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La Chimie Collégiale au Canada

Newsletter

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In This Issue

A FOCUS ON INCLUSIVITY AT THE 2017 C3 CONFERENCE

The 2017 C3 conference was held at the University of Toronto and included three plenary talks, 23 contributed talks and 16 poster presentations. The plenary talks were delivered by Alison Flynn, who highlighted the crucial role of learning outcomes to drive rich and meaningful assessment strategies, Carey Supalo, who provided a first-hand account of his experiences and compelling strategies for the inclusion of the blind in STEM professional training, and Deb Herrington, who highlighted the use of screencasts to promote student learning from computer simulations. While the contributed talks and poster presentations explored a range of topics, all shared the common theme of finding ways to support and engage students in the chemistry classroom and laboratory.

Alison Flynn, University of Ottawa

Carey Supalo, Education Testing Services, Princton, NJ.

Deborah Herrington, Grand Valley State University, MI.

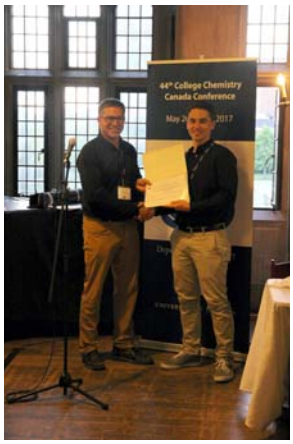
IN RECOGNITION OF…..

A number of awards were presented at the 2017 C3 conference banquet.

The C3 Host Student Scholarship was awarded to Max Olsen, a fourth year undergraduate in the Synthetic and Catalytic Chemistry specialist program at U of T.

The C3 General Student Scholarship was awarded to Mark Croxall, who is now enrolled in graduate school after completing a Chemistry specialist program at U of T.

The C3 Award for Chemical Education was awarded to Andy Dicks for his influential and significant contributions to advancing the field of chemical education at the college level.



Max Olsen receives the C3 Host Student Scholarship

Mark Croxall receives the C3 General Student Scholarship

Andy Dicks receives the C3 Award for Chemical Education

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CHEM ED CONFERENCES FOR 2018

There are a number of options for professional development in chemistry education in 2018, including our own C3 conference:

219th Conference of the 2YC3, March 16-17, 2018

This conference, from our sister organization in the US, is hosted by Delgado Community College, New Oreleans, LA. The title of the conference is Creativity, Collaboration, and Customization in Chemical Education. The program chair is Diondra DeMolle (ddemol@dcc,edu).

14th Annual UBC Okanagan Learning Conference, May 2-3, 2018

In 2018, this conference is being held in conjuction with the BC Chemistry Articulation Meeting, in Kelowna, BC. In addition to the regular stream of general education presentations, there will be at least one complete set of sessions associated specifically with teaching and learning in the chemical sciences.

45th College Chemistry Canada (C3) Conference, May 24-26, 2018

The 2018 C3 conference is hosted by the Chemical Technology Program, NAIT, Edmonton, AB. The organizing committee Co-Chairs are Paula Hawrysz (phawrysz@nait.ca) and Laura Lucan (laurentl@nait.ca). The C3 conference is immediately prior to the 101st Canadian Chemistry Conference and Exhibition in Edmonton, May 27-May 31.

2018 Biennial Conference on Chemical Education, July 29– August 2, 2018

This conference is hosted by University of Notre Dame, South Bend, IN. The deadline for workshop and symposia abstract submission is December 4, 2017. For more information about the conference, go to: http://www.bcce2018.org.

45th College Chemistry Canada (C3) Conference at NAIT

Mary Sheppard, former C3 Newsletter editor and Ph.D. candidate in Chem. Ed. at University of New-Hampshire

THE (PSYCHOLOGICAL) SCIENCE OF LEARNING

By Mary Sheppard (mary.sheppard@smu.ca), Saint Mary's University, Halifax, NS.

