

Molly B. Atkinson, Ph.D.

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PROFESSIONAL EXPERIENCE

Assistant Professor of Chemistry, University of North Texas, Denton, TX (August 2020 – Present)
Postdoctoral Research Fellow, Miami University, Oxford, OH (January 2019 – July 2020)

EDUCATION

Postdoctoral Research Fellow, Chemistry Education Research

- Miami University, Department of Chemistry, Oxford, OH (2018 – Present)
- Advisor: Dr. Stacey Lowery Bretz, Miami University Distinguished Professor and Recipient of the 2020 ACS Award for Achievement in Research on Teaching and Learning of Chemistry
- “Development of the Reaction Coordinate Diagram Inventory (RCDI): Assessing student misconceptions and confidence about reaction coordinate diagrams throughout the undergraduate chemistry sequence”

Doctor of Philosophy, Chemistry

- University of Georgia, Department of Chemistry, Athens, GA (2012 – 2018)
- Bioinorganic Chemistry Research (2012 – 2015); Advisor: Dr. Michael K. Johnson, Department of Chemistry; “Investigating the role and assembly of iron-sulfur clusters in *Azotobacter vinelandii* NfuA”
- Chemistry Education Research (2016 – 2018); Advisor: Dr. Norbert J. Pienta, Department of Chemistry, 2009-2019 Editor-in-Chief of the *Journal of Chemical Education*; Collaboration with Dr. Julie A. Luft, Department of Mathematics and Science Education, College of Education; “Assessing student explanation construction and affective characteristics towards improving student success in general chemistry”

Bachelor of Science, Chemistry

- Piedmont College, Department of Natural Sciences, Demorest, GA (2008 – 2012)
- Advisors: Dr. Sean Carrigan (Piedmont College), Dr. Shanta Dhar (UGA), “Optimization of block copolymer synthesis for drug delivery and nanoparticle formulation for combination therapy”

Bachelor of Science, Biology

- Piedmont College, Department of Natural Sciences, Demorest, GA (2008 – 2012)
- Advisor: Dr. Carlos Camp (Piedmont College), “The potential effect of low-level nitrate pollution on survival of larval salamanders from the southeastern United States”

RESEARCH EXPERIENCE

Postdoctoral Research Fellow, Oxford, OH

- (2018 – Present) Research Advisor: Dr. Stacey Lowery Bretz, bretszi@miamioh.edu
- Using both qualitative and quantitative methods through a sequential, mixed-methods design to investigate student thinking using reaction coordinate diagrams (RCDs) depicting both thermodynamic and kinetic information
- Conducted semi-structured interviews to develop an assessment tool to quantitatively measure students’ misconceptions about RCDs, the Reaction Coordinate Diagram Inventory (RCDI)
- Experience with writing Institutional Review Board (IRB) protocols for collaboration with external institutions
- Research mentor for 3 undergraduate students (Daniel Reed (REU), Natalie Musolf, Anna Page) and 2

graduate students (Sarah Fullington, Courtney Chatha) at Miami University, including 1 REU student, in qualitative and quantitative research methods, developing assessment items, and analyzing the reliability and validity of data generated by assessments

Graduate Student Research Assistant, Athens, GA

- (2016 – 2018) Research Advisor: Dr. Norbert J. Pienta, npienta.uga@gmail.com
- Used both quantitative and qualitative methods to investigate student explanation construction in preparatory chemistry, preceding general chemistry I, to increase student success in the general chemistry sequence
- Investigated student representations of molecular structures, the use of eye-tracking in student learning, curricular design and development, active learning pedagogies, and implementation of the preparatory chemistry course at UGA
- Developed a collaboration with Dr. Julie A. Luft in the Department of Mathematics and Science Education at UGA
- Extensive experience in quantitative statistical analysis using R, SPSS, and JMP
- Experience with writing of IRB research proposals
- Research mentor for 3 undergraduate students (Alex Aspley, Tatiana Barron, Brianna Blevins) at the University of Georgia in learning theory, general chemistry course material development and testing

Graduate Student Research Assistant, Athens, GA

- (2012 – 2015) Research Advisor: Dr. Michael K. Johnson, mkj@uga.edu
- Investigated role and assembly of iron-sulfur clusters in the *Azotobacter vinelandii* NfuA Protein
- Experience with cell culture, protein overexpression and anaerobic purification, and spectroscopic techniques (UV/Vis, CD, EPR, Raman Spectroscopy)

TEACHING EXPERIENCE

University of North Texas:

- Instructor, General Chemistry I (August 2020)

Miami University:

