W. E. Harris Teaching Workshop:
Teaching Analytical Chemistry

August 15-16, 2016

Department of Chemistry University of Alberta

Monday, August 15 Gunning-Lemieux Chemistry Centre

9:00-9:30 am Introduction and Welcome by organizers (**room E3-25**)
Discussion of Workshop Goals
Organization of Breakout Discussion Groups and Topics

9:30-10:30 am *Breakout Session 1*, various locations.

Each group is to introduce themselves and share what your objectives, challenges and desired workshop outcomes are. These discussions will form the topics for the subsequent breakout sessions. Some of the topics already suggested are:

Lab Projects, Environmental Analysis, Innovative Laboratory experiments, Marking unknowns in instrumental experiments, Trouble shooting and maintenance of instrumentation, Control charting and LIMS in student labs, How to engage students in analytical labs, Types of instrumentation used in instrumental laboratories.

Developing problem solving skills in labs, Scaffolding labs to help students identify important vs supporting information, Calculation of experimental error, Experiential learning (industry, research, entrepreneurship, etc.), opportunities in analytical chemistry undergraduate and graduate programs.

What do we teach: Systematic equilibrium? Spectroscopy? Instrumentation? New techniques in solution and sample preparation? Global warming? Data analysis / statistics?

How hard do we make the subject? Which learning objectives to prioritize at different year levels of anal chem labs? How do we incorporate active learning? Flipped classrooms? Case studies?

How do we tell if our teaching is effective for analytical chemistry learners?

10:30-11:00 am Coffee & exhibition (E1-60)

11:00-12:30 pm *Strategies for Effective Active Learning* by Dr. Jill Robinson, Indiana University (E1-60), sponsored by U. Alberta Centre for Teaching and Learning

Many recent studies have shown that students perform better in an active learning setting than in a classroom with traditional lecturing. However, there is not one clear definition for active learning and this pedagogy can be implemented in a variety of ways. This presentation will answer the questions, “What is active learning?” and “What key components make active learning effective?” Challenges to the implementation of active learning and potential solutions will be explored. Methods for preparing students for class, forming effective groups, designing classroom activities, and providing feedback will be discussed in the context of large and small class sizes.

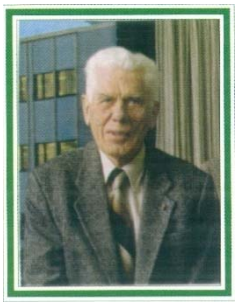
Sponsored by the Department of Chemistry, the Faculty of Science and the Centre for Teaching and Learning at the University of Alberta, and by Wiley, McGraw Hill, Nelson, and Pearson Canada.

12:30-1:30 pm	Lunch & exhibition (E4-43)
1:30-2:45 pm	*Breakout Session 2*, various locations each discussing a different topic. Current topics include: *Activating a Lab Experiment* led by Jill Robinson (E3-25). Bring your lab manual. *SmartBook Adaptive Learning Technology*, McGraw Hill Education (W1-50) Additional topics from Breakout Session 1
2:45-3:15 pm	Coffee & exhibition (E4-43)
3:15-4:30 pm	Reports from Breakout Groups (E3-25)
5:00-7:00 pm	Reception at Devaney's Irish Pub (Downstairs), 11113 87 Ave NW

Tuesday, August 16 E3-25 Chemistry (Gunning-Lemieux) Centre

9:00-9:30 am	Convene in E3-25; Organization of Discussion Groups
9:30-11:00 am	Breakout Session 3, various locations. Topics will include: *Activating an Analytical Lecture* led by Jill Robinson (E3-25). Bring electronic copies of a few lectures to workshop them. Other topics from Breakout Session 1
11:00-11:30 am	Coffee & exhibition (E4-43)
11:30 -12:30	Breakout Session 4, various locations). Topics will include: *Active Learning and Academic Reading*, Brett McCollum, Mount Royal (E3-25) *What does industry want us to teach?* with special guests Devin Sears of Gilead, Ken Schmidt of Wilson Analytics and Nicole Heshka of CanmetENERGY. Other topics from Breakout Session 1
12:30-1:30 pm	Lunch & exhibition (E4-43)
1:30-2:45 pm	Reports from Discussion Groups
2:45-3:00 pm	Coffee (E3-25)
3:00-3:30 pm	General discussion, Conclusions, and Follow-up Planning
3:30 pm	Adjourn

The W. E. Harris Teaching Workshops



Each year the Walter E. Harris Teaching Workshop brings together select university and college chemistry instructors from across western Canada to the University of Alberta to discuss a specific aspect of teaching undergraduate chemistry. Summaries of previous workshops are at http://tinyurl.com/zyrme9o.

