

**Curriculum Vitae**  
**RENÉE S. COLE**

**Business Address:** Department of Chemistry  
University of Iowa, Iowa City, IA 52242  
**Phone:** 319-384-1883  
**E-mail:** renee-cole@uiowa.edu

**EDUCATIONAL AND PROFESSIONAL HISTORY**

**Higher Education**

Ph.D., Physical Chemistry 1998  
M.S., Physical Chemistry 1995  
University of Oklahoma (1992-1998)  
Thesis: "Characterization of Pure and Phase-Stabilized Sodium Phosphate"  
Advisor: Prof. Roger E. Frech  
B.A., Chemistry\*, Magna Cum Laude with departmental distinction 1992  
Hendrix College, Conway, AR (1988-1992)  
\*American Chemical Society certified degree

**Professional and Academic Positions**

***Professor of Chemistry*** August 2018 -  
University of Iowa

***Associate Professor of Chemistry*** August 2011 – August 2018  
University of Iowa

***Professor of Chemistry*** August 2008 – August 2011  
University of Central Missouri

***Associate Professor of Chemistry*** August 2003 – July 2008  
University of Central Missouri (the institution underwent a name change in Oct. 2006)

***Assistant Professor of Chemistry*** January 2000 - August 2003  
Central Missouri State University

***Postdoctoral Research Associate*** (Prof. John W. Moore) July 1998 - December 1999  
University of Wisconsin-Madison

**Honors and Awards**

2022 – Selected as US Representative to IUPAC Committee on Chemical Education  
2021 – American Association for the Advancement of Science Fellow  
2021 – University of Iowa CLAS Collegiate Teaching Award  
2018 – University of Iowa CLAS Collegiate Scholar  
2017 – 2<sup>nd</sup> Place Best Research Paper for the American Society of Engineering Education  
Entrepreneurship & Engineering Division  
2015 – American Chemical Society Fellow  
2015 – American Chemical Society Western Connecticut Section Visiting Scientist Award  
2014 – Iowa Women of Innovation Award for Academic Innovation & Leadership (Post-Secondary)  
2010 – UCM College of Science & Technology Award for Excellence in Teaching

2009 – Missouri Governor’s Award for Excellence in Education  
2009 –UCM Fall 2009 Convocation Speaker

## Memberships

American Chemical Society  
Women Chemist’s Committee  
Division of Chemical Education  
American Association for the Advancement of Science  
National Science Teachers Association  
Phi Lambda Upsilon  
Phi Kappa Phi

## SCHOLARSHIP

### Publications

**Refereed articles** (\*indicates undergraduate research student)

1. Joshua Reid, Zubeyde Demet Kirbulut Gunes, Shaghayegh Fateh, Adan Fatima, Michael Macrie-Shuck, Hannah Nennig, Fabrizio Quintanilla, Nicole States, Ahmad Syed, **Renee Cole**, Gregory Rushton, Lisa Shah, Vicente Talanquer, “Investigating Patterns of Student Engagement during Collaborative Activities in Undergraduate Chemistry Courses, *Chemistry Education Research and Practice*, **23**, 173-188 (2022).
2. Rachel Roller, Saichon Sumantakul, Michelle Tran, Andrea Van Wyk, Jessica Zinna, Destiny Donelson, Sarah Finnegan, Gregory Foley, Olivia Frechette, Jessica Gaetgens, Jinai Jang, Kathryn Rinaolo, **Renee Cole**, Marya Lieberman, Vincent Remcho, and Kimberley Frederick, “Inquiry-Based Labs Using Paper Microfluidic Devices, *Journal of Chemical Education*, **98**(6), 1946-1953 (2021).
3. Doug Czajka, Gil Reynders, Courtney Stanford, **Renée Cole**, Juliette Lantz, and Suzanne Ruder, “A Novel Rubric Format for Providing Feedback on Process Skills to STEM Undergraduate Students, *Journal of College Science Teaching*, **50**(6), 48-56 (2021).
4. Karla K. McGregor, Amanda Owen Van Horne, Maura Curran, Susan Wagner Cook, and **Renee Cole**, “The Challenge of Rich Vocabulary Instruction for Children With Developmental Language Disorder,” *Language, Speech, and Hearing Services in Schools*, Feb, 1-18 (2021).
5. **Renee Cole**, Marc Muniz, Erica Harvey, Robert Sweeney, and Sally Hunnicutt, “How Should Apples Be Prepared for a Fruit Salad? A Guided Inquiry Physical Chemistry Experiment,” *Journal of Chemical Education*, **97**(12), 4475-4481 (2020).
6. Gil Reynders, Juliette Lantz, Suzanne Ruder, Courtney Stanford, and **Renee Cole**, “Rubrics to assess critical thinking and information processing in undergraduate STEM courses,” *International Journal of STEM Education*, **7**(9) (2020).
7. Wayne Jacobson and **Renée Cole**, “Motivations and Obstacles Influencing Faculty Engagement in Adopting Teaching Innovations,” *To Improve the Academy*, **39**(1), 1-23 (2020).

