

NATHANIEL GROVE

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EDUCATION

- 2008 Post-doctoral Fellow, Chemistry Education** **Advisor:** Dr. Melanie M. Cooper
Clemson University, Clemson, SC; Department of Chemistry
- 2008 Doctor of Philosophy, Chemistry** **Advisor:** Dr. Stacey Lowery Bretz
Miami University, Oxford, OH; Department of Chemistry and Biochemistry
Committee Members: Dr. Roger Knudson, Dr. Christopher Makaroff, Dr. Jerry Sarquis,
Dr. Richard Taylor, Dr. Hong-cai Zhou
Dissertation: A Change in Structure: Meaningful learning and cognitive development in a
spiral, organic chemistry curriculum
- 2005 Master of Science, Chemistry** **Advisor:** Dr. Stacey Lowery Bretz
Youngstown State University, Youngstown, OH; Department of Chemistry
Committee Members: Dr. Peter Norris, Dr. Timothy Wagner
Thesis: CHEMX: Assessing Cognitive Expectations for Learning Chemistry
- 2003 Bachelor of Sciences, Chemistry and Secondary Education** **Advisor:** Dr. George B. Trimitsis
University of Pittsburgh at Johnstown, Johnstown, PA
Undergraduate Research: Integration of Technology into the Organic Classroom

PROFESSIONAL EXPERIENCE

General Chemistry Coordinator, University of North Carolina Wilmington, Department of Chemistry and Biochemistry, August 2012-Present.

Assistant Professor of Chemistry, University of North Carolina Wilmington, Department of Chemistry and Biochemistry, August 2010-Present.

Post-doctoral Fellow, Clemson University, Department of Chemistry, 2008-2010

- ❖ Mentored graduate and undergraduate students in teaching, research, and presentation and manuscript preparation
- ❖ Designed, conducted, and analyzed chemistry education research
- ❖ Taught organic chemistry 1 and 2 lecture courses and graduate-level teaching chemistry discussion course
- ❖ Prepared and graded instructional materials

Teaching Associate, Miami University, Department of Chemistry and Biochemistry, 2005-2008

- ❖ Taught general chemistry 1, general chemistry 2, organic chemistry 1, organic chemistry 2, and foundations of organic chemistry labs and lab lectures
- ❖ Designed, conducted, and analyzed chemistry education research
- ❖ Taught organic and general chemistry lectures as a substitute
- ❖ Prepared and graded quizzes and tests
- ❖ Graded lab notebooks and lab reports

Graduate Assistant, Youngstown State University, Department of Chemistry, 2004-2005

- ❖ Taught high school honors chemistry, general chemistry 1, and general chemistry 2 labs
- ❖ Graded lab notebooks and lab reports
- ❖ Designed, conducted, and analyzed chemistry education research

Assistant Lab Instructor, University of Pittsburgh at Johnstown, Fall 2002

- ❖ Taught one section of organic chemistry 1 lab
- ❖ Prepared and graded quizzes and tests
- ❖ Graded lab notebooks and lab reports

Supplemental Instruction Leader, University of Pittsburgh at Johnstown, 2000-2003

- ❖ Tutored general chemistry and organic chemistry students in large group format
- ❖ Prepared instructional materials

TEACHING EXPERIENCE

- ❖ CHM 101 – General Chemistry 1: UNCW, Fall 2010, Fall 2011, Fall 2012, Fall 2013, and Fall 2014.
- ❖ CHM 101 L – General Chemistry 1 Lab: UNCW, Fall 2010 and Fall 2011.
- ❖ CHM 102 – General Chemistry 2: UNCW, Spring 2011, Spring 2012, Spring 2013 and Spring 2014.
- ❖ CHM 211 – Organic Chemistry 1: UNCW, Summer 2013 and Summer 2014.
- ❖ CHM 495 – Senior Seminar: UNCW, Fall 2010, Spring 2011, Spring 2013, Spring 2014, and Fall 2014.
- ❖ CHM 590 – Chemistry Education Research and Practice: UNCW, Fall 2011, Fall 2012, and Fall 2013.
- ❖ CHM 590 – Methods of Chemistry Education Research: UNCW, Spring 2012.
- ❖ UNI 101 – First Year Seminar: UNCW, Fall 2012, Fall 2013, Spring 2014, and Fall 2014.
- ❖ UNI 292 – First Year Seminar Lab: UNCW, Fall 2014.
- ❖ CH 223 – Organic Chemistry 1: Clemson University, Fall 2008 and Fall 2009.
- ❖ CH 224 – Organic Chemistry 2: Clemson University, Spring 2009 and Spring 2010.
- ❖ CH 471/671 – Teaching Chemistry: Clemson University, Spring 2010.

RESEARCH INTERESTS

- ❖ Factors influencing meaningful/rote learning in chemistry.
- ❖ Students' epistemological development in chemistry.
- ❖ The development of representational competence in chemistry.
- ❖ The role of cognitive load in developing representation competence.
- ❖ The use of technology in the chemistry classroom.

