Centre for Learning and Teaching

focus

on university teaching and learning

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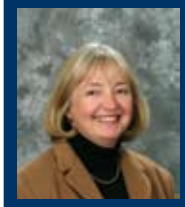
Inaugural Graduate Student Issue

From the Director

Graduate Teaching Assistants bring a unique wisdom to their teaching roles. Positioned at the nexus between the disciplinary expertise of professors and the learning challenges experienced by undergraduate students, GTAs' insights about facilitating learning are valuable assets in the learning experiences of many Dalhousie students. This issue of Focus – the first ever dedicated to the GTA role – exemplifies and celebrates their diverse contributions.



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Teaching Assistant Approaches to Enhancing Student Learning

Teaching assistants are an integral part of teaching and learning across Dalhousie, taking on various roles such as markers, laboratory assistants, and tutorial leaders, to name just a few. The Centre for Learning and Teaching is proud to introduce the first issue of *Focus on University Teaching and Learning* that is dedicated to the work of teaching assistants. The theme for this issue of *Focus* is "Teaching Assistant Approaches to Enhancing Student Learning." In this issue, Hilary Moors (Biology) reflects on her journey as a teacher-in-training and shares techniques she has used to improve her lectures. Norman MacDonald (Computer Science) discusses the importance of exploring multiple solutions and debating the merits of one's solution. Abu Kamara (Social Work and SOSA) invites us to create an inclusive classroom through reflective teaching and learning. I discuss a teaching and learning project created to encourage learning outside the laboratory in an introductory organic chemistry course. I do hope you enjoy this issue of *Focus* which showcases the work of some of Dalhousie's great TAs. ~ Jennifer MacDonald, Graduate Teaching Associate 2009-2010

In this issue...

Engaging Students During Lectures: Lessons learned by a teacher-in-training

Hilary Moors
Biology Department

What makes a teacher a good teacher? This is a question I consistently keep coming back to over time, particularly when preparing a class lecture. No, I'm not a professor—I'm a biology graduate student who has realized that one day, if I am to continue along this path into the world of academia, I will most certainly be expected to teach. This is true of almost any research scientist who enters the realm of professorship at a university. Surprisingly, however, even though teaching courses is a major component of a career in academia (and class lectures are typically the main setting for student-teacher interactions), very few graduate students are ever formally taught how to give a lecture. I decided early on, that if lecturing was going to be a part of my future career, I needed some practice. That's why I volunteered to teach a section of one of my professor's courses. Consider me a teacher-in-training!

Four years ago I put together my first set of lectures for the fourth-year biology course "Marine Mammology". I had been given two classes to teach the students all about my research specialty: marine mammal acoustic communication! Now, as many of us prepare to give our very first lecture, we only have what we ourselves experienced as students in the classroom to guide us though the process. Unfortunately, after my undergraduate experience as a science student, my definition of a lecture had become "teacher talking for an hour while student furiously takes notes". So, my first lecture consisted of me cramming everything I knew about marine mammal sounds into two 50-minute presentations. I talked from the start to the end of class (I'm pretty sure all in one breath), and watched as students tried to keep up with their notes, eventually giving up as their eyes glazed over and their attention faded. I had lost them. I'm not sure what the students actually learned during those lectures but I walked away with a valuable lesson; just talking in front of the class is not necessarily teaching.

"Lectures should be an interaction—not a soliloquy."

My first set of lectures may not have been a success, but they did inspire me to really start thinking about my own teaching style and how students learn effectively. I didn't have a lot of hands-on practice when it came to teaching, but I found thinking back to my own experiences as a student (more carefully this time), helped me to start figuring out the qualities that I believe make good teachers. For me, enthusiasm was important. I looked forward to even what I thought would be the most boring subject if the professor was excited about what they were teaching. The classes I enjoyed most were those taught by professors who really seemed to care about the course material and the students. These professors were approachable. They took the time to prepare well-organized lectures with clear messages. They gave us examples to which we could relate. They asked questions and initiated discussions. They gave us the opportunity to ask our own questions. They didn't just talk – they got us to engage with the material we were learning.