8. Gil Reynders, Erica Suh, **Renée Cole**, and Rebecca Sansom, "Developing Student Process Skills in a General Chemistry Laboratory," *Journal of Chemical Education*, **96**(10), 2109-2119 (2019).
9. Daniel Reinholz, Rebecca Matz, **Renee Cole**, and Naneh Apkarian, "STEM is not a monolith: A preliminary analysis of variations in STEM disciplinary culture and implications for change," *CBE-Life Sciences Education*, **18**(4), 18:mr4,1-14 (2019).
10. Jennifer Schmidt-McCormack, Caryl Fish, Anne Falke, Juliette Lantz and **Renée Cole**, "Assessment of process skills in analytical chemistry student responses to open-ended exam questions," *Journal of Chemical Education*, **96**(8), 1578-1590 (2019).
11. Deborah Herrington, Ryan Sweeder, Patrick Daubenmire, Chris Bauer, Stacey Lowery Bretz, Diane Bunce, Justin Carmel, **Renee Cole**, Brittlund DeKorver, Resa Kelly, Scott Lewis, Maria Oliver-Hoyo, Stephanie Ryan, Marilyne Stains, Marcy Towns, and Ellen Yeziarski, "Supporting the Growth and Impact of the Chemistry Education Research Community," *Journal of Chemical Education*, **96**(3), 393-397 (2019).
12. Marilyne Stains, Jordan Harshman, Megan Barker, Stephanie Chasteen, **Renee Cole**, Sue Ellen DeChenne-Peters, Kevin Eagan, Joan Esson, Jennifer Knight, Frank Laski, Marc Levis-Fitzgerald, Christopher Lee, Stanley Lo, Lisa McDonnell, Timothy McKay, Nicole Michelotti, Amanda Musgrove, Michael Palmer, Kathryn Plank, Tamara Rodela, Erin Sanders, Natalie Schimpf, Patricia Schulte, Michelle Smith, MacKenzie Stetzer, Blaire Van Valkenburgh, Erin Vinson, Laura Weir, Paul Wendel, Lindsay Wheeler, and Anna Young, "Anatomy of STEM teaching in North American universities," *Science* **359** (6383), 1468-1470 (2018).
13. Alena Moon, Courtney Stanford, **Renee Cole**, and Marcy Towns, "Analysis of inquiry materials to explain complexity of chemical reasoning in physical chemistry students' argumentation," *Journal of Research in Science Teaching*, **54** (10), 1322-1346 (2017).  
(<http://onlinelibrary.wiley.com/doi/10.1002/tea.21407/full>)
14. Jeff Froyd, Charles Henderson, **Renee Cole**, Debra Friedrichsen, Raina Khatri, Courtney Stanford, "From dissemination to propagation: A new paradigm for education developers," *Change: The Magazine of Higher Learning*, **49**(4), 35-42 (2017).
15. Jennifer Schmidt-McCormack, Marc Muniz, Ellie Keuter†, Scott Shaw, and **Renée Cole**, "Design and implementation of instructional videos for upper-division undergraduate courses," *Chemistry Education Research and Practice*, **18**, 749-762 (2017)  
(<http://pubs.rsc.org/en/content/articlepdf/2017/RP/C7RP00078B>)
16. Alena Moon, Courtney Stanford, **Renee Cole**, and Marcy Towns, "Decentering: A characteristic of effective student-student discourse in inquiry-oriented physical chemistry classrooms," *Journal of Chemical Education*, **94**(7), 829-836 (2017).  
(<http://pubs.acs.org/doi/abs/10.1021/acs.jchemed.6b00856>)
17. Courtney Stanford, **Renee Cole**, Jeff Froyd, Charles Henderson, Debra Friedrichsen, and Raina Khatri, "Analysis of propagation plans of NSF-funded education development projects," *Journal of Science Education and Technology*, **26**(4), 418-437 (2017).  
(<https://link.springer.com/article/10.1007%2Fs10956-017-9689-x>)

