy helping learners gain a deep understanding of difficult concepts, and develop enthusiasm for the material. This enables them to enjoy learning and to develop the drive to build upon their previous understanding. I am involved in many different teaching roles at the University of Calgary, and my Overall Teaching Goal instructs my efforts in each. These teaching roles are: 1) Instructing and coordinating large undergraduate classes; 2) Supervising undergraduate project students and summer scholarship holders in my research lab; 3) Supervising MSc, PhD and Post-Doctoral Researchers in my lab; 4) Delivering workshops to Graduate Students on how to succeed in Graduate School; 5) In my role as Assistant Dean (Supervisory Development) in the Faculty of Graduate Studies, teach Graduate Supervisors how to improve the quality of supervision that they deliver, primarily accomplished through workshops, presentations to graduate programs, developing resources, and meeting with individual supervisors to address their specific needs. In each of these five teaching environments I take my role as an educator seriously, and I continually strive to improve my teaching skills. Outlined below are some principles that guide my strategies in teaching, and efforts that I have made to continually improve.

I base my approach to teaching on two basic principles;

- 1. Students who are interested and engaged are more likely to learn and gain a deep understanding of the topic.*
- 2. Students enrolled in my courses or attending my workshops have at least some interest or intellectual curiosity in the course material, and most students are very interested in the topic.*

Throughout my teaching career, and in many different teaching situations, I have observed that those students who are the most interested in the course material, or display some intellectual curiosity about the topic, tend to be those who gain the deepest understanding of the core concepts, and thus are the students most likely to be able to apply this understanding to novel situations. These interested/curious students tend to ask the most questions during lecture sessions or workshops, are more likely to come to my office to discuss the broader implications of core concepts, and in my opinion, are more likely to spend additional time thinking about the material and expanding their understanding outside of the classroom. They are also more able to place the material into a broader context, applying their understanding of the material to concepts covered in other courses or other learning situations. In other words, these students are not those who are narrowly focused on learning or memorizing the material solely for the purpose of performing well on exams. Although the achievement of a good grade is important to all students, my aim is that as many students as possible depart the course with both a level of performance reflective of their abilities and an enhanced level of engagement and innate curiosity. It is such attributes

that will contribute most effectively to future success. My challenge, therefore, is to foster this transition. I take, as a starting point, the assumption that the mere act of enrolling in a course can be taken to indicate that students have some level of interest and intellectual curiosity regarding the subject material. I try, therefore, to utilize and build upon this curiosity and desire to learn.

Given my basic premise that curious and engaged students are more likely to have a positive learning experience, the double-edged question that I posed to myself quite early in my teaching career is: **Am I, as an instructor/facilitator, able to influence the engagement level of the student/learner?** (In other words, is it possible for me to help learners become more interested and engaged in the course material?) **Conversely, if I do not engage the students well, can my poor teaching result in students becoming less engaged and suffering a lowering of their enthusiasm in the topic, causing them to have a poor learning experience?** Many years of reflection on these questions and the honing of my teaching practice permits me to conclude that my teaching style and method of delivery/facilitation can significantly positively influence the interest level of the students. This, therefore acts as my guiding principle and causes me to place significant emphasis upon employing a teaching style that increases and enhances student interest and engagement. This helps me to achieve my overall teaching goal of assisting students to gain a deep understanding of core concepts and to develop the tools that are needed to build upon these concepts. Whereas I still believe that the ultimate responsibility for learning lies with the individual student, **I consider it my responsibility as an educator to engage the students in ways that provide them with the best opportunity for learning and appreciating core concepts.** This includes, in large part, providing them with learning opportunities that will increase their interest and enthusiasm for the topic.

How do I help my students become more interested in the course material?

Upon arrival at the University of Calgary in 2004 my first assignment was as the course coordinator and lecturer for Biol 311 (Principles of Genetics). I have continued in these roles in this course for the past 11 years. Biol 311 is a high enrolment course that is required of all students majoring in the Department of Biological Sciences, and is also taken by many students from other departments and faculties. The typical current enrollment is ~550 students, spread over two lecture sections. This large enrolment creates particular challenges for me to be able to achieve my overarching teaching objectives of enhancing interest and engagement. Many of the strategies that I adopt to achieve these ends have been tailored to this large class size, but I have also been successful in applying these principles in smaller sized courses, and have subsequently adapted them to other learning situations. For example, I have served as the course coordinator and lecturer for CMMB 413 (Human Genetics) with ~100 students, and have lectured in CMMB 505 (Advanced Developmental Biology) with 17 students and CMMB 519 (Advanced Cell Biology) with 19 students. I have been able to demonstrate proficiency at all levels of undergraduate teaching by being adaptable and by employing my talents and aptitudes to their best advantage when responding to the challenges unique to each situation. My teaching style and approach has thus developed through the employment of best practices in a given situation, and, through reflection and assessment of the particular environment, their adaptation to others.

I have also supervised 8 Graduate Students, 4 Post-Doctoral Researchers, and 54 Undergraduate Research Students (research project students or summer scholarship

researchers). In addition, I have facilitated 8 workshops for graduate students, and 15 workshops for Graduate Supervisors in my role as Assistant Dean (Supervisory Development) in the Faculty of the Graduate Studies. While these teaching opportunities are quite varied with respect to student/learner number and material being covered, I am guided by over-arching principles that guide my teaching in each of these situations.

