ABSTRACT 
To address the lack of both Teaching Assistant training and the support of teaching skill development in graduate students, the Department of Earth and Ocean Sciences at the University of British Columbia began a graduate course, entitled Teaching and Learning in the Earth and Ocean Sciences, in 2007. This course is based on the Instructional Skills Workshop model in that students have the opportunity to teach three mini-lessons and receive feedback from their peers. In addition, topics of learner-centered pedagogy are explored throughout the semester and the course culminates in a lab redesign project. Pre- and Post-Course Teacher Attitude surveys show a substantial increase in teaching confidence. Course evaluations indicate that the course is both popular and effective; in the three years the course has been offered, all participants that filled out the summative evaluation forms say they will recommend it to other students. Going forward, this course will continue to develop the confidence and instructional skills of the teachers who spend the most time with undergraduate students: our graduate students.

RATIONALITY
Every year, graduate students in the Department of Earth and Ocean Sciences (EOS) contribute to the delivery of more than 50 undergraduate courses, interacting with more than 2000 students. The department employs approximately 60 Teaching Assistants (TAs) per year, at an average rate of 6 hours per week per TA. EOS TAs contribute to the education of our undergraduates in many ways: they run laboratory sessions, lead in-class tutorials and mini-lectures, support students one-on-one at our help centre, lead field trips, and mark assignments and exams. Until 2007, our department had no formal system to train and support TAs; experience was gained on the ground with (or lack of) support of the course Instructor and fellow TAs. The obvious limitations of “training by practice” was compounded by a relatively high turnover rate; each year, approximately 30 new TAs start teaching in the department. Recognizing the important role TAs play in the education of our undergraduates and the opportunity for professional development for graduate students, the Earth and Ocean Sciences department began a graduate course in 2007, entitled Teaching and Learning in the Earth and Ocean Sciences (EOSC 516). EOSC 516 is based on the Instructional Skills Workshop model, which is an instructor development program offered by many universities across Canada and abroad.

LEARNING GOALS
By the end of the course, students will be able to:
• Effectively evaluate peers and provide constructive feedback
• Create an environment conducive to learning for diverse groups of students
• Develop strategies for fostering student inquiry and independent learning in Earth and Ocean Sciences while meeting students’ needs for support
• Formulate learning objectives for TA-led activities in Earth and Ocean Science courses
• Engage in critical reflection on one’s own teaching practice
• Design and implement one or more assignments for Earth and Ocean Science courses using the frameworks provided in the course

THE EVOLUTION OF EOSC 516
EOSC 516 has gone through several iterations since it was first envisioned. Initial development of the course was led by a committee of current and recently completed graduate students. Subsequent changes have been based on course feedback and recommendations of the Instructor and Head TAs.

2007
• Changed from a two-day workshop offered at the end of August to biweekly meetings

2008
• Course assigned a 2-credit weighting
• Added a lab redesign project
• Began using Pre/Post Teaching Attitudes survey for assessment

2009
• Improved documentation of workshop material (handouts, presentations, etc.)
• Changed from a graded course to a Pass/Fail course

Proposed Changes for 2010
• Reduce the workload of the lab redesign activity and introduce a series of smaller assignments
• Facilitate a theme session about extra credit options with CWSEI and other teaching resources

What part(s) of the course did you find most useful? Why? “I think the mini-lessons helped me in building my self-confidence and being effective at choosing material”

MINILESSON CYCLES (3 small group meetings)
• Mini-lessons
• Video Recording
• Reflection
• Peer Feedback

PEDAGOGY THEME SESSIONS (4 large group meetings)
• Theme Sessions
• Paper and Pedagogy Discussions
• Paper Review

COURSE ASSIGNMENTS (independent work and study)
• Paper Readings
• Reflections
• Lab Assignment

COURSE STRUCTURE

Course meetings occur every 2 weeks, alternating between large group (all enrolled students) and small group (4-5 students) sessions. A total of 7 meetings occur throughout the semester.

Pedagogy Theme Sessions (large group sessions)
Large group sessions are designed to encourage class participation in pedagogical and literature discussions, and to engage students in a variety of activities. Theme activities are designed to follow teaching models presented in the course, which students are encouraged to use in their lessons (see Mini-lesson Cycles). Both the course Instructor and Head TAs lead theme sessions, which allows for variety in lesson planning and teaching style, and also offers valuable teaching experience to Head TAs.

Mini-lesson Cycles (small group sessions)
The class is divided up into working groups of 4-5 students that meet three times throughout the semester. During each small group meeting, a Head TA will facilitate a mini-lesson cycle. Drawing specifically from lesson planning and learning objectives theme sessions (see Pedagogy Theme Sessions), each student completes a microteaching cycle, which includes: teaching a 10-minute lesson, reflecting on that lesson, and receiving verbal and written feedback from their peers. Lessons are also videotaped for later viewing and reflection (see Course Assignments). The main objective of the mini-lesson cycle for students is that in addition to teaching and obtaining feedback, each student also observes and provides feedback on peers’ mini-lessons. Throughout the semester, participants also propose teaching challenges for their peers, as risk-taking is emphasized in later meetings. Challenges are wide-ranging, they can target technological crutches, encourage students to teach a lesson in a different domain of learning, or even suggest a difficult topic.

Course Assignments
The course assigns a variety of assignments. Prior to each large group meeting, students read an assigned paper in preparation for class discussion. After each small group assignment they reflect on recordings of their mini-lessons. During Pedagogy Theme Sessions, students have the opportunity to share their ideas and comments based on their reading and reflection. Students also complete one larger assignment during the semester; they have the option of conducting an interview of a novice or redesigning one of the labs offered within EOS.

PRE/POST TEACHING ATTITUDES SURVEY

Starting in Fall 2008, we began to use a Teaching Attitudes Survey (Based on one developed in the Department of Physics and Astronomy at UBC). The survey presents a series of statements and gauges respondent agreement to those statements using a 5-point Likert scale. Attitudes are notoriously difficult to change, especially over short time scales such as one semester. In general, we found that students taking EOSC 516 have expert-like attitudes. For many survey statements, the majority of the class did not significantly reevaluate their opinions over the course of the term (for example Figure 1).

On questions gauging teaching confidence, however, students are much more confident by the end of the course (Figure 2).

Would you recommend this course to other graduate students in EOS? Why or why not? “Yes. Great way to learn effective teaching methods in EOS if you don’t have the time to take an Education Degree.”