18. Raina Khatri, Charles Henderson, **Renée Cole**, Jeff Froyd, Debra Friedrichsen, and Courtney Stanford, "Characteristics of Well-Propagated Teaching Innovations for Undergraduate STEM Disciplines," *International Journal of STEM Education*, **4**(2), 1-10 (2017).
19. Courtney Stanford, Alena Moon, Marcy Towns, and **Renee Cole**, "Analysis of Instructor Facilitation Strategies and Their Influences on Student Argumentation: A Case Study of a Process-Oriented Guided-Inquiry Learning Physical Chemistry Classroom," *Journal of Chemical Education*, **93**(9), 1501-1513 (2016). (<http://dx.doi.org/10.1021/acs.jchemed.5b00993>)
20. Alena Moon, Courtney Stanford, **Renee Cole**, and Marcy Towns, "The nature of students' chemical reasoning employed in scientific argumentation in physical chemistry," *Chemistry Education Research and Practice*, **17**, 353-364 (2016). (<http://pubs.rsc.org/en/content/articlelanding/2016/rp/c5rp00207a>)
21. Courtney Stanford, **Renée Cole**, Jeff Froyd, Debra Friedrichsen, Raina Khatri, Charles Henderson, "Supporting sustained adoption of education innovations: The Designing for Sustained Adoption Assessment Instrument" *International Journal of STEM Education*, **3**(1), 1-13 (2016). (<http://link.springer.com/article/10.1186/s40594-016-0034-3>)
22. Raina Khatri, Charles Henderson, **Renée Cole**, Jeff Froyd, Debra Friedrichsen, and Courtney Stanford, "Designing for sustained adoption: A model of developing educational innovations for successful propagation," *Phys. Rev. ST Phys. Educ. Res.*, **12**(1), 010112-1-22 (2016). (<http://link.aps.org/doi/10.1103/PhysRevPhysEducRes.12.010112>)
23. Nicole Becker, Courtney Stanford, Marcy Towns, and **Renee Cole**, "Translating across macroscopic, submicroscopic, and symbolic levels: the role of instructor facilitation in an inquiry-oriented physical chemistry class," *Chemistry Education Research and Practice*, **16**, 769-785 (2015). (<http://pubs.rsc.org/en/content/articlepdf/2015/rp/c5rp00064e>)
24. Benjamin Weidemann<sup>†</sup>, Nicole Littlejohn, **Renee Cole**, and Justin Grobe, "The brain renin-angiotensin system suppresses digestive efficiency," *The FASEB Journal*, **28**, 1126.13. (2014).
25. Nicole Becker, Chris Rasmussen, George Sweeney, Megan Wawro, Marcy Towns, and **Renee Cole**, "Reasoning using particulate nature of matter: An example of a sociochemical norm in a physical chemistry class," *Chemistry Education Research and Practice*, **14**, 81-94 (2013). (<http://pubs.rsc.org/en/content/articlelanding/2013/rp/c2rp20085f>)
26. Chris Bauer and **Renee Cole**, "Validation of Assessment Rubric via Controlled Modification of Classroom Activity," *Journal of Chemical Education*, **89**(9), 1104-1108 (2012).
27. **Renee Cole**, Nicole Becker, Marcy Towns, George Sweeney, Megan Wawro, and Chris Rasmussen, "Adapting a Methodology from Mathematics Education Research to Chemistry Education Research: Documenting Collective Activity," *International Journal of Science and Mathematics Education*, **10**, 193-211 (2012).
28. Kimberly Linenberger<sup>†</sup>, **Renee S. Cole**, and Somnath Sarkar, "Looking Beyond Lewis Structures: A General Chemistry Molecular Modeling Experiment Focusing on Physical Properties and Geometry," *Journal of Chemical Education*, **88**(7), 962-965 (2011).