The workshop series was established in 1976 by late professor emeritus and former department chair Walter E. Harris. This workshop was re-established in 2003 and has since been endowed in his honour. Any donations to this endowment would be greatly appreciated.

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University of Alberta
Department of Chemistry

W.E. Harris Teaching Workshop
Invited Speaker

Jill K. Robinson

Senior Lecturer, Chemistry Department
Indiana University, Bloomington, Indiana

"Strategies for Effective Active Learning"

Abstract:
Many recent studies have shown that students perform better in an active learning setting than in a classroom with traditional lecturing. However, there is not one clear definition for active learning and this pedagogy can be implemented in a variety of ways. This presentation will answer the questions, "What is active learning?" and "What key components make active learning effective?" Challenges to the implementation of active learning and potential solutions will be explored. Methods for preparing students for class, forming effective groups, designing classroom activities, and providing feedback will be discussed in the context of large and small class sizes.

Lecture details: 15 August 2016 at 11:00 a.m. in Chem E1-60
Refreshments provided

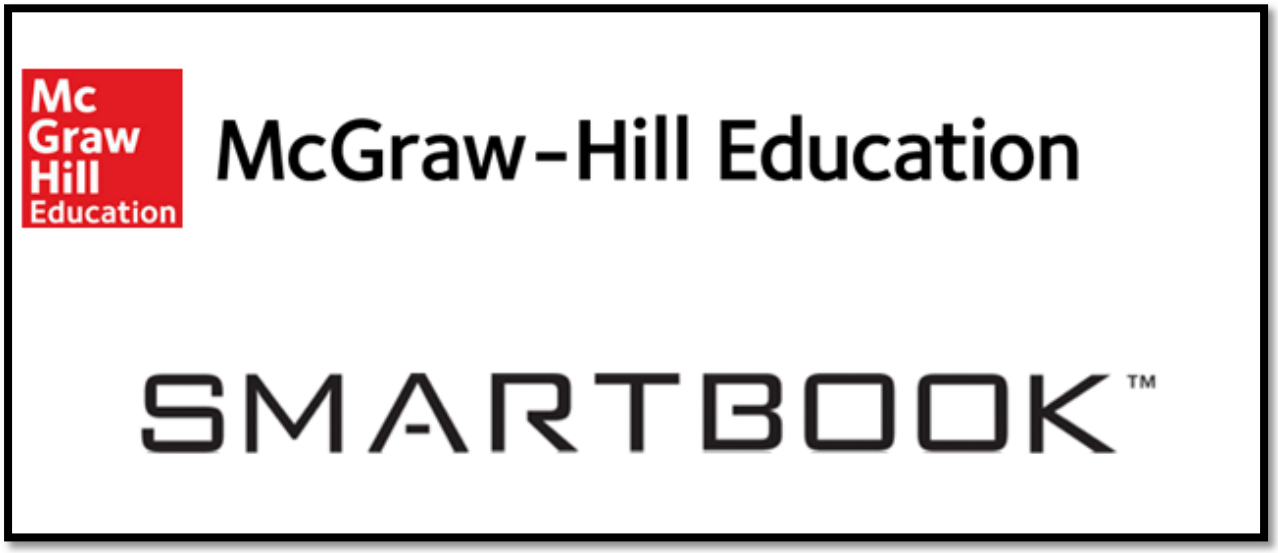
Short Biosketch:
Jill Robinson is a Senior Lecturer in the Chemistry Department at Indiana University and teaches courses in general, analytical, environmental chemistry. She has a B.S. in Chemistry from Truman State University and a Ph.D. in Analytical and Atmospheric chemistry from the University of Colorado in Boulder. Her graduate work with Professor John Birks was the development of a portable instrument for measuring nitric oxide in the atmosphere and human breath. She is a coauthor of *Chemistry 7th Ed.*, by McMurry, Fay, and Robinson and published by Pearson Education. For the past five years she has been a participant in a National Science Foundation Transforming Undergraduate Education grant to develop and disseminate active learning materials for analytical chemistry. She enjoys chemistry outreach and has facilitated K-12 teacher workshops in project-based learning and nanoscience education. Jill has been honoured with several teaching awards including the President's Award for Distinguished Teaching at Indiana University. Most recently, Jill joined the first group of Mosaic Active Learning Fellows at IU. The Mosaic group is studying active learning methods as well as active learning classrooms.