The following provides an account of how I achieve my goals by enhancing student interest.

1) Showing my own enthusiasm for the topic

In each of the teaching opportunities described above, I am keenly aware of how my own enthusiasm for the topic of instruction/discussion directly impacts the enthusiasm level of the students/learners. I believe that students easily discern whether the topic is interesting to the instructor, which influences their own excitement and desire to learn the subject matter. I demonstrate my excitement for the topic by showing my awareness of current advances, especially those that the students may be aware of through their knowledge of the mass media. I often discuss such advances or discoveries during class in ways that can be directly related to a particular concept that is being covered. For example, when I teach about the Polymerase Chain Reaction (PCR), I discuss how this technology has resulted in the acquittal of many people on death row—or how clinics are using it to perform sex selection of embryos prior to implanting the embryo into a woman's uterus. Through examples of the implications of the research we are discussing, and by discussing it enthusiastically, the students are more likely to grasp the importance of the topic, and thus of what they are learning. My demonstration of enthusiasm is reflected in the USRI evaluations in which 'Communicated With Enthusiasm' is consistently one of my highest scoring categories, with an average of 6.51/7 over the past 7 years. Comments in my student evaluations also suggest that I am being successful in exhibiting my enthusiasm for the course material. As one student stated, *'Hansen's enthusiasm makes this class very enjoyable'*

2) Emphasize the understanding of concepts over the memorization of facts or definitions

University faculty have many research, service and teaching responsibilities to attend to. This requires them to be very efficient with their time. This demand for efficiency may, therefore, lead to the delivery of teaching, and the evaluation of students, that undermines the more important long-term goals of post-secondary education. From my own perspective, I know that it is much easier to teach definitions or a list of facts, than it is to teach overarching concepts. It is also much easier to evaluate or examine a student's ability to memorize facts than it is to evaluate their understanding of concepts. However, I do not believe that teaching definitions and facts, instead of overarching themes and concepts, is best for the student. Although some of this is necessary for the establishment of the language with which to communicate, and to provide the students with a base of understanding from which to draw information, my goal is to have the students understand the core concepts.

To illustrate how this applies to my approach to teaching, I employ the concepts of meiosis and mitosis, two processes that lie at the core of understanding of much of cell biology and genetics. They explain how chromosomes behave during cell division. Students initially encounter the concepts of mitosis and meiosis in high school, and continue to meet them in various courses in the Department of Biological Sciences. The typical approach to teaching them is to list their stages, and to then provide definitions of each of these stages. On

examinations, students are often asked to provide definitions for the stages. A revelation became evident to me when, some years ago, I asked a question on an exam that I thought would be the easiest question on the test. I provided drawings of chromosomes within cells at various stages of mitosis and meiosis. These drawings differed as to the number of chromosomes, whether the chromosomes contained one chromatid or two, and where the chromosomes were found in the cell. I then asked whether each drawing depicted a cell in mitosis, meiosis, or whether the depiction illustrated an impossible situation (i.e. the drawing depicted a cell that could not occur in nature). To my great surprise, the majority of students failed this question, even though they had encountered the concepts on many prior occasions. I am quite certain that if I had asked the students to provide definitions of the various stages of the processes, most students would have answered correctly because their studying had involved memorizing these definitions. However, since my question required them to truly understand how chromosomes behave during these cell divisions, which is the basis for understanding meiosis and mitosis, they were not able to perform well because they had understood only at a very superficial level. Truly understanding these processes is necessary for the comprehension of more advanced concepts in genetics. Therefore, these students were struggling to understand topics presented later in the course material.

This experience emphasized to me that I needed to teach mitosis and meiosis differently -- that I needed to emphasize understanding of the core concepts, rather than memorization of definitions. My approach to teaching this material changed completely. I now spend very little time going over the various stages of mitosis and meiosis. Rather, I emphasize the purpose of these cell divisions. I first have the students consider the overall purpose of each stage by asking questions, such as 'Why does the number of chromatids need to double before cell division?', 'Why do homologous chromosomes line up across from each other in meiosis and not mitosis?', 'Why does the DNA have to condense prior to cell division?', etc.. To emphasize each of these points, I then have the students consider situations in which mitosis or meiosis does not occur properly. For example, 'What failure in meiosis is the cause of Down's Syndrome?', 'Why is a mule sterile?', 'What is different about mitosis and meiosis such that cells in a mule or a zebonkey are able to undergo mitosis, but they are unable to undergo meiosis?', etc.. By emphasizing the purpose of mitosis and meiosis, students are better able to truly understand these processes, and have a stronger foundation for learning subsequent concepts.

By emphasizing core concepts rather than definitions and facts, I believe that students gain a better understanding of material and are better able to apply their understanding to new situations. Importantly, I also believe that when we resort to having students memorize lists and definitions, they begin to lose interest in the material. If the students are unable to place the material in a larger context, or to see the connection between this material and other concepts taught in this course, and in others, they are less likely to have a successful learning experience.