29. Philip R. Burkholder, **Renee S. Cole**, and Gordon H. Purser, "Using Molecular Dynamics Simulation to Reinforce Student Understanding of Intermolecular Forces," *Journal of Chemical Education*, **85(8)**, 1071-1077 (2008).  
Note: This article was selected as the cover feature.
30. Christopher F. Bauer, John V. Clevenger, **Renée S. Cole**, Loretta L. Jones, Paul B. Kelter, Maria T. Oliver-Hoyo, and Barbara A. Sawrey, "Hiring and Promotion in Chemical Education: A Task Force Report," *Journal of Chemical Education*, **85(7)**, 898-901 (2008). (*Invited*)
31. Scott E. McKay, Timothy Robbins†, and **Renée S. Cole**, "Modern Sport and Chemistry: What a Golf Fanatic Should Know," *Journal of Chemical Education*, **85(10)**, 1319 (2008). (*Invited*)
32. **Renée S. Cole** and John B. Todd, "Effects of web-based multimedia homework with immediate rich feedback on student learning in general chemistry" *Journal of Chemical Education*, **80(11)**, 1338-1343 (2003).
33. **Renée S. Cole** and Roger Frech, "Characterization of the sodium sulfate-sodium phosphate system" *Journal of Molecular Structure*, **643**, 101-107 (2002).
34. Guinevere A. Giffin†, Steven R. Boone, **Renée S. Cole**, Scott E. McKay and Robert Kopitzke, "Modern Sport and Chemistry: What a chemically aware sports fanatic should know" *Journal of Chemical Education* **79(7)**, 813-819 (2002).  
Note: This article was selected as the cover feature.
35. Renée Cole, "Chemistry, Teaching, and WebCT" *Journal of Chemical Education* **77(7)**, 826-827 (2000). (*Invited*)
36. **R. S. Cole** and Roger Frech, "Spectroscopic characterization of pure and cation-stabilized sodium phosphate" *Journal of Chemical Physics* **112(9)**, 4251-4261 (2000).
37. Roger E. Frech, **Renee S. Cole** and Gamini Dharmasena, "Raman spectroscopic studies of Y<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> substitution in LiNaSO<sub>4</sub> and LiKSO<sub>4</sub>," *J. Solid State Chem.*, **105**, 151-160 (1993).
38. David P. Smith, Jamie R. Strickler, Steven D. Gray, Michael A. Bruck, **Renee S. Holmes** and David E. Wigley, "Early-transition-metal-mediated [2+2+2] cycloadditions: formation and fragmentation of a reactive metallocyclopentadiene and its direct conversion to η<sup>6</sup>-arene and η<sup>2</sup>-pyridene complexes of tantalum," *Organometallics*, **11**, 1275-1288 (1992).

