OrganicERs Newsletter Vol. 5 No. 1

Organic Education Resources

A *cCWCS* Community of Scholars

BCCE 2018

If you haven't already, there is still time to register for the 25th Biennial Conference on Chemical Education. The conference will be held on the campus of the University of Notre Dame July 29 – Aug. 2. Among the many offerings, there will be the Active Learning in Organic symposium with 32 presentations over four sessions. Many of the speakers attended the previous cCWCS ALOC workshops. Board members will be presenting workshops on Active Learning in Organic Chemistry: Backward Design, Active Learning in Organic Chemistry: Collaborative Learning and Classroom Assessment Techniques, and OpenOChem Project – Creating interactive chemistry assessments and presentations accessible from most any LMS. There will be an OrganicERs / Active Learning in Organic Chemistry Birds of a Feather lunch Wednesday, 8/1, 12:15-1:45 pm at the Dining Hall South Dining.

Although the links provide the entire list of symposia and workshops, the following is a list that may be of particular interest to organic chemists and those interested in active learning.

- 3D Printing in Chemistry Education, Wed. 8 – 11 AM, Wed. 2 – 3:25 PM
- Active Learning in Organic Chemistry: Approaches to Active Learning Sun. 2 – 5 PM
- Active Learning in Organic Chemistry: Active Learning in a Flipped Classroom Mon. 8 – 11 AM
- Active Learning in Organic Chemistry: Assessment & Technology to Facilitate Active Learning Mon. 2- 5 PM
- Active Learning in Organic Chemistry: Research on Active Learning Tues. 8 – 11 AM

- Alternative Ways to Teach Important Concepts in Organic Chemistry Wed. 8 – 11 AM, Wed. 2 – 3:25 PM
- Collaborative & Cooperative Learning Mon. 8 – 11 AM, Mon. 2 – 3:25 PM
- Discourse Frameworks in Active Learning Chemistry Classrooms Thurs. 8 – 11
- Engaging Students in Organic Chemistry Tues. 2 – 5 PM, Wed. 8 – 11 AM
- Innovative Ways to Lower Course Material Costs Sun. 2- 5 PM
- Present & Future Directions in Organic Chemistry Laboratory Courses Wed. 2 – 5 PM, Thurs. 8 – 10:20 AM
- Spiral (Two-Cycle) Organic Chemistry Sun. 2 – 5 PM
- The 3 Ps of Student Engagement in the Flipped General Chemistry Classroom: Preparation, Participation, & Performance Tues 2 – 5 PM, Wed. 8 – 11 AM
- Using Specifications Grading to Assess Learning Outcomes in Chemistry Sun. 2 – 5 PM

Some workshops are closed, but in case there are last minute openings, here are some that may be of interest to the community.

- Active Learning in Organic Chemistry: Backward Design Sun. 2 – 5 PM
- Active Learning in Organic Chemistry: Collaborative Learning and Classroom Assessment Techniques Mon. 8 – 11 AM
- Engaging Organic Chemistry Students in an Active Learning Process That Promotes Development of Critical Thinking Skills and the Ability to Apply Essential Concepts Wed. 2 – 5 PM
- OpenOChem Project – Creating interactive chemistry assessments and presentations accessible from most any LMS Tues. 8 – 11 AM
- Organic Chemistry Reactions Couple 3D Animations to 2D Schemes Wed. 8 – 11 AM
- Reformed Experimental Activities (REActivities): Rethinking How We Deliver an Organic Chemistry Lab Mon. 8 – 11 AM
- Teaching Cultural Issues in Organic Chemistry Labs: Wed. 2 – 5 PM

Hope to see you there!