As scientists, we read many research articles and critically evaluate the rigour of the results. Strangely, as instructors we do not necessarily bring this same depth of attention to assess the teaching methods we employ. Most faculty teach as they themselves were once taught. How do we know these methods are working? Gauging success on the small percentage who go on to become scientists is not an impartial assessment. These students would likely succeed even if taught poorly. Where do we go for answers?

"Most faculty teach as they themselves were once taught."

When encountering a scientific problem in the lab, the published literature is our first resource. This equally applies to teaching methods! While chemistry DBER (discipline based education research) is evolving, much literature exists in cognitive psychology on the science of learning. A 2006 article in the Journal of Educational Psychology (Lee, PLass, & Homer, 2006) studied the difference between presenting pictures versus words for concepts such as pressure and temperature. Results showed that low-knowledge students are at a disadvantage and understand less if only words are used. While this may seem trivial to a person who has little difficulty understanding chemistry, it is enormous to the student sitting in class. A simple addition of a symbol next to (or instead of) a word can make the difference between understanding or confusion for the student. (In this instance, I'm secretly satisfied that my intuition to include pictures with words whenever possible has some basis in the literature).

Also in the cognitive psychology literature, an article in Psychological Science (Roediger & Karpicke, 2006) studied the effects of reading versus testing on short- and long-term learning. While frequent study or reading sessions enhance short-term retention, frequent testing enhances retention in the long-term. Interestingly, this applies even if the wrong answer was given during testing. This is the opposite to what students may think or do.

THE (PSYCHOLOGICAL) SCIENCE OF LEARNING—CONTINUED

As instructors, do we need to implement more frequent testing to assist with learning? In large introductory classes of 200+ students, how is this feasible in a meaningful way? I often wonder whether online quizzes provide the same benefits as hand-written problems?

Further delving into testing as a means for learning, Kornell et al. (Kornell, Hays, & Bjork, 2009) report that forcing a moment of questioning enhances learning. This applies even if an incorrect answer is given. The important part is the moment of challenging yourself to recall. Once again, low stakes multiple testing opportunities are beneficial. Does this benefit extend to the student completing problems at home or is it only during formalized testing? Kornell states that feedback is an important aspect and one could surmise that there is no feedback during homework problems. Perhaps peer-group homework or in-class work would encompass the feedback aspect without requiring large scale grading of 200+ students? If this is the case, does this partially explain the success of peer-learning?

Returning to the DBER literature, Pazicni and Bauer (Pazicni & Bauer, 2014) studied students' perceptions of their performance versus their actual exam performance. The association was inversely proportional with low achievers perceiving themselves higher and high achievers perceiving themselves lower. The effect persists through multiple exams and across sections and instructors. The students' subject knowledge base is mediating a perception that even exam grade feedback does not alter. This rings true as I recall many office conversations of low exam marks and persistent predictions of high achievement. If the effect is subject dependent, is there no hope for the low achievers that consistently think they will do better on the final exam? Are there strategies to make the conversation more realistic for the student?

Recognizing that student's (and instructor's) time is limited, it is difficult to know how many and what type of instructional strategies to employ in the classroom. I have to come to terms with the fact that it is not "an all or nothing" issue. Any research-based teaching strategies employed will assist with learning. One person does not have to change everything at once.

"A simple addition of a symbol next to (or instead of) a word can make the difference between understanding or confusion for the student."

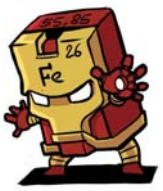
References

Kornell, N., Hays, M., & Bjork, R. A. (2009). Unsuccessful Retreival Attempts Enhance Subsequent Learning. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 35, 989-998.

Lee, H., PLass, J., & Homer, B. (2006). Optimizing Cognitive Load for Learning from Computer-Based Science Simulations. *Journal of Educational Psychology*, 98, 902-913.