### Peer-reviewed Book Chapters

1. Andrea Van Wyk, Rebecca Hunter, Lisa S. Ott, **Renee S. Cole**, and Kimberley A. Frederick, "Supporting Student Inquiry and Engagement in the Analytical Lab: Pilot Studies from Three Institutions," in *Active Learning in the Analytical Chemistry Curriculum*, Editors Thomas Wenzel, Jill Robinson, and Michelle Kovarik, (in press). (invited)
2. Renee Cole, "Sustaining the Adoption of Active Learning," in *Active Learning in the Analytical Chemistry Curriculum*, Editors Thomas Wenzel, Jill Robinson, and Michelle Kovarik, (in press). (invited)
3. Ian Brown, Thomas Wenzel, and **Renee Cole**, "Supporting faculty in adopting active learning pedagogies," in *Best Practices in Chemistry Teacher Education*. Editor: Sarah Boesdorfer. Oxford

University Press, 2019, pp. 135-148. (invited)

4. **Renee Cole** and Tricia Shepherd, "Making Sense of Mathematical Relationships in Physical Chemistry," in *It's Just Math: Research on Students' Understanding of Chemistry and Mathematics*. Editors: Marcy Towns, Kinsey Bain, and Jon-Marc Rodriguez, Oxford University Press, 2019, pp. 173-186. (invited)
5. **Renee Cole**, Gil Reynders, Suzanne Ruder, Courtney Stanford, and Juliette Lantz, "Constructive alignment beyond content: Assessing professional skills in student group interactions and written work," in *Research into Practice in Chemistry Education - Selected Contributions from the 25th IUPAC International Conference on Chemistry Education 2018*. Editors: Madeleine Schultz, Siegbert Schmid, and Gwen Lawrie, Springer, 2019, pp. 203-222. (invited)
6. **Renee Cole**, Juliette Lantz, and Suzanne Ruder, "PO: The Process," in *POGIL: An Introduction to Process Oriented Guided Inquiry Learning for Those Who Wish to Empower Learners*. Editor: Shawn Simonson, Stylus Publishing, Sterling, VA. 2019, pp. 42-68. (invited)
7. Marcy Towns, **Renee Cole**, Alena Moon, and Courtney Stanford, "Argumentation in physical chemistry," in *Argumentation in Chemistry Education: Research, Policy and Practice*. Editor: Sibel Erduran, Royal Society of Chemistry. 2019, pp. 247-274. (invited)
8. Courtney Stanford, Alena Moon, Marcy Towns, and **Renee Cole**, "The impact of guided inquiry materials on student representational level understanding of thermodynamics," in *Engaging Students in Physical Chemistry (ACS Symposium Series)*. Editors: Craig Teague and David Gardner, Oxford University Press. 2018, pp. 141-168. (invited)
9. Renee Cole, "Using chemistry education research to inform teaching strategies and design of instructional materials," in *Chemistry Education: Best Practices, Opportunities, and Trends*, Editors: Javier Garcia-Martinez and Elena Serrano-Torregrosa, Wiley-VCH: Weinheim, Germany, 2015, pp. 151-180. (invited)
10. **Renee Cole**, Nicole Becker, and Courtney Stanford, "Discourse analysis as a tool to examine teaching and learning in the classroom," in *Tools of Chemistry Education Research (ACS Symposium Series)*, Editors: Diane Bunce and Renee Cole, Oxford University Press, 2014, pp. 61-81.
11. **Renee Cole** and Diane Bunce, "An introduction to the tools of chemistry education research," in *Tools of Chemistry Education Research (ACS Symposium Series)*, Editors: Diane Bunce and Renee Cole, Oxford University Press, 2014, pp. 1-7.
12. Diane Bunce and **Renee Cole**, "Using this book to get started on your own research," in *Tools of Chemistry Education Research (ACS Symposium Series)*, Editors: Diane Bunce and Renee Cole, Oxford University Press, 2014, pp. 335-341.
13. Renee Cole, "Representing Chemical Equations and Stoichiometry," in *AP Chemistry: Implementing Guided Inquiry Activities in the AP Chemistry Classroom*, Editors: Thomas Greenbowe and Marian DeWane, The College Board; New York, NY, 2013, pp. 9-16, 39-44.
14. **Renee S. Cole** and Christopher F. Bauer, "Assessing Your Implementation of POGIL," in *Process-Oriented Guided-Inquiry Learning (ACS Symposium Series)*, Editor: Richard Moog, Oxford University Press, 2008, pp 213-225.