- Guest Lecturer, Learning Theories in Chemistry (2019)
 - 3 credit hour course, 1 section that met once a week, 11 undergraduate students, 5 graduate students
 - Instructor: Dr. Stacey Lowery Bretz
 - Course Description: Students are introduced to the learning theories that inform chemistry education research and the methods therein. Students will focus on how the research findings regarding how humans learn chemistry can be applied to improve teaching and learning. Additionally, the course introduces students to chemistry education research as a field and an essential source of scholarship on learning chemistry.
 - Instructed 2 of the 13 class sessions on the following topics: Metacognition and Reflection, Cognitive Development and Perry's Scheme
- Guest Lecturer, General Chemistry I (2019)
 - 4 credit hour course, 1 section, 200 undergraduate students
 - Instructor: Dr. Mariia Bauman
 - Instructed several activity-based class sessions, helped facilitate and moderate the group general chemistry activities

University of Georgia:

- Instructor, Basics of Chemistry (2017)
 - 4 credit hour course, 1 section, 10 undergraduate students

- Part of the Freshman College Summer Experience (FSCE) Program at UGA
- Active learning instructional approach, most of the class time devoted to student group work and discussion
- Developed syllabus, taught daily in a summer short session, developed and graded all assignments and exams and returned with feedback within a timely manner, and held office hours weekly
- Guest Lecturer, Basics of Chemistry (2016 – 2017)
 - Delivered 22 lectures in fall 2016 and 5 lectures fall 2017
 - Topics: radioactive decay, VSEPR theory and electronegativity, gas laws, Lewis structures, solubility, thermodynamics, electromagnetic spectrum, kinetics, equilibrium, and acidity and basicity.
- Administrator, Chemistry Diagnostic Test (2017 – 2018)
 - Maintained the UGA Chemistry Diagnostic Test (UGA-CDT): timed placement test advising students about enrollment in Freshman Chemistry I (General Chemistry I) or Basics of Chemistry (Preparatory Chemistry)
 - Assesses student knowledge about basic chemistry ideas and skills
- Classroom Teaching Assistant, Basics of Chemistry (2016)
 - 4 credit hour course, 3 sections, 72 undergraduate students in each section
 - Assisted instructor of the course, monitored student progress on activities during class, answered questions, graded assignments, administered exams, and held two office hours each week
- Lab Teaching Assistant, Chemistry in Context, Non-Science Majors (2016 – 2017)
 - 1 credit hour introductory lab course, 3 sections, 24 undergraduate non-science major students
 - Introduced lab concepts, monitored student progress, answered questions, maintained safety, and graded assignments
- Lab Teaching Assistant, General Chemistry I (2012 – 2013, 2017 – 2018)
 - 1 credit hour introductory lab course, 9 sections total, 205 undergraduate students total
 - Introduced lab concepts, monitored student progress, answered questions, maintained safety, and graded assignments
- Make-Up Lab Teaching Assistant, General Chemistry I and II (2018)
 - 1 credit hour introductory lab course, make-up lab session for excused absences
 - Set up each lab, approved excused absences and scheduled students to attend the make-up lab session, introduced lab concepts specific to each course, monitored student progress, answered questions, maintained safety, and submitted assignments to each student's respective TA
- General Chemistry Tutor (2012 – 2018)
 - Tutored first- and second-semester general chemistry students and attended tutoring seminars by the Division of Academic Enhancement at UGA

PEER-REVIEWED ARTICLES

5. Atkinson, M. B.; Bretz, S. L. Measuring Changes in Undergraduate Chemistry Students' Understanding of Reaction Coordinate Diagrams: A Longitudinal, Multi-institution Study, *J. Chem. Educ.* (Preparing for Submission August 2020).
4. Atkinson, M. B.; Croisant, M.; Bretz, S. L. Investigating first-year undergraduate chemistry students' reasoning with reaction coordinate diagrams using particulate-level reaction mechanisms, *Chem. Educ.*

- Res. Pract.* (In Revision, August 2020).
3. Atkinson, M. B.; Popova, M; Croisant, M.; Bretz, S. L. (2020) Development of the Reaction Coordinate Diagram Inventory: Measuring Student Thinking and Confidence. *J. Chem. Educ.* 97, 1841–1851.
 2. Atkinson, M. B.; Krishnan, S.; McNeil, L. A.; Luft, J. A.; Pienta, N. J. (2020) Constructing Explanations in an Active Learning Preparatory Chemistry Course. *J. Chem. Educ.* 97, 626–634.
 1. Tang, H; Day, E. L.; Atkinson, M. B.; Pienta, N. J. (2018) GrpString: An R Package for Analysis of Groups of Strings, *The R Journal*, 10 (1), 359–369.