Keeping these things in mind, I was ready to try lecturing again. Each year for the past few years, I've taught that very same section of Marine Mammology. I don't give exactly the same lectures every year though; they seem to continually change as I try to improve them and incorporate what I learned from previous years. I'd like to share with you some of things that I've leaned as a teacher-in-training, which I believe have increased student engagement during my lectures.

Less is more

It was clear that the first thing I had to change was the amount of information in my lectures. Students can only be expected to manage so much when it comes to new information, and reducing the quantity of material you present to an amount that they can actually follow along with (and remember) is key to holding their attention. But this isn't as easy as it sounds. I

had difficultly cutting out material from my lectures at first, because everything seemed important and I wasn't sure what to leave out. This brings me to the next lesson I learned…

Know your goals

Around the time I was trying to whittle down my lectures, I was taking a course on teaching in higher education where we were discussing the importance of aligning what you teach with the learning goals you have set for your students. It had never really crossed my mind that a lecture should have a specific goal (other than to impart all of my hard-earned wisdom onto students), but this made a lot of sense. After all, how could I narrow the focus of my lecture if I wasn't even sure what my focus was? By asking myself "what's the take home message I'd like students to walk away with?" I was able to establish a goal for my lecture. I wanted students to understand that sound is very important to marine mammals, and I wanted them to know why. After determining the purpose of my lectures, it was much easier to decide what information should be included and what wasn't necessary to get the message across. For example, it wasn't crucial for me to explain the physics of sound transmission, but discussing how marine mammals use sound was important. After establishing a clear goal, my lectures became more organized, much easier to follow, and were better received by students.

Encourage participation

One of the comments from a peer-observer who sat in on my lectures a couple of years ago, was to give students more opportunities to ask questions. This was a scary concept for me; I was just starting to get comfortable with talking in front of students, and now I was going to give them the opportunity to ~gulp~ talk back. Despite my nervousness, I tried it out and found that answering student questions wasn't all that bad, and in fact made me feel that the students were actually interested in what I had to say! The biggest problem with this approach was that I found that asking students if they had any questions, more often than not resulted in silence, when I really did want to hear what they had to say.

Ask questions

The next time I gave my lectures, instead of soliciting questions, I asked them. I thought of very specific questions that the students should be able to answer based on what was presented to them. I found that the students were more likely to participate if asked questions, and sometimes my questions even generated discussion among students. Student responses to questions also allowed me evaluate if I had been able to get my message across, and if I hadn't, to take the time to explain it more clearly right there in class. At the end of a more recent set of lectures I found a great use for questions: asking students to write down (and hand in before leaving) one thing that they learned or liked from the lecture, and one thing they didn't understand. This exercise is often called a one-minute reflection. The answers the students handed in gave a pretty clear indication of the strengths and weaknesses of my lectures—a great start for making improvements for the next time around!

Change it up

The strange thing about lectures is that you don't have to (and probably shouldn't) lecture the whole time! I've found that students respond very positively when other activities are incorporated into the class. You can tell a story relevant to the material you're teaching, or talk about related research of yours. You can ask students to talk about their own experiences, initiate a discussion, or quiz them on what you just presented. I like to play marine mammal sounds during my lectures. Doing so helps drive home the point of how important sound is for marine mammals. I listen to whales all day and get excited when I share that part of my research with others. The comments I've received from the one-minute reflections show that students can see and appreciate my enthusiasm, and that they enjoy the sounds as much as I do (I've had many comments on how the sounds are their favorite parts of the lectures). There are many options out there when it comes to changing up your lecture. You just have to be willing to try them out.