15. Diane M. Bunce and **Renee S. Cole**, "Using This Book to Find Answers to Chemical Education Research Questions" in *Nuts and Bolts of Chemical Education Research* (ACS Symposium Series), Editors: Diane M. Bunce and Renee S. Cole, Oxford University Press, 2007, pp 1-10.
16. Christopher F. Bauer, **Renee S. Cole**, and Mark F. Walter, "Assessment of Student Learning: Guidance for Instructors," in *Nuts and Bolts of Chemical Education Research* (ACS Symposium Series), Editors: Diane M. Bunce and Renee S. Cole, Oxford University Press, 2007, pp 183-201.
17. Scott E. McKay and **Renee S. Cole**, "An Undergraduate Interdisciplinary Course in Computational and Theoretical Chemistry: Two Approaches Are Better Than One." in *Developing and Sustaining a Research-Supportive Curriculum: A Compendium of Successful Practices*; Editors: Kerry Karukstis and Timothy Elgren; Learning through Research Series, Council on Undergraduate Research: Washington, D.C., 2007.

### Refereed Conference Proceedings

1. **Renee Cole**, Juliette Lantz, Suzanne Ruder, Gilbert Reynders, and Courtney Stanford, "Enhancing learning by assessing more than content knowledge," Paper presented at 2018 ASEE Annual Conference & Exposition, Salt Lake City, UT. (2018)  
(<https://peer.asee.org/29991>)
2. Victoria Matthew, Jeffrey Froyd, Raina Khatri, Thomas Katona, Robby Sanders, Bonnie Bachman, **Renee Cole**, John Lovitt, Melissa Geist, Charles Henderson, Debra Friedrichsen, Phil Weilerstein, "Institutionalizing campus innovation and entrepreneurship programming by optimizing a faculty grantmaking process: A case study," Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, OH. (2017)  
(<https://peer.asee.org/28539>)  
\*\*Awarded 2<sup>nd</sup> Best Research Paper for the Entrepreneurship & Engineering Innovation Division\*\*
3. Raina Khatri, Charles Henderson, **Renée Cole**, Jeff Froyd, Debra Friedrichsen, and Courtney Stanford, "Characteristics of Well-Propagated Undergraduate STEM Teaching Innovations," 2015 PERC Proceedings, edited by A. D. Churukian, D. L. Jones, and Lin Ding, p. 167-170 (2016).  
(<http://www.compadre.org/per/items/detail.cfm?ID=13862>)
4. Raina Khatri, Charles Henderson, **Renée Cole**, and Jeff Froyd, "Learning About Educational Change Strategies: A Study of the Successful Propagation of Peer Instruction," 2014 PERC Proceedings, edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones, p. 131-134 (2015).  
(<http://www.compadre.org/per/items/detail.cfm?ID=13466>)
5. Raina Khatri, Charles Henderson, **Renée Cole**, and Jeff Froyd, "Over One Hundred Million Simulations Delivered: A Case Study of the PhET Interactive Simulations," 2013 PERC Proceedings, edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones. p. 205-208 (2014).  
(<http://www.compadre.org/per/items/detail.cfm?ID=13163>)
6. Raina Khatri, Charles Henderson, **Renee Cole**, and Jeff Froyd, "Successful propagation of educational innovations: Viewpoints from principal investigators and program officers," Proceedings of the 2012 Physics Education Research Conference, AIP Conference Proceedings, Volume 1513, p. 218-221 (2013) (<http://www.compadre.org/per/items/detail.cfm?ID=12817>)

7. Lowell R. Matthews, Edward T. Knobbe, Gamini Dharmasena, **Renée S. Cole** and Roger E. Frech, "Spectrofluorimetric characterization of an ionic conductor: Sodium sulfate high-temperature phases doped with europium(III)," *Materials Research Symposium Proceedings*, **369**, 475-480 (1995).

### Books

Charles Henderson, **Renee Cole**, Jeff Froyd, Debra Friedrichsen, Raina Khatri, and Courtney Stanford (2015). *Designing educational innovations for sustained adoption: A how-to guide for education developers who want to increase the impact of their work*. Kalamazoo, MI: Increase the Impact.