PRESENTATIONS

Contributed Talks

9. Atkinson, M. B.; Bretz, S. L. (July 2020 - *Cancelled due to COVID-19) A Longitudinal, Multi-institution Research Study: Changes in Organic Chemistry Students' Thinking and Confidence in the Contexts of Functional Group and Mechanisms Curricula. 26th Biennial Conference on Chemical Education (BCCE), Corvallis, Oregon.
8. Atkinson, M. B.; Bretz, S. L. (May 2020 - *Cancelled due to COVID-19) Using the Reaction Coordinate Diagram Inventory (RCDI) to Measure Chemistry Student Thinking and Confidence when Interpreting Reaction Coordinate Diagrams. 103rd Canadian Chemistry Conference and Exhibition, Winnipeg, MB, Canada.
7. Bretz, S. L.; Atkinson, M. B. (May 2020 - *Cancelled due to COVID-19) A Longitudinal, Multi-institution Research Study: Changes in Organic Chemistry Students' Reasoning with Reaction Coordinate Diagrams. American Chemical Society Central Regional Meeting (CERM), Columbus, OH.
6. Atkinson, M. B.; Popova, M; Croisant, M.; Bretz, S. L. (August 2019) The Reaction Coordinate Diagram Inventory: Measuring General and Organic Chemistry Student Thinking and Confidence. American Chemical Society National Meeting and Expo, San Diego, CA.
5. Bretz, S. L.; Atkinson, M. B.; Croisant, M.; Popova, M. (June 2019) An Inventory to Measure Student Thinking about Reaction Coordinate Diagrams. 102nd Canadian Chemistry Conference and Exhibition, Quebec, QC.
4. McNeil, L. A.; Luft, J. A.; Atkinson, M. B.; West, A. (February 2019) An Exploration in Building Knowledge in Small Group Discussions in Undergraduate Chemistry. 38th Annual Research Association Minority Professional (RAMP) Conference, New Orleans, LA.
3. Atkinson, M. B.; Krishnan, S.; McNeil, L. A.; Luft, J. A.; Pienta, N. J. (July 2018) Constructing Explanations During and Outside of a Non-Majors Chemistry Class: Which Improves Student Learning? 25th Biennial Conference on Chemical Education, South Bend, IN.
2. Atkinson, M. B.; Pienta, N. J. (March 2018) Student Attitudes and Self-Concepts in an Active Learning Preparatory Chemistry Classroom Utilizing the Construction of Explanations to Promote Understanding. American Chemical Society National Meeting and Expo, New Orleans, LA.
1. Krishnan, S.; Atkinson, M. B.; McNeil, L. A.; Luft, J. A.; Pienta, N. J. (March 2018) Constructing Explanations to Aid in Conceptual Chemistry Learning in an Active Learning Environment. National Association Research Science Teaching (NARST) Annual International Conference, Atlanta, GA.

Contributed Posters

9. Musolf, N.; Atkinson, M. B.; Bretz, S. L. (April 2020 - *Cancelled due to COVID-19) Investigating Chemistry Students' Understanding of Intermolecular Forces using a Matrix Representation. Undergraduate Research Forum, Miami University, Oxford, OH.
8. Page, A.; Atkinson, M. B.; Bretz, S. L. (April 2020 - *Cancelled due to COVID-19) Investigation into General Chemistry Students' Ideas about Thermodynamics using a Matrix Representation. Undergraduate Research Forum, Miami University, Oxford, OH.
7. Atkinson, M. B.; Popova, M; Croisant, M.; Bretz, S. L. (March 2020 - *Cancelled due to COVID-19) Longitudinal Study using the Reaction Coordinate Diagram Inventory (RCDI): Changes in Students' Reasoning during Organic Chemistry. American Chemical Society National Meeting and Expo, Philadelphia, PA.

6. Reed, D. J.; Atkinson, M. B.; Popova, M.; Croisant, M.; Bretz, S. L. (March 2020 - *Cancelled due to COVID-19) Misconceptions about Reaction Coordinate Diagrams: An Analysis of General, Organic, and Physical Chemistry Students' Thinking. American Chemical Society National Meeting and Expo, Philadelphia, PA.
5. Atkinson, M. B.; Croisant, M.; Popova, M.; Bretz, S. L. (July 2019) Development of the Reaction Coordinate Diagram Inventory: Measuring Student Thinking and Confidence with Reaction Coordinate Diagrams. NSF-Funded CER Grad Student and Post-Doc Professional Development Conference, Oxford, OH.
4. Atkinson, M. B.; Croisant, M.; Popova, M.; Bretz, S. L. (June 2019) Development of the Reaction Coordinate Diagram Inventory: Measuring Student Thinking and Confidence with Reaction Coordinate Diagrams. Chemistry Education Research and Practice Gordon Research Conference, Lewiston, ME.
3. Atkinson, M. B.; Croisant, M.; Popova, M.; Bretz, S. L. (March 2019) An Inventory to Measure Student Thinking about Reaction Coordinate Diagrams. American Chemical Society National Meeting and Expo, Orlando, FL.
2. Atkinson, M. B.; Krishnan, S.; McNeil, L. A.; Luft, J. A.; Pienta, N. J. (August 2017) Constructing Explanations to Aid in Conceptual Chemistry Learning in Active Learning Classrooms. Scientists Engaged in Education Research (SEER) Center at UGA Reception, Athens, GA.
1. Atkinson, M. B.; Pienta, N. J. (July 2017) Tracking General Chemistry Student Misconceptions Using an Electronic Learning Tool. NSF-Funded CER Grad Student and Post-Doc Professional Development Conference, Oxford, OH.