Specifications Grading

At the BCCE there will be two sessions for the Using Specifications Grading to Assess Learning Outcomes in Chemistry symposium. Joshua Ring (Lenoir-Rhyne University, 2013 cCWCS ALOC Workshop in Charlotte) has implemented it in his organic chemistry. (C&EN News (October 24, 2016 - Vol. 94 Issue 42; http://cen.acs.org/articles/94/i42/CEN-talks-Joshua-Ring-organic.html), ConfChem 2016 (http://confchem.ccce.divched.org) and J. Chem. Educ. 2017, 94, 2005−2006). He described how he applied specifications grading to a 1st semester organic chemistry course. The choice to use an alternative grading method arose from the concern that giving partial credit in grading lead to partial understanding of topics that left students unprepared for the second semester.

In specifications grading, specific assessable concepts and skills are chosen as required objectives for the course. The course is then structured around these objectives. The students are given benchmarks to achieve. After presentation and practice of the material, they are assessed on these learning outcomes. Course grades are then based on how many of these outcomes are passed. Passing of an outcome depends on mastery of the concept or skill. Specifications grading was originally developed by Linda Nilson at Clemson.

The method was implemented by dividing the material into essential and general learning outcomes. See Tables 1 and 2 for the outcomes chosen. After a topic had

Table 1. Essential Learning Outcomes

1. Drawing Lewis Dot Structures
2. Interconverting Lewis Dot Structures, condensed formulas, and line-angle structures
3. Using basic nomenclature
4. Identifying and explaining charge stability
5. Drawing Reaction Mechanisms (Acid-Base, Substitution, Addition, Elimination)
6. Predicting reactive sites (Nucleophiles, Electrophiles, Acids, and Bases)

Table 2. Categories of General Learning Outcomes

1-5 Involve Conformations, Chirality, Relationships, and Advanced Nomenclature I
6-10 Involve Drawing Mechanisms, Predicting Products, and Identifying Reagents for Acid-Base, Substitution, and Elimination Reactions
11-13 Involve Drawing Mechanisms, Predicting Products, and Identifying Reagents for Addition Reactions
14-15 Involve Biochemical Application and Introductory Multistep Retrosynthesis*

*(The last two General Outcomes were given as small-group take-home evaluations)

been covered over two to three class periods, students were given a five question test taking 10 – 12 minutes. No partial credit was given. Answers were either completely correct or incorrect. To pass an outcome, a score of 4 out of 5 was required. Students could retake up to six tests during each of three retake periods over the course of the semester. For the final exam, one hour was a cumulative test while for the second hour, students were able to retake unpassed tests.

No student could pass the course without passing all six essential outcomes and at least four general outcomes. Passing those outcomes earned a D^-. With each subsequent passed outcome, the grade improved by about 1/3 of a letter grade. There were fifteen total general outcomes.

The scores on test questions between the class assessed by specifications grading and previous classes were compared. After regrading test questions from earlier classes for pass/fail with no partial credit, the specifications grading group had performed better. Using specifications grading, it appeared that students would be better prepared for the 2^{nd} semester.

Board Members' Picks

Some publications, presentations, and events that caught our interest

From Alexey Leontyev

Parkes, J., Zimmaro, D. (2018). The College Classroom Assessment Compendium. New York: Routledge.

From Vincent Maloney

Talbert, Robert Flipped learning: A Guide for Higher Education Faculty; Stylus, Sterling, Virginia, 2017

Upcoming Events

25TH INTERNATIONAL CONFERENCE ON CHEMISTRY EDUCATION (ICCE 2018), July 10 – 14, Sydney, Australia

ACS National Meeting & Expo, Nanoscience, Nanotechnology & Beyond, Aug. 19 – 23, Boston, MA

8th Edition of International Conference on Chemistry Education and Research, August 27-28th, 2018, Zurich, Switzerland

2018 ACS Midwest Regional Meeting, Oct. 21-23, Ames, IA

70th ACS Southeastern Regional Meeting, Oct. 31 – Nov. 3, Augusta, GA

74th ACS Southwest Regional Meeting, Nov. 7 - 10, Little Rock, AR

Chemistry Education Research & Practice, Gordon Research Conference, June 16 – 22, 2019, Bates College, Lewiston, ME