### Edited Books

*Tools of Chemistry Education Research* (ACS Symposium Series), Editors: Diane M. Bunce and Renee S. Cole, American Chemical Society, 2014.

*Nuts and Bolts of Chemical Education Research* (ACS Symposium Series), Editors: Diane M. Bunce and Renee S. Cole, American Chemical Society, 2007.

### Other Publications

Henderson, C., Cole, R., Froyd, J., & Khatri, R. (2012). Five Claims about Effective Propagation, A White Paper prepared for January 30-31, 2012 meetings with NSF TUES Program Directors. <http://homepages.wmich.edu/~chenders/Publications/2012WhitePaperFiveClaims.pdf>

### Educational Materials

Lantz, J.; Cole, R.; Bauer, C.; Cornely, K.; Dalton, C.; Falke, A.; Fischer-Drowos, S.; Fish, C.; Langhus, D.; Riter, R.; Salter, C.; Walczak, M., *Analytical Chemistry: A Guided Inquiry Approach - Instrumental Analysis Collection*. John Wiley & Sons: 2015.

Lantz, Julie; Cole, Renee; Bauer, Chris; Dalton, Christine; Falke, Anne; Fischer-Drowos, Shirley; Fish, Caryl; Langhus, David; Riter, Ruth; Salter, Carl; Walczak, Mary. *Analytical Chemistry: A Guided Inquiry Approach: Quantitative Analysis Collection*. John Wiley & Sons: 2014.

Renée S. Cole and Steven Boone, WebCT-based Instructor Resources to support *Chemistry, 7<sup>th</sup> Edition* by Raymond Chang, McGraw Hill: Boston, 2002.

### Book Reviews

Renée S. Cole, "Book Review of Misconceptions in Chemistry: Addressing Perceptions in Chemical Education," *Journal of Chemical Education*, **88(4)**, 386 (2011).

### Grants Funded

#### External

Agency	Role	Grant Number	Amount	Year
Carver Foundation	Co-PI	N/A	\$189,400	2020-22
HHMI	Co-PI	N/A	\$75,000	2020
NSF DUE IUSE	PI	DUE #1915047	\$428,976 as part of a \$1,404,616 collaborative grant	2019-23
NSF DRL	Co-PI	DRL #1661166	\$1,090,869	2017-21



NSF DUE IUSE	PI	DUE #1624956	\$267,930 as part of a \$925,000 collaborative grant	2016-19
NSF DUE IUSE	PI	DUE #1524965	\$462,050 as part of \$1,158,885 collaborative grant	2015-21
NSF DUE IUSE	PI	DUE #1432728	\$599,942	2014-19
NSF DUE TUES	PI	DUE #1236926	\$185,891 as part of a \$764,880 collaborative grant	2012-16
NSF DUE CCLI	PI	DUE #0816792	\$31,487 as part of a \$150,867 collaborative grant	2008-10
NSF DUE CCLI	Co-PI	DUE #0717492	\$498,825	2007-13
POGIL Project	Co-PI	SPUR grant	\$2500	2006
Flinn Foundation	PI		\$10,000	2006
NSF DUE CCLI	PI	DUE #0411104	\$79,018	2004-08

### Internal

Program	Role	Amount	Year
Innovations in Teaching with Technology	PI	\$33,100	2014-2015

### Conference Presentations (presenting author(s) underlined, + indicates undergraduate student)

1. Renée Cole and Ian Brown, "Building a community of engaged instructors," George C. Pimentel (2020) Symposium in honor of Thomas Wenzel, American Chemical Society Fall 2021 National Meeting, September 2021. (invited)
2. Renee Cole, Juliette Lantz, Kathryn Mauger-Sonnek, Suzanne Ruder, "Strategies for facilitating and assessing transferable skills", STEM for All Video Showcase: Learning from Research and Practice, May 11-18, 2021.
3. Renée Cole and Gregory Rushton, "