PROFESSIONAL DEVELOPMENT

- **NSF-Funded CER Grad Student and Post-Doc Professional Development Conference**, Oxford, OH (Selected twice: July 2017 and July 2019)
- **Graduate Student Mentor for the Summer Bridge Program**, through the Office of Outreach and Diversity at UGA for mentoring incoming graduate students, Athens, GA (2013-2015)
- **Graduate Student Mentor for the GRO Program**, through the Office of Outreach and Diversity at UGA for mentoring incoming graduate students, Athens, GA (2013-2015)

HONORS AND AWARDS

- **Division of Chemical Education (DivCHED) International Activities Committee International Travel Award (2020)**
The Division of Chemical Education funds a \$2000 Travel Award each year in support of a division member who presents and fully participates in an international chemical education conference held outside the US. As the winner for 2020, I will communicate information and insights gained at the conference to the membership through available CHED publications and by postings on the DivCHED website (<http://www.divched.org>).
- **Excellence in Teaching Award Nominee, Department of Chemistry, University of Georgia (2018)**
Sponsored by the Graduate School at UGA, given to graduate student teaching assistants demonstrating superior teaching skills and contributing to teaching beyond their responsibilities, one of only 34 nominees from UGA
- **Outstanding Teaching Award, Department of Chemistry, University of Georgia (2014)**
Administered by the Center for Teaching and Learning and sponsored by the Office of the Vice President for Instruction at UGA, given to graduate student teaching assistants demonstrating superior teaching skills while serving as an instructor of a class or lab

PROFESSIONAL ACTIVITIES

- **Journal Manuscript Reviewer (2019-Present)**

Peer reviewer for manuscripts submitted to:

- The American Chemical Society Journal of Chemical Education (*J. Chem. Educ.*)
- The Royal Society of Chemistry Journal of Chemistry Education Research and Practice (*Chem. Educ. Res. Pract.*)
- Chemistry Education Research in the Canadian Journal of Chemistry (*CJC*)
- **American Chemical Society Member (2016-Present), ACS Division of Chemical Education (DivCHED) Member (2019-Present)**
- **Women in Science (WiSci), Member (2018)**
WiSci is a student organization at UGA that welcomes all genders, with goals to promote equality in the sciences through providing opportunities for mentoring, networking, and career development.
- **Georgia General Chemistry Network (GGCN), Member (2017-2018)**
The GGCN is a network of high school and collegiate faculty, postdocs, and graduate students teaching chemistry in the state of Georgia, with goals to understand and promote the teaching and learning of introductory chemistry.
- **SEER Center Graduate Student Chair (May 2018-December 2018)**
As the Graduate Student Chair, responsibilities include voicing graduate student interests at SEER Center business meetings, managing all committees, serving on the membership committee, maintaining the membership list and organizing student/postdoc-run workshops, and attending SEER Center Executive Committee meetings.
- **SEER Center at the University of Georgia, Core Student Member (2017-2018)**
The SEER (Scientists Engaged in Education Research) Center consists of faculty, postdocs, and graduate students across many departments at UGA performing research in collegiate STEM education, with a main aim to develop collaborative research programs in university-based STEM education and disseminate research results.
- **Biochemistry Problem Solving Faculty Learning Community, Member (2017-2018)**
This Faculty Learning Community is composed of UGA faculty, graduate students and postdoctoral students, and high school teachers in the region, with the main goals of gaining insight into the way students think about key biochemistry topics and designing problem-solving assessments and products.

OUTREACH

- **Annual Miami University and Talawanda Elementary School Science Week, Volunteer (2019)**
13th annual Miami/Talawanda Science Week, welcoming hundreds of elementary students from the surrounding school district. Miami faculty, staff, graduate and undergraduate students provide hands-on learning experiences during Science Week in physics, chemistry, biology, psychology, geology, geography and engineering.
- **Science Olympiad Outreach at UGA (2017)**
I served as a volunteer in the forensics and chemistry labs for the 4th Annual Science Olympiad Invitational Tournament (Division C) at UGA. This is a student-run organization promoting STEM in the local community.