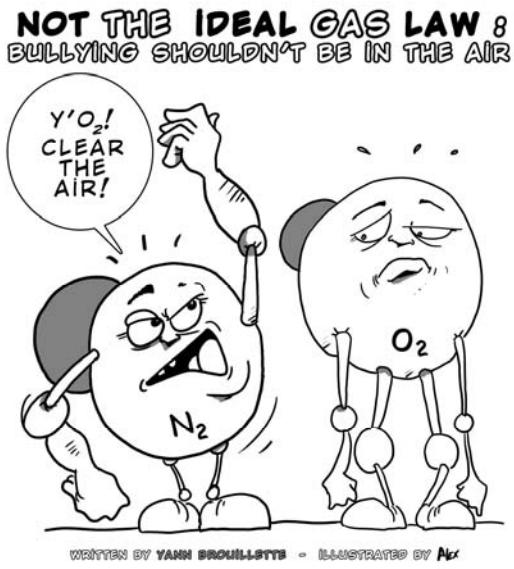
Pazicni, S., & Bauer, C. (2014). Characterizing Illusions of Competence in Introductory Chemistry Students. *Chemistry Education Reearch and Practice*, 15, 24-34.

CHEM CURIOUS VIDEOS



By Nicolas Ughen

Yann Brouillette has been busy this past summer and has produced ten new CHEM CURIOUS videos. These can be viewed on his season three You Tube channel at this link. You can also check out his Comic Book Chemistry website at this link. Finally the iron man symbol was drawn by Nicolas Ughen and the cartoon on the right was created by Alexandre Brunel and Yann Brouillette.



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FERMI ESTIMATION WORKSHOPS: DO THEY ENCOURAGE QUANTITATIVE LITERACY AMONG CEGEP SCIENCE STUDENTS?

By Ed Hudson (Edward.hudson@johnabbott.qc.ca), CEGEP John Abbott College, Ste.-Anne-de-Bellevue, QC

There appears to be widespread agreement that numeracy, or quantitative literacy (QL), is essential for informed citizenship in our data-drenched and heavily data-dependent society (Steen, 2001). Paradoxically, I often find that science students, who should have better-than-average quantitative reason skills, can be reticent to use them in unfamiliar situations.

This piece describes my practice of doing Fermi estimation ('back-of-an-envelope' calculation) workshops in two second-year environmental science courses ("Chemistry of the Environment" and "The Energy Dilemma") which I teach in the Chemistry department at John Abbott College. Students are typically given 30 minutes or so to formulate and present a strategy, and a plausible solution, to a problem for which the answer cannot readily be Googled. These problems have ranged from the highly relevant to whimsical, including:

1) A lot of hydroelectric dams are made of concrete. How much carbon dioxide is produced in the building of a 'typical' large concrete hydroelectric dam? How might a person visualize that much CO_2?
2) How many trees are there in Quebec? How much wood do they collectively contain?
3) Some years ago, a Toronto bike courier tried to claim the extra food he had to eat everyday as a business expense on his tax return. What might have been a reasonable monetary sum to claim, annually?

After the students' initial shock at confronting the unfamiliar, the exercise is generally well received, and there is often spirited discussion during the presentations, with groups challenging each other's assumptions and methods. Over 2 semesters, 65% of students surveyed agreed or strongly agreed that "This workshop made me less reluctant to roughly estimate unknown quantities", and 52% reported subsequently using the ideas outside of a course (in daily life).

Lastly, to the question mark in my title: is my conjecture (that Fermi estimation workshops encourages the development of QL) born out? There is no agreed-on definition or metric of QL (Roohr, Graf, & Liu, 2014), and I have been unable to find any studies on whether practicing Fermi estimation improves QL. How might such a study be designed or executed? I welcome your thoughts or discussion on this topic.

Ed Hudson, John Abbott College

"Paradoxically, I often find that science students, who should have better-than-average quantitative reason skills, can be reticent to use them in unfamiliar situations."