The Harris Teaching Workshop would like to acknowledge this year's sponsors: The University of Alberta's Centre for Teaching and Learning, The Faculty of Science, The Department of Chemistry, and Corporate Sponsors: Wiley, McGraw-Hill Ryerson, Nelson, and Pearson Canada.

University of Alberta
Department of Chemistry

Chemical Education Presentation

SmartBook Adaptive Learning Technology



Abstract:

McGraw-Hill Education is excited to present SmartBook, our award winning adaptive technology and explore how incorporating SmartBook adaptive reading before class can lead to better outcomes: students are more engaged, can better prioritize their time, and come to class ready to participate.

In 2015, SmartBook won the Best Learning Capacity-Building Solution honour at the SIIA CODiE Awards. The CODiE Awards are one of the most recognized in the software industry.
http://www.siia.net/codie/

The presentation is organized as part of the 2016 W.E. Harris Teaching Workshop (www.ualberta.ca/chemistry/news-and-events/events/we-harris-teaching-workshops), but is open to all interested chemical educators.

Lecture details: 15 August 2016 at 1:30-2:45 p.m. in Chem W1-50, Gunning/Lemieux Chemistry Centre, University of Alberta

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University of Alberta
Department of Chemistry

Science Education Presentation

Active learning and academic reading:
a systemic approach using academic reading circles and OWLv2 in flipped chemistry classrooms

Brett McCollum

Apple Distinguished Educator,
Nexen Scholar
Mount Royal University

Lecture details: 16 August 2016 at 11:30-12:30 p.m. in Chem E3-25, Gunning/Lemieux Chemistry Centre, University of Alberta

Abstract on next page

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Abstract:

Do most university students read their textbooks? Evidence suggests the answer is 'no'. Can university students read university-level textbooks? Shockingly, many faculty say the answer is 'no'. Flipping the classroom is a popularized method for stimulating active learning and increasing student engagement with course concepts. This has been particularly embraced within science and mathematics education. However, the use of preparatory videos, as proposed by Bergmann and Sams (2012), has been found to further suppress student textbook reading habits.

A flipped-learning approach that focused on reading and chemical language development was developed for general and organic chemistry at Mount Royal University. The results are both reassuring and surprising. Participant interview comments, student reflections, and student evaluations of instruction were coded following the practice of grounded theory, an inductive set of procedures that allowed researchers to develop abstract categories from individual responses and focus groups (Glaser and Strauss, 1967; Glaser and Strauss, 2009).

The reassuring aspects of the conclusions relate to particular features of my flipped approach: academic reading circles (ARCs) (Daniels, 2002; Shelton-Strong, 2012; Seburn, 2015), an online learning system (OWLv2 from Nelson-Cengage), open-response multi-attempt (ORMA) group unit quizzes, and in-class peer leaders (Gosser and Roth, 1998; Gosser et al., 2001). The role that each of these flipped techniques played in student success will be discussed.

A surprising feature of the conclusions was the interplay between student relationships, active learning, and class preparation. Finally, the impact that student perceptions of the flipped classroom should have on instructor practice will be discussed in relation to the experiences of other STEM educators, such as Yestrebsky (2016) and Van Sickle (2016). The results can guide decisions made by instructors, departments, and institutions that endeavor to undertake flipped instruction methods.

Bio:

Dr. Brett McCollum is an Associate Professor of Chemistry at Mount Royal University, a Nexen Scholar, Apple Distinguished Educator, and software developer. In addition to his recent contribution to Science Teaching in Distance Education: Lessons from Research and Practice, he has numerous publications that span a variety of fields including the scholarship of teaching and learning, interdisciplinary teaching in science and public policy, and the use of the radioactive positive muon [mew-on] as a probe of chemical reactivity. McCollum is the recipient of research awards and grants from organizations such as ACS, ACIFA, NSERC and Petro-Canada. His teaching duties have encompassed much of the chemistry spectrum: general, organic, inorganic, physical, spectroscopy, and nuclear. With his undergraduate research team, McCollum investigates the best practices for the use of mobile technologies in Higher Education, not just in chemistry but across the university curriculum.