Don't be afraid to try something new

This brings me to the final point I wanted to make as a teacher-in-training: teaching itself is a learning experience, so don't be afraid to try something new! Lectures should be an interaction—not a soliloquy. So, find ways to get your students engaged. In my case, trying new things has completely changed my approach to teaching, and the lectures I give today are much improved over my lectures of the past. I find that students are more engaged during my lectures now, and I have a lot more fun teaching the classes too!

The Importance of Multiple Solutions

Norman MacDonald
Faculty of Computer Science

For many of the concepts we teach the final answer is not as important as the careful analysis of many possible solutions to a problem. There is rarely just one valid answer; however, some answers are better than others. Allowing time for divergent thinking and developing multiple solutions to a problem lets students play and think of alternative interpretations that can help them develop their creativity and critical reasoning skills. Students may also get hung up on trying to figure out the "best" solution, but by considering any good solution, students may become more confident in tackling new problems.

One opportunity that teachers can use to help students in their divergent thinking is when the solutions students come up with are not correct. Rather than simply giving the preferred solution, finding where the student went wrong with his or her method and giving an acceptable solution for that specific implementation can help leverage a student's learning. This can also help students in the future when they are faced with a difficult on-the-job problem. They will have learned to tackle problems head-on, critically considering multiple methods of applying the theory that they have learned.

Critical thinking and reflection

Divergent thinking is a valuable skill that students should develop in every discipline. Asking students to ponder the merits of various solutions can give rise to critical thinking skills, a core goal of every university program. Students can reflect on their own completed works, and, even if they are correct, think of other approaches they could have taken. Perhaps there is a shorter method, or perhaps a longer method that provides more intellectual satisfaction. Many mathematical formulas that we ask students to use have been boiled down from much longer, but possibly more insightful, formulas. While getting students to derive formulas does let them see where the relationships lie, it is perhaps useful to remind them from time-to-time of the longer method of solution when they are applying the formula. After they have been diligently working hard on a problem, the information is most relevant and they will be much more ready to internalize it. This training in self-reflection and assessment is a valuable life skill for the future; there will not always be someone present to evaluate performance.

Debating merits

Course performance, in terms of grades, is something that students compete with one another about. This competition is a valuable tool to get students to push themselves to master difficult material. However, this sometimes intense competition may, in part, give rise to anxiety about trying new solutions, thus partly stamping out creativity and critical reasoning. I believe we can leverage competition in order to develop divergent thinking skills and not strangle creativity. If we accept various solutions, and not give much more credit to the preferred solution, I believe that students will compete with one another, not on grades, but on the merits of their individual solutions. We can do this by instigating debates on various (anonymous and correct) submitted solutions, asking students to reason about the advantages and disadvantages of each, being sure to state that all are valid approaches.

Application

By encouraging debate, we can develop students' communication skills. Many students who will

go on to work in industry will need to effectively communicate the merits of his or her own solution, as well as to listen and weigh alternative ones. After their education, they will have to solve previously unseen problems, where the beautiful, 'best', solution would be nice, but a valid solution is what is actually required. Ensuring that students have the tools to get a valid solution to a problem should be a core goal, followed closely by the developing ability to critically think about their own work and how to improve upon it with other solutions.

"Divergent thinking is a valuable skill that students should develop in every discipline."

Taking ownership

Students should feel like their solutions are their own, not a regurgitation of the best solution an expert discovered. Developing divergent thinking skills can help foster students in taking ownership of their solutions. I believe that students can have fun learning if they change the question from "What is the solution to this problem?", to "How am I going to solve this problem?" As a teaching assistant in computer science labs, I see students who struggle with reasoning whether they should structure code such that each module is concerned with only a specific and limited task, or use encompassing modules that overlap multiple tasks. I ask them to think through the advantages and disadvantages in structuring code each way. Though many students are frustrated by not being given a straight answer, I have always found that when the light comes on the extra intellectual effort is rewarding for them. Quick praise (e.g., a simple "that's it!") and affirmation that they did the right thing, goes a long way to cementing the information, and giving them confidence to not be afraid to explore a concept for which they do not already know the answer.