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Steen, L. A. (2001). The Case for Quantitative Literacy. In L. A. Steen. (Ed.), *Mathematics and Democracy: The Case for Quantitative Literacy* pp. 1–22: Woodrow Wilson National Fellowship Foundation, Washington, DC.
Roohr, K. C., Graf, E. A., Liu, O. L. (2014). Assessing Quantitative Literacy in Higher Education: An Overview of Existing Research and Assessments with Recommendations for Next-Generation Assessment. In ETS Research Report Series RR-14-22.

MARY SHEPPARD IS "BACK TO SCHOOL"

Mary Sheppard (mary.sheppard@smu.ca), Saint Mary's University, Halifax, NS

"Back to school" has always meant a busy time when our family transitions from the laid back days of summer to scheduled activities. This September will prove busier as I am also going "back to school". After 16 years I will once again be a graduate student as I pursue a PhD in Chemistry Education Research at the University of New Hampshire. As a possible mid-life crisis goes (I turned forty this year), it will be more expensive than a new sea kayak with all the bells and whistles. I'm maintaining my position as full-time lecturer at Saint Mary's because I love my job there. In addition to teaching three lectures, one lab and coordinating lab for 350 students, I will be taking two graduate level courses. One course is in Psychology at Saint Mary's (advanced statistics, psychometrics and qualitative survey techniques) and the other is a chemistry colloquium on recent chemistry education research via Skype at the University of New Hampshire. All this to say that time is precious and I had to cut everything else out of my schedule including C3 editor. I hope to get to C3 and CSC in Edmonton in 2018 but finances may prevent it. Who knew tuition was so expensive and that the Canadian dollar is akin to Monopoly money! I wish you all the best for the next year!

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THE PRESIDENT'S MESSAGE

Jimmy Lowe, the new C3 president, with Professor Poliakoff

Greetings C3 members,

Holy cow! The pressure is on to write the President's message. I hope your Fall term is going well whether you are teaching or on leave. As I dropped off my kids at school, I thought about that first day of class dealing with the school announcements and the "What did you do during the summer?" discussion. First, the announcements: (i) Save the dates for the 45th C3 Conference at NAIT in Edmonton (May 24-26, 2018); (ii) nominate a worthy student or deserving colleague respectively for the General Student Scholarship or the Award in Chemical Education; (iii) renew your membership (still an incredible $20). This helps to fund a portion of our awards; and (iv) pass this newsletter on to other chemical educators.

For those of you that missed it: The 2017 Conference at the University of Toronto (thank you to the organizing committee) clearly illustrated the theme of diversity and inclusiveness in chemical education with the speakers and activities. Many of us were able to stay for the following 100th CSC Conference where I met Sir Martyn Poliakoff of 'periodicvideos.com' fame. I have shown many of the videos in class and the students enjoy Professor Poliakoff's ties and Einsteinian hair. There were many opportunities for the Curious Chemistry Collective to visit labs, the science of brewing, and a Blue Jays' game.

The networking and variety of topics always motivates me to work on my teaching every year and incorporate one new thing in my class.

My summer PD was to read 'Make It Stick: The Science of Successful Learning' as I want to help my students know how to study smarter. I found the book incorporated many examples, strategies and research to helping anyone become a more effective learner or teacher.

Lastly, I would like to thank the past executive for their past work and the current executive for their continued efforts for our organization.

Best regards for the end of the term,

Jimmy

Reference

Brown, P.C., Roediger H.L. III., & McDaniel, M.A. (2014). Make It Stick: The Science of Successful Learning. Cambridge, MA: Harvard University Press.

A BIG THANK YOU!

The 2017 C3 conference marked the end off Bruno Cinel's 2 year term as President of C3. A big thank you for his service!

Bruno Cinel receives recognition for his term

C3 EXECUTIVE AND BOARD MEMBERS

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