HONORS AND AWARDS

- ❖ UNCW Housing and Residence Life, Academic/Intellectual Program of the Year, "Science Cove with Dr. Grove," April 2013.
- ❖ National Science Foundation TRUSE Conference Travel Award, May 2010
- ❖ Postdoctoral Workshop for Prospective Chemistry Faculty, Sloan Foundation and ACS, October 2008
- ❖ Outstanding Graduate Teaching Assistant, Miami University, 2007-2008
- ❖ Phi Kappa Phi, Youngstown State University, March 2006
- ❖ William Hale Charch Graduate Fellowship, Miami University, 2005-2006
- ❖ Graduate School Academic Achievement Assistantship, Miami University, 2005-2006
- ❖ Sheldon I. Clare Award, University of Pittsburgh at Johnstown, March 2004
- ❖ University Scholar, Secondary Education, University of Pittsburgh at Johnstown, March 2004
- ❖ National Science Foundation, Research Experience for Undergraduates Fellowship, Summer 2003
- ❖ Robert McClure Award, University of Pittsburgh at Johnstown, March 2003
- ❖ Pi Lambda Theta Education Honors Society, March 2001
- ❖ Phi Eta Sigma National Honor Society, April 2000
- ❖ National Honors Society, April 1996

GRANTS

8. Posey, M.; Boersma, J.; Finelli, C.; **Grove, N.**; McNamara, D. "Roots, STEMs, and Leaves: A pilot project enhancing student understanding, mentoring, and community outreach." **\$2,846,699**, submitted February 13, 2014.
7. **Grove, N.** "Cognitive Load and Representational Competence: The Use of Physiological Techniques to Measure Cognitive Load in Chemistry Students." NSF-DUE-IUSE; **\$374,511**, submitted February 4, 2014.
6. **Grove, N.**; Balok, R.; Coleman, A. "Cognitive Load and Representational Competence: The Use of Physiological Techniques to Measure Cognitive Load in Chemistry Students." UNCW Summer Undergraduate Research and Creativity Award (SURCA); **\$1,540**, funded April 2014.
5. **Grove, N.** "BeSocratic: A flexible interactive system to investigate the development of representational competence." NSF-DUE-TUES-Type 2; **\$126,662**, funded October 2011.
4. **Grove, N.**; Cooper, M. M.; Pargas, R. P. "*iRespond*: iPhone/iPad/iPod touch as interactive personal response system." NSF-DUE-TUES-Type 1, **\$199,452**, funded June 2011.
3. **Grove, N.** "CHEMX: Assessing Cognitive Expectations for Learning Chemistry." Travel Grant, Gordon Research Conference, New London CT; June 2005, **\$700**, funded.
2. **Grove, N.**; Mathew, J. "Doctoral-Undergraduate Opportunities in Scholarship Program." Miami University; November 2005, **\$800**, funded.

1. **Grove, N.**; Bretz, S.L. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry." National Science Foundation, REU Travel Grant for 227th American Chemical Society National Meeting, Anaheim, CA; March 2004, **\$200**, funded.

PEER-REVIEWED PUBLICATIONS (UNCW undergraduate/graduate students underlined)

27. Cooper, M. M.; **Grove, N.**; Underwood, S. M.; Bryfczynski, S. P.; Craig, A. F.; Cox, E. L. "Embodied Arrows: Can gesture help students learn organic mechanisms?" *Science*, manuscript in preparation.
26. Mazzarone, K. M.; Lunde E. I.; **Grove, N.** "Exploring the relationship between epistemological development and metacognitive ability." *Journal of Chemical Education*, manuscript in preparation.
25. Koch, D. L.; Shore, M. G.; **Grove, N.** "Understanding students' use of physical models in organic chemistry." *Journal of Chemical Education*, manuscript in preparation.
24. Tiettmeyer, J. M.; **Grove, N.** "Did it make a difference? A longitudinal study of the impact of online homework on general chemistry performance." *Journal of Chemical Education*, manuscript in preparation.
23. Cranford, K. N.; Tiettmeyer, J. M.; Chuprinko, B. C.; Jordan, S.; **Grove, N.** "Measuring overload: The use of heart rate as a means of measuring chemistry students' cognitive load." *Journal of Chemical Education*, **2014**, *91*, 641-647.
22. Bryfczynski, S. P.; Brown, R.; Hester, J.; Herrmann, A.; Koch, D. L.; Cooper, M. M.; **Grove, N.** "uRespond: iPad as interactive, personal response system." *Journal of Chemical Education*, **2014**, *91*, 357-363.
21. Mazzarone, K. M.; **Grove, N.** "Understanding epistemological development during the first and second-year chemistry experience." *Journal of Chemical Education*, **2013**, *90*, 968-975.
20. Bryfczynski, S. P.; Pargas, R. P.; Cooper, M. M.; Klymkowsky, M. W.; Hester, J.; **Grove, N.** "Classroom uses for beSocratic: Emerging technology research." *Proceedings of the Workshop on the Impact of Pen and Touch Technology on Education*, WIPTE and Peppercine University, **2013**, 3-8.
19. Craig, A. F.; Koch, D. L.; Buffington, A.; **Grove, N.** "Narrowing the gap: Revisiting publication rates in chemistry education research." *Journal of Chemical Education*, **2012**, *89*, 1606-1608.
18. **Grove, N.**; Cooper, M. M.; Cox, E. L. "Does Mechanistic Thinking Improve Student Success in Organic Chemistry?" *Journal of Chemical Education*, **2012**, *89*, 850-853.
17. **Grove, N.**; Cooper, M. M.; Rush, K. M. "Decorating with Arrows: Towards the development of representational competence in organic chemistry," *Journal of Chemical Education*, **2012**, *89*, 844-849.