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An Invitation to Reflective Teaching and Learning:
A conceptual framework for creating an inclusive classroom culture

Abu Kamara, *IDPhD Program Social Work and Sociology & Social Anthropology*

Defining reflective teaching and learning

Unreflective teaching is teacher-centered instruction that pays little attention to individual learner needs. Characterized by a lack of direct engagement, unreflective teaching and learning perspectives do not readily submit to critical self-analysis, which leaves all the forces that frame the learning environment veiled and unexamined. To weaken the strong hold of unreflective teaching and learning on higher education, some researchers and instructors have experimented with various student-centered and community-centered approaches. One such method is reflective teaching and learning.

Defined partly as willingness to recognize that the degree of learning that takes place in the classroom is predetermined, to a certain extent, by the individual histories of instructors and learners, reflective teaching and learning offers an alternative teaching and learning method that seeks to open communication between instructors and students. Both learners and instructors bring different learning histories to the classroom. These histories coalesce to form the teaching or learning lenses, which may predispose the bearer to only see certain interpretations. Previous informal and formal education makes up the most fundamental aspect of the learner and instructor lenses. For example, my teaching lens is made up of knowledge that arises out of an interdisciplinary framework. I believe that integrating different modes of thinking provides a rich perspective for understanding a given subject matter. Consequently, my teaching preparation has included the combination of concepts from a wide range of disciplines to appeal to different learners. For learners who are not familiar with this approach, reflective learning would provide an avenue by which students could explore interdisciplinary work with the support and encouragement of the instructor.

Applying reflective teaching and learning methods

The first step in building a reflective teaching and learning frame of mind is developing the ability to critically look at the present through a historical lens. Objectivising both the learner and instructor lenses allow for both instructors and learners to begin to understand how previous learning experiences shape the present.

A good example that captures this is my evolution as a social scientist. With most contemporary migration research focusing primarily on economic variables, I quickly realized that, if I were going to be able to contribute to the expansion of our knowledge on migration related issues, I had to first develop a broader research lens. Objectivising my predominantly socio-economic research lens allowed me to come to the realization that disciplines like psychology, history, anthropology and linguistics all offer strong concepts that can improve my understanding of migration. According to Malcolm Knowles (1980), this "self induced dissatisfaction with the present inadequacies, [which is generated by self-diagnosis], coupled with a clear sense of direction for self improvement is in fact a good definition of 'motivation to learn'." (p.48) The locus of control in this case becomes intrinsically anchored instead of extrinsically situated. The idea of self-diagnosis can also be implemented in the classroom setting, via small groups.

Self-diagnosis is beneficial for several reasons. Because it is based on the principles of life long learning, new competency models can always be created to address evolving learner needs. The process of self-diagnosis is an effective tool for helping students develop as self-directed learners. Self-diagnosis allows instructors

> *"...the learning journal tracks the growth of students and can motivate continued critical thinking."*

to match students to knowledge instead of knowledge to students.

Knowles (1980) states, "one of the strongest impulses that students have is to show how good they are. So the notion of engaging in a self-diagnostic process for the purpose of revealing one's weaknesses—one's needs for additional learning—is both strange and threatening." (p.229) Overcoming this barrier is crucial to self-directed learning. To accomplish this, students must adopt a reflective approach to learning. To help students develop this perspective, instructors must offer presentations on the benefits of self-reflective learning and self-diagnosis. Learning assessments within this student-centered and reflective framework is seen as an opportunity to not only measure current competency levels, but also as a way to generate future learning objectives.

Building a reflective teaching and learning framework

In his essay "How we think" written in 1933, Dewey states that persons do not just think at large, nor do ideas arise out of nothingness—even ideas have histories. Questioning the applied impact and role of both the results and conditions of previous learning experiences is crucial to reflective teaching and learning. Consequently, the process of making meaning in the classroom has a history as well. The past experiences of both students and instructors help determine the amount of learning that happens within a given learning environment.