16. **Grove, N.**; Bretz, S. L. "A Continuum of Learning: Describing the Dimensions of Meaningful Learning in Chemistry," *Chemistry Education Research and Practice*, **2012**, *13*, 201-208.
15. Bryfczynski, S. P.; Underwood, S. M.; **Grove, N.**; Pargas, R. P.; Cooper, M. M. "OrganicPad as a Research Tool: Investigating the Development of Representational Competence in Chemistry." *Proceedings of the Workshop on the Impact of Pen-Based Technology on Education*, WIPTE and Virginia Tech, **2011**, 3-10.
14. Cooper, M. M.; **Grove, N.**; Underwood, S. M.; Klymkowsky, M. W. "Lost in Lewis structures: an investigation of student difficulties in developing representation competence." *Journal of Chemical Education*, **2010**, *87*, 869-874.
13. **Grove, N.**; Bretz, S. L. "Perry's Scheme of Intellectual and Epistemological Development as a framework for describing student difficulties in learning organic chemistry." *Chemistry Education Research and Practice*, **2010**, *11*, 207-211.
12. Bryfczynski, S. P.; Pargas, R.; Cooper, M. M.; **Grove, N.**; Underwood, S. M. "How Do Students Solve Chemistry Problems?" *Proceedings of the Workshop on the Impact of Pen-Based Technology on Education*, WIPTE and Virginia Tech, **2010**, 29-37.
11. Cooper, M. M.; **Grove, N.**; Pargas, R.; Bryfczynski, S.; Gatlin, T. "OrganicPad: An interactive freehand drawing application for organic chemistry." *Chemistry Education Research and Practice*, **2009**, *10*, 296-301.
10. **Grove, N.** *A Change in Structure: Meaningful Learning and Epistemological Development in a Spiral, Organic Chemistry Curriculum*, LAP LAMBERT Academic Publishing AG & Co. KG: Koln, Germany, 2009 (ISBN: 978-3-8383-1275-0).
9. **Grove, N.**; Collins, D. J.; Guerin, N. P.; Lopez, J. J.; Bretz, S. L.; Zhou, H. "Designing, Teaching, and Evaluating a Unit on Symmetry and Crystallography in the High School Classroom." *Journal of Chemical Education*, **2009**, *86*, 946-949.
8. Mathew, J. M.; **Grove, N.**; Bretz, S. L. "CHEMX: Online Data Collection and Database Development for Survey Research in Chemistry Education." *The Chemical Educator*, **2008**, *13*, 190-194.
7. **Grove, N.**; Hershberger, J. W.; Bretz, S. L. "Impact of a Spiral Organic Chemistry Curriculum on Student Learning and Attrition." *Chemistry Education Research and Practice*, **2008**, *9*, 157-162.
6. **Grove, N.**; Bretz, S. L. "Measuring What Students Know about How to Learn Chemistry." *Proceedings of the National Science Foundation Conference, Assessment of Student Achievement*, National Science Foundation and Drury University, **2008**, 159-165.
5. Hohloch, J. M.; **Grove, N.**; Bretz, S. L. "Pre-Service Teacher as Researcher: The Value of Inquiry in Learning Science." *Journal of Chemical Education*, **2007**, *84*, 1530-1534.

4. **Grove, N.**; Bretz, S. L. "CHEMX: Assessing Students' Cognitive Expectations in Learning Chemistry." *Journal of Chemical Education*, **2007**, *84*, 1524-1529.
3. Fay, M. E.; **Grove, N.**; Towns, M. H.; Bretz, S. L. "Mapping the Dimensions of the Undergraduate Chemistry Laboratory: Faculty Perspectives on Curriculum, Pedagogy, and Assessment." *Chemistry Education Research and Practice*, **2007**, *8*, 212-219.
2. **Grove, N.**; Bretz, S. L. "Sherlock Holmes and the Case of the Immortal and the Raven: An Inquiry-Based Murder Mystery." *Journal of Chemical Education*, **2005**, *82*, 1532.
1. **Grove, N.** "JCE Classroom Activities." *Journal of Chemical Education*, **2003**, *80*, 1139.

NON-PEER REVIEWED PUBLICATIONS

1. **Grove, N.** "If you build it, will they come? Reflections on working with undergraduate researchers in chemistry education research." *Division of Chemical Education Younger Chemistry Education Scholars Newsletter*, **2013** (<http://www.divched.org/blogentry/if-you-build-it-will-they-come-reflections-working-undergraduate-researchers>).

INVITED PRESENTATIONS

15. "uRespond: The quest towards a more authentic personal response system," University of South Florida, Tampa, FL, May 15, 2014.
14. "Exploring the impact of cognitive load on students' use of chemical representations using physiological metrics," 247th American Chemical Society National Meeting, Dallas, TX, March 16-20, 2014 (with Mr. Patrick Duffy, UNCW graduate student and Ms. Jessica Tiettmeyer, UNCW undergraduate student).
13. "Tracing electron flow: Using embodied cognition to teach organic chemistry mechanisms," University of North Carolina Wilmington, Wilmington, NC, September 30, 2011.
12. "Tracing electron flow: Using embodied cognition to teach organic chemistry mechanisms," 241st American Chemical Society National Meeting, Anaheim, CA, March 30, 2011.
11. "Co-dependency in research: The use of think-aloud interviews in a mixed-methods investigation of representational competence," 21st Biennial Conference on Chemical Education, University of North Texas, Denton, TX, August 3, 2010.
10. "Lost in Lewis Structures: an Investigation of Student Difficulties in Developing Representational Competence," University of Illinois at Chicago, Chicago, IL, March 2, 2010.
9. "Lost in Lewis Structures: an Investigation of Student Difficulties in Developing Representational Competence," University of North Carolina Wilmington, Wilmington, NC, February 4, 2010.

8. "Decorating with Arrows: Students' Use of Mechanisms in Organic Chemistry," California State University Fullerton, Fullerton, CA, January 12, 2010.
7. "Lost in Lewis Structures: a Study of Representational Competence," 61st Southeast Regional Meeting of the American Chemical Society Meeting, San Juan, Puerto Rico, October 22, 2009.
6. "OrganicPad and Markov Modeling: The Use of Technology in Eliciting Lewis Structure Problem-solving Strategies," 238th American Chemical Society National Meeting, Washington, DC, August 18, 2009.
5. "Through the Savage Forest: The Journey to Meaningful Learning in Organic Chemistry," University of Northern Colorado, Greeley, CO, January 21, 2009.
4. "Making the Case for Forensics in the Chemistry Classroom," 39th American Chemical Society Central Regional Meeting, Cincinnati, OH, May 22, 2007.
3. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," 2006 Summer Meeting, American Association of Physics Teachers, Syracuse, NY, July 25, 2006.
2. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," 231st American Chemical Society National Meeting, Atlanta, GA, March 30, 2006.
1. "From Rainforest to Urban Jungle: Energy and Chemical Reactions," Youngstown State University, Youngstown, OH, December 14, 2004.

CONTRIBUTED PAPERS

22. "uRespond: iPad as interactive, personal response system," 245th American Chemical Society National Meeting, New Orleans, LA, April 10, 2013 (with Ms. Rebecca Brown, UNCW graduate students).
21. "First two years: Exploring epistemological development of chemistry majors," 245th American Chemical Society National Meeting, New Orleans, LA, April 10, 2013 (with Ms. Kristina Mazzarone, UNCW graduate students).
20. "uRespond: iPad as interactive, personal response system," 22nd Biennial Conference on Chemical Education, Penn State University, State College, PA, August 1, 2012 (with Mr. Andrew Herrmann and Ms. Rebecca Brown, UNCW graduate students).
19. "Changing perspectives: Understanding students' epistemological development in chemistry," 22nd Biennial Conference on Chemical Education, Penn State University, State College, PA, August 1, 2012 (with Ms. Kristina Mazzarone, UNCW graduate student).