Take, for example, my first teaching experience during the first year of my PhD. I was solely responsible for preparing lectures, teaching and marking student papers. In all, I taught the same class in two consecutive semesters. The two classes presented very different challenges. My first experience teaching the class was more straight-forward than the second. I found that the students in the daytime class were, on average, more focused and prepared for class on than students in the nighttime class. Given my student-centered approach to teaching, it was more difficult to have the kind of robust discussion I wanted for students during the nighttime class. Arriving at this realization has helped me personalize my teaching practices and tailor my teaching methods to reflect the fact that students' lives outside the classroom affect their lives inside the classroom.

Recognizing the historical component of the learner and instructor lenses is a fundamental notion within the reflective teaching and learning framework. Because of this historical component, both learners and instructors share the responsibility of reflecting on past learning for the purpose of improving respective teaching and learning abilities. Without this, differences in the level of preparedness and unreflective teaching approaches are likely to combine forces to successfully sabotage the learning process.

Building a reflective teaching perspective includes helping students to develop the essential tools for challenging distorted beliefs about learning capabilities that may either reduce their level of commitment or threaten to completely derail their commitment to learning. One technique that has worked for me is the introduction of learning journals to my students. I have encouraged my students to keep learning journals to document in-class and out-of class comments, questions and reactions. When read in retrospect, the learning journal tracks the growth of students and can motivate continued critical thinking.

I learned this journaling technique from my undergraduate advisor. We met weekly on Friday afternoons for a creative hour of reading each other's poetry. She encouraged me to keep a journal for grappling with some of the issues raised in the poems. Our time together was instrumental in the development of my critical thinking skills, which directly correlated to an increased self-efficacy in my learning capabilities. This example illuminates how learning diaries can not only be used as a tool for building self-efficacy but also ultimately for

finding one's academic voice.

Building a reflective teaching and learning perspective also includes becoming aware of the demands students have to meet with their education and adopting a problem based approach to offer students the best chance at meeting the identified need. It also includes the development of a teaching self-awareness that seeks to bridge the gap that divides instructors and students. It includes the development of a community of learners wherein both students and teachers construct knowledge together. It includes the recognition that self-efficacy and social efficacy play a part in the learning process, and also, the recognition that attribution, which is what students attribute their failures and successes to, is important. Finally, it means breaking with conservative teaching methods that seek to maintain a distance between teachers and students. Ultimately, the building of an inclusive classroom and development of self-reflectivity within a classroom setting is only possible with a strong commitment to the principles of life-long learning and self-directed learning.

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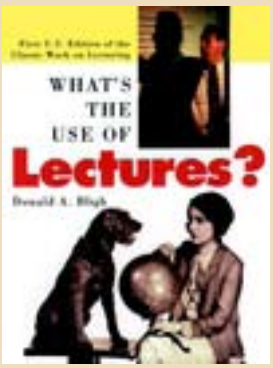

What's the Use of Lectures?
by Donald A. Bligh

Donald Bligh draws from decades of research and hands-on experience to help college and university teachers develop and use lectures effectively. What's the Use of Lectures? is an indispensable guide for anyone who aspires to be a skilled lecturer and teacher. It examines the nature of teaching and learning in a classroom lecture--describing how students learn, how much knowledge they retain, and how to enhance their attention and motivation. Bligh builds on this information to share strategies for creating organized, thoughtful, and effective lectures. Topics include taking notes, using handouts, practicing different formats and styles, obtaining feedback, overcoming difficulties, evaluating the lecture, and testing alternative methods when lecturing is not adequate.

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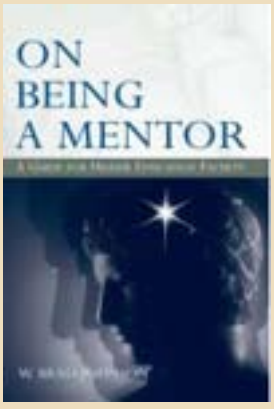

On Being a Mentor: A Guide for Higher Education Faculty
by W. Brad Johnson

The definitive guide for faculty in higher education who wish to mentor both students and junior faculty. It features strategies, guidelines, best practices, and recommendations for professors who wish to excel in this area. Written in a pithy style, this no-nonsense guide offers straightforward advice about managing problem mentorships and measuring mentorship outcomes.

Engaging the Online Learner: Activities and Resources for Creative Instruction
Rita-Marie Conrad, J. Ana Donaldson

Includes an innovative framework—the Phases of Engagement—that helps instructors become more involved as knowledge generators and cofacilitators of a course. The book also provides specific ideas for tested activities (collected from experienced online instructors across the nation) that can go a long way to improving online learning.

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2010 Recipient of the Dalhousie President's Graduate Teaching Assistant Award

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"Sarah is always ready and willing to answer questions and help a troubled undergrad. She made me think about how to arrive at an answer to a problem, and she showed me how to perform a technique properly for the first time. Sarah is a great TA." ~ from a student

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Learning Outside the Laboratory

Jennifer L. MacDonald, *Department of Chemistry & Centre for Learning and Teaching*

In chemistry, many courses require a hands-on laboratory component. In CHEM 2401 (Introductory Organic Chemistry), students are required to complete pre-laboratory exercises in their lab notebook prior to each lab experiment. These exercises aim to familiarize the students with experimental procedures, instrumentation and theory of each experiment. Despite the learning goals intended to be achieved with pre-lab exercises, it is evident that some students only do the bare minimum to answer the questions to receive credit, and thus are not prepared for conducting these experiments. This problem became particularly evident to me in the polarimeter experiment, which includes pre-lab exercises as well as an in-lab quiz designed to test students' knowledge of operating the polarimeter instrument. This particular experiment is plagued by poor quiz grades and frustrated students requiring extra time to complete their measurements.

As a new teaching assistant in 2006, I had time to practice using the polarimeter prior to the lab experiment. At this point in my academic studies I had learned the theory of polarimetry but this was the first time I actually had seen and was able to use a polarimeter. If teaching assistants are offered a session prior to the laboratory experiment to learn how to read the polarimeter and practice taking readings, students should also be afforded the same privilege, but how could this opportunity be given to hundreds of students where instrument time and individual student schedules are restrictive?

I decided to create a learning module that would help students prepare for the polarimeter experiment with a strong emphasis on reading the polarimeter and skills necessary for completing the in-lab quiz. My initial plan was to hold 2 or 3 tutorial sessions prior to the lab session; however, it quickly became apparent that with mid-term exams approaching and differing student schedules, participation may have suffered. Knowing that the class had an active Blackboard Learning System (BLS) page, I pursued the possibility of offering the learning module online as this would allow students to participate at a time convenient for them.

Schematic Scale [4]

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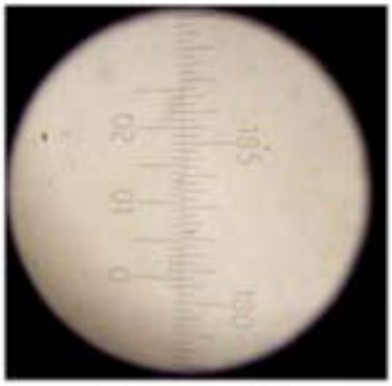


Polarimeter Scale

Chittleborough *et al*. [1] and Limniou *et al*. [2] report that the use of online learning modules for pre-lab exercises improves student understanding of theory and experimental procedures. Students enjoy the flexibility to learn at their own pace (with multiple attempts) at a time that is convenient for them, prior to the experiment. Similarly, in the Department of Chemistry's successful "Concepts in Chemistry" program [3], students are very receptive to the online learning modules and vignettes which allow them to learn at their own pace, catch up on a concept they are struggling with, and review for tests and exams. With these ideas in mind, I created the online polarimeter module as an optional resource to students and the pilot run was delivered to all students enrolled in CHEM 2401 in Fall 2008.