18. "Changing perspectives: Understanding students' epistemological development in chemistry," 22nd International Conference on Chemistry Education and 11th European Conference on Research in Chemical Education, Rome, Italy, July 16, 2012 (with Ms. Kristina Mazzarone, UNCW graduate student).
17. "Changing perspectives: Understanding students' epistemological development in general chemistry," 243rd American Chemical Society National Meeting, San Diego, CA, March 25, 2012 (with Ms. Kristina Mazzarone, UNCW graduate student).
16. "Rethinking Lewis structures: The development and evaluation of a novel instructional scheme," 241st American Chemical Society National Meeting, Anaheim, CA, March 30, 2010.
15. "OrganicPad as a Research Tool: Investigating the Development of Representational Competence in Chemistry," 2010 Workshop on the Impact of Pen-based Technology on Education, Virginia Tech, Blacksburg, VA, October 25, 2010.
14. "Decorating with arrows? Students' use of mechanisms in organic chemistry," 21st Biennial Conference on Chemical Education, University of North Texas, Denton, TX, August 3, 2010.
13. "Making Lewis structures more meaningful: The assessment of alternative instructional strategies for teaching Lewis structures," 21st Biennial Conference on Chemical Education, University of North Texas, Denton, TX, August 2010.
12. "Lewis structures: A new approach for instruction," 239th American Chemical Society National Meeting, San Francisco, CA, March 25, 2010.
11. "Myth: Teaching students rules for learning specific tasks is an effective way to develop competence," 239th American Chemical Society National Meeting, San Francisco, CA, March 23, 2010.
10. "*OrganicPad*: An interactive freehand drawing application for organic chemistry," 3rd Teaching with Technology Symposium, Clemson University, Clemson, SC, May 5, 2009.
9. "Assessing the cognitive and visualization skills necessary for understanding and use of chemical structures," 20th Biennial Conference on Chemical Education, Indiana University, July 28, 2008.
8. "*OrganicPad*: An interactive, freehand drawing application for organic chemistry," 20th Biennial Conference on Chemical Education, Indiana University, July 28, 2008.
7. "Change in Structure: The evolution of student difficulties in a spiral organic chemistry curriculum," 235th American Chemical Society Meeting, New Orleans, LA, April 8, 2008.
6. "Introducing advanced inorganic chemistry concepts in the high school classroom," 234th American Chemical Society Meeting, Boston, MA, August, 2007.

5. "Symmetry and crystallography in the high school chemistry classroom," 39th American Chemical Society Central Regional Meeting, Cincinnati, OH, May 20, 2007.
4. "CHEMX: Assessing Students' Cognitive Expectations for Learning Chemistry," 19th Biennial Conference on Chemical Education, Purdue University, July 31, 2006.
3. "CHEMX: Assessing Students' Cognitive Expectations for Learning Chemistry," 18th Biennial Conference on Chemical Education, Iowa State University, July 20, 2004.
2. "CHEMX: Assessing Students' Cognitive Expectations for Learning Chemistry," American Chemical Society Central Regional Meeting, Indianapolis, IN, June 2, 2004.
1. "Integration of Technology into Organic Chemistry," University of Pittsburgh at Johnstown, Celebration of Undergraduate Research, Johnstown, PA, April 2003.

RESEARCH POSTERS

39. "Researching chemistry students' perceptions of the reliability and validity of summative assessments," 247th American Chemical Society National Meeting, Dallas, TX, March 16-20, 2014 (with Ms. Jessica Tiettmeyer, UNCW undergraduate student).
38. "Understanding students' use of physical models in organic chemistry," Science and Engineering Learning Community Research Celebration, UNCW, November 21, 2013 (with Ms. Danielle Koch and Madelyn Shore, UNCW undergraduate students).
37. "Exploring the impact of cognitive load on students' use of chemical representations using physiological metrics," Science and Engineering Learning Community Research Celebration, UNCW, November 21, 2013 (with Ms. Jessica Tiettmeyer, Ms. Kristen Cranford, Mr. Bryan Chuprinko, and Ms. Sophia Jordan, UNCW undergraduate students).
36. "Understanding students' use of physical models in organic chemistry," 245th American Chemical Society National Meeting, New Orleans, LA, April 8, 2013 (with Ms. Danielle Koch and Madelyn Shore, UNCW undergraduate students).
35. "How Do Students Learn to Use Representations in Chemistry?" 22nd International Conference on Chemistry Education and 11th European Conference on Research in Chemical Education, Rome, Italy, July 17, 2012 (with Drs. Melanie Cooper and Sonia Underwood).
34. "Embodied Arrows: Can gestures help students learn organic mechanisms?" Gordon Research Conference on Visualization in Science Education, Bryant University, RI, July 11, 2011.
33. "Changing perspectives: Understanding students' epistemological development in chemistry," Gordon Research Conference on Chemistry Education Research and Practice, Davidson College, NC, June 28, 2011 (with Ms. Kristina Ruggless, UNCW Undergraduate).