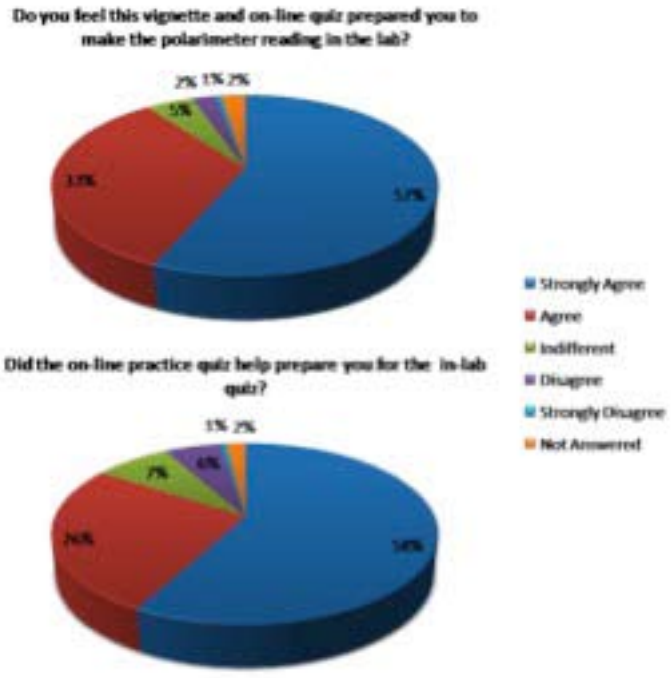
The pilot run of the online polarimeter module included a vignette, self-assessment quiz (unlimited attempts), and a short feedback survey. Since the students couldn't physically gain access to the instrumentation prior to their lab session, the vignette aimed to familiarize the students with the instrumentation and the required calculations using photos, video , step-by-step problem solving, and narration to deliver the material in an interactive way to supplement the experimental

write-up in the course lab manual. For example, in the online module, students were able to practice reading both schematic scales (like those shown in the lab manual) and actual scales that they would see upon looking into the polarimeter eyepiece.

After watching the vignette, students could test their knowledge with a 10 question self-assessment quiz with unlimited attempts. Following the conclusion of the in-lab experiment students were invited to fill out a short feedback survey online about the learning module.

After reading the survey results, I was thrilled to find that the module was so well received by students. They also made some excellent suggestions for improvement of the module. Students thought that more examples and more self assessment quiz questions would be beneficial. Based on student feedback, future modules were modified to include a quiz with a larger question bank, so that a new quiz was randomly generated for each new attempt as well as a problem set, complete with a solution key.

In total, the polarimeter module has been offered to three classes during 2008-2009. Over the course of three terms, the majority of students rated the vignette as excellent, and strongly agreed that the module prepared them for the lab experiment and quiz. "I thought the vignette was a GREAT idea. It made things very clear as well as gave students a chance to "practice" lab procedures before going to lab. Sometimes it is very difficult to visualize what you will be doing in an experiment and tools like this are so useful," said a CHEM 2401 student. When asked if they would like to have similar modules for other laboratory experiments, 81% of student respondents said "yes". It is evident that there is great potential for further online learning tools for pre-laboratory exercises and students truly appreciate opportunities to learn about up-coming lab techniques prior to the experiment. By increasing student awareness of the importance of these online learning tools, students would be more likely to engage in these types of learning activities, as well as use their in-lab time more efficiently.



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Absent: Alain Joseph, Nancy Salmon, Andrea Chircop, Hadi Hadjkarim Kharrazi

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