32. "Investigating chemistry students' epistemological development," 241st American Chemical Society National Meeting, Anaheim, CA, March 30, 2011 (with Ms. Kristina Ruggless, UNCW Undergraduate).
31. "Decorating with Arrows: Students' use of Mechanisms in Organic Chemistry," Transforming Research in Undergraduate STEM Education Conference, University of Maine, ME, June 16, 2010.
30. "The Utility of Lewis Structures: A Mixed-methods Study of the Students' View of the Significance of Lewis Structures," Transforming Research in Undergraduate STEM Education Conference, University of Maine, ME, June 16, 2010.
29. "OrganicPad: an Interactive, Freehand Drawing Application," National Science Foundation Research and Evaluation on Education in Science and Engineering Conference, Washington, DC, March 12, 2010.
28. "Representational Drowning: An investigation of the impact of representational combinations on learning organic chemistry," Gordon Research Conference on Chemistry Education Research and Practice, Colby College, ME, June 24, 2009.
27. "Lost in Lewis Structures: an investigation of student difficulties in developing representation competence," Gordon Research Conference on Chemistry Education Research and Practice, Colby College, ME, June 23, 2009.
26. "Lost in Lewis Structures: an investigation of an investigation of student difficulties in developing representation competence," Chemistry Education Research Graduate Student Conference, Miami University, OH, June 6, 2009.
25. "CHEMX: Assessing Students' Cognitive Expectations of Chemistry," National Science Foundation Course, Curriculum, and Laboratory Improvement Conference, Washington DC, August 13-15, 2008.
24. "Impact of a Spiral Organic Chemistry Curriculum on Student Learning and Attrition," 235th American Chemical Society Meeting, New Orleans, LA, April 7, 2008.
23. "Impact of a Spiral Organic Chemistry Curriculum on Student Learning and Attrition," 235th American Chemical Society Meeting, New Orleans, LA, April 6, 2008.
22. "A Change in Structure: Understanding Student Attrition in a Spiral Organic Chemistry Curriculum," Gordon Research Conference on Chemistry Education Research and Practice, Bates College, ME, June 25, 2007.
21. "Online Data Collection and Database Development for Survey Research in Chemistry Education," 13th Annual Undergraduate Research Forum, Miami University, Oxford, OH, April 18, 2007 (with Mr. Jacob M. Mathew, undergraduate researcher).

20. "Change in Structure: Understanding Student Attrition in a Spiral Organic Chemistry Curriculum," 233rd American Chemical Society Meeting, Chicago, IL, March 26, 2007.
19. "Online Data Collection and Database Development for Survey Research in Chemistry Education," 233rd American Chemical Society Meeting, Chicago, IL, March 27, 2007 (with Mr. Jacob M. Mathew, undergraduate researcher).
18. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," International Society for Scholarship of Teaching and Learning, Washington, DC, November 10, 2006.
17. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," National Science Foundation Conference on Assessment, Washington, DC, October 20, 2006.
16. "Mapping the Dimensions of the Undergraduate Chemistry Laboratory: Faculty Perspectives on Curriculum, Pedagogy, and Assessment," 19th Biennial Conference on Chemical Education, Purdue University, July 31, 2006 (with Mr. Michael Fay, Dr. Marcy Towns, and Dr. Stacey Lowery Bretz).
15. "CHEMX: Online Data Collection and Database Development for Survey Research in Chemistry Education," 19th Biennial Conference on Chemical Education, Purdue University, July 31, 2006 (with Mr. Jacob M. Mathew, undergraduate researcher).
14. "Visualizing Chemistry: Creating a Demonstrations Database," 12th Annual Undergraduate Research Forum, Miami University, Oxford, OH, April 19, 2006 (with Ms. Alyssa S. Paloian and Mr. Joseph J. López, undergraduate researchers).
13. "CHEMX: Online Data Collection and Database Development for Survey Research in Chemistry Education," 12th Annual Undergraduate Research Forum, Miami University, Oxford, OH, April 19, 2006 (with Mr. Jacob M. Mathew, undergraduate researcher).
12. "CHEMX: Online Data Collection and Database Development for Survey Research in Chemistry Education," 231st American Chemical Society Meeting, Atlanta, GA, March 29, 2006 (with Mr. Jacob Mathew, undergraduate researcher).
11. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," Gordon Research Conference on Chemistry Education Research and Practice, New London, CT, June 27, 2005.
10. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," 16th Youngstown State University QUEST, Youngstown, OH, April 5, 2005.
9. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," 229th American Chemical Society National Meeting, San Diego, CA, March 14, 2005.
8. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," International Society for Scholarship of Teaching and Learning, Bloomington, IN, October 23, 2004.

7. "CHEMX: Assessing Cognitive Expectations for Learning Chemistry," 15th Youngstown State University QUEST, Youngstown, OH, April 4, 2004.
6. "Differences in Expectations between Teachers and Learners of University Chemistry," 227th American Chemical Society National Meeting, Anaheim, CA, March 28, 2004.
5. "Differences in Expectations between Teachers and Learners of University Chemistry," American Chemical Society Central Regional Meeting, Pittsburgh, PA; October 20, 2003.
4. "Effectiveness of Supplemental Instruction in the General Chemistry Classroom," American Chemical Society Central Regional Meeting, Pittsburgh, PA, October 20, 2003.
3. "Differences in Expectation between Teachers and Learners of University Chemistry," Duquesne University, Research Experiences for Undergraduates Symposium, Pittsburgh, PA, July 23, 2003.
2. "Effectiveness of Supplemental Instruction in the General Chemistry Classroom," University of Pittsburgh at Johnstown Poster Session, Johnstown, PA, April 2003.
1. "Integration of Technology into Organic Chemistry," University of Pittsburgh at Johnstown Poster Session, Johnstown, PA, April 2003.

GRADUATE STUDENTS (MENTORED AS ADVISOR)

- ❖ **Ms. Rebecca Brown**, MS Computer Science, Research Supervisor, graduated December 2013.
- ❖ **Ms. Kelli Davis-Hendrix**, MS Chemistry, Research Advisor.
- ❖ **Mr. Patrick Duffy**, MS Chemistry, Research Advisor.
- ❖ **Mr. Andrew Herrmann**, MS Computer Science, Committee Member and Research Supervisor, graduated May 2012.
- ❖ **Ms. Kristina Mazzarone**, MS Chemistry, Research Advisor, graduated May 2013.
- ❖ **Ms. Anna Meriwether**, MS Chemistry (online), Research Advisor, finished November 2013.
- ❖ **Mr. Donald Patterson**, MS Chemistry (online), Research Advisor.

GRADUATE STUDENTS (COMMITTEE MEMBER)

- ❖ **Ms. Emily Lunde**, MS Science Education, Portfolio Committee Member, graduated May 2012.
- ❖ **Mr. Malcolm (Ray) MacLeod**, MS Science Education, Portfolio Committee Member, graduated May 2012.
- ❖ **Mr. Timothy Schuldes**, MS Chemistry (online), Committee Member.
- ❖ **Mr. Jason Sheedy**, MS Chemistry (online), Committee Member, graduated May 2013.
- ❖ **Mr. Adrian Villalta-Cerdas**, Ph.D. Chemistry (Chemistry Education Research), Outside Committee Member, University of South Florida, graduated August 2014.

UNDERGRADUATE STUDENTS (MENTORED AS ADVISOR)

- ❖ *Mr. Ryan Balok*, October 2013 – Present.
- ❖ *Mr. Bryan Chuprinko*, May 2012 – December 2012.
- ❖ *Ms. Amelia Coleman*, November 2013 – Present.
- ❖ *Mr. Andrew Craig*, January 2011 – May 2012.
- ❖ *Ms. Kristen Cranford*, August 2012 – May 2013.
- ❖ *Mr. Tyler Gampp*, January 2014 – Present.
- ❖ *Ms. Ashley Johnson*, August 2011 – May 2012 (honors).
- ❖ *Ms. Sophia Jordan*, August 2012 – December 2012.
- ❖ *Ms. Danielle Koch*, August 2011 – August 2013.
- ❖ *Mr. Brandon Pitzen*, August 2012 – March 2013.
- ❖ *Ms. Kristina Ruggless*, August 2010 – May 2011.
- ❖ *Ms. Madelyn Shore*, May 2012 – May 2013.
- ❖ *Ms. Jessica Tiettmeyer*, May 2013 – Present.

UNDERGRADUATE STUDENTS (HONORS COMMITTEE MEMBER)

- ❖ *Mr. Jack Koch*, January 2014 – Present (biology).
- ❖ *Ms. Danielle Koch*, August 2012 – May 2013 (biology).

DEPARTMENTAL-LEVEL PROFESSIONAL SERVICE

- ❖ *Chair*, Chemistry Lecturer Search Committee, University of North Carolina Wilmington, February 2014 – Present.
- ❖ *Event Volunteer*, Majors Fair, University of North Carolina Wilmington, September 25, 2013.
- ❖ *Chair*, Assessment Committee, Department of Chemistry and Biochemistry, University of North Carolina Wilmington, August 2013 – Present.
- ❖ *Event Volunteer*, Seahawk Saturday, University of North Carolina Wilmington, April 6, 2013.
- ❖ *Member*, Organic Chemistry Search Committee, Department of Chemistry and Biochemistry, University of North Carolina Wilmington, August 2011 – January 2012.
- ❖ *Co-advisor*, UNCW Chemistry Club, University of North Carolina Wilmington, January 2011 – Present.
- ❖ *Member*, Assessment Committee, Department of Chemistry and Biochemistry, University of North Carolina Wilmington, August 2010 – Present.
- ❖ *Member*, Undergraduate Curriculum Committee, Department of Chemistry and Biochemistry, University of North Carolina Wilmington, August 2010 – Present.
- ❖ *“Ins and Outs of Graduate School” Round Table Panel*, Clemson University SURP Program, July 2009.
- ❖ *Talawanda School District Science Week*, Miami University, May 2007 and May 2008.
- ❖ *Departmental Representative*, Miami University Graduate Student Association, August 2006 – July 2008
- ❖ *Workshop Presenter*, “Teaching Science through Inquiry,” Professional Development Day for High School Chemistry Teachers, Youngstown State University, December 2004.

UNIVERSITY-LEVEL PROFESSIONAL SERVICE

- ❖ *Event Volunteer*, Freshman orientation: “In or Out: Residency for Tuition Purposes”, University of North Carolina Wilmington, June 11, 2014.
- ❖ *University College Faculty Advisor*, University of North Carolina Wilmington, August 2014 – Present.
- ❖ *Member*, Fostering Undergraduate Student Success Task Force, University of North Carolina Wilmington, September 2013 – Present.
- ❖ *Member*, Institutional Review Board (IRB), University of North Carolina Wilmington, August 2013 – Present
- ❖ *Event Volunteer*, North Carolina Science Olympiad, University of North Carolina Wilmington, March 2, 2013.
- ❖ *Member*, Faculty Advisory Committee, First Year Seminar, University of North Carolina Wilmington, February 2013 – Present.
- ❖ *Faculty Co-Marshall*, College of Arts and Sciences Fall Commencement, University of North Carolina Wilmington, December 15, 2012.
- ❖ *Ex-officio Member*, Faculty Senate, University of North Carolina Wilmington, August 2012 – Present.
- ❖ *Ex-officio Member*, Honors Faculty Advisory Council, University of North Carolina Wilmington, August 2012 – Present.
- ❖ *Chair*, Academic Standards Committee, University of North Carolina Wilmington, August 2012 – Present.
- ❖ *Member*, Residency Appeals Board, University of North Carolina Wilmington, August 2012 – Present.
- ❖ *Member*, Teacher Education Council, University of North Carolina Wilmington, October 2011 – May 2013.
- ❖ *Member*, Academic Standards Committee, University of North Carolina Wilmington, August 2011 – Present.
- ❖ *Inquiry Assessor*, General Education Assessment, University of North Carolina Wilmington, January 2012.
- ❖ *Written Communication Assessor*, General Education Assessment, University of North Carolina Wilmington, May 2011.
- ❖ *University Appeals Board*, Miami University, September 2007 – July 2008.
- ❖ *Executive Council*, Associated Student Government, Miami University, August 2007 – July 2008.
- ❖ *University Senator*, Miami University Senate, January 2007 – July 2008.
- ❖ *Science Alliance*, Miami University, August 2006 – May 2008.
- ❖ *Exemplary Student Teacher Panel*, University of Pittsburgh at Johnstown, December 2003.

NATIONAL-LEVEL PROFESSIONAL SERVICE

- ❖ *Symposium Organizer*, IUPAC International Conference on Chemistry Education 2014, Toronto, Canada, July 2014.
- ❖ *Member*, 2015 American Chemical Society General Chemistry Exam Writing Committee, Examinations Institute of the American Chemical Society, October 2013 – Present.

- ❖ *Panel Reviewer*, National Science Foundation, Directorate of Education and Human Resources, July 2013.
- ❖ *Symposium Organizer*, Division of Chemical Education, American Chemical Society National Meeting, New Orleans, LA, March 2013.
- ❖ *Member*, 2013 American Chemical Society General Chemistry Exam Writing Committee, Examinations Institute of the American Chemical Society, July 2011 – August 2012.
- ❖ *Panel Reviewer*, National Science Foundation, Transforming Undergraduate Education in STEM (TUES) Program, July 2011.
- ❖ *Symposium Organizer and Presider*, Division of Chemical Education, American Chemical Society National Meeting, Anaheim, CA, March 2011.
- ❖ *Member*, Committee on Chemical Education Research, Division of Chemical Education, American Chemical Society, January 2011 – Present.
- ❖ *Workshop Presenter*, “OrganicPad: A free-form structure drawing program,” 21st Biennial Conference on Chemical Education, University of North Texas, Denton, TX, August 4, 2010.
- ❖ *Symposium Organizer and Presider*, Division of Chemical Education, American Chemical Society National Meeting, Washington, D.C., August 2009.
- ❖ *Consulting Editor*, *Interdisciplinary Journal of Problem-based Learning*, 2009-Present.
- ❖ *Symposium Presider*, Division of Chemical Education, 61st Southeast Regional Meeting of the American Chemical Society, San Juan, Puerto Rico, October 22, 2009.
- ❖ *Proposal Assessor*, National Association for Research in Science Teaching, September 2009.
- ❖ *Advisory Board Member*, Modular Chemistry Concept Inventory, January 2009 – January 2011.
- ❖ *Strategic Planning Taskforce*, Division of Chemical Education, American Chemical Society, September 2007 – May 2009.
- ❖ *Symposium Organizer*, Division of Chemical Education General Posters, American Chemical Society National Meeting, Atlanta, GA, Spring 2006.

JOURNAL REVIEWER

- ❖ The Chemical Educator
- ❖ Chemistry Education Research and Practice
- ❖ Interdisciplinary Journal of Problem-based Learning
- ❖ The Journal of Chemical Education
- ❖ The Journal of College Science Teaching

PROFESSIONAL SOCIETIES

- ❖ American Chemical Society, Division of Chemical Education
- ❖ National Association for Research in Science Teaching
- ❖ National Science Teacher’s Association
- ❖ Phi Eta Sigma, National Honor Society
- ❖ Phi Kappa Phi, National Honor Society
- ❖ Pi Lambda Theta, Education Honors Society

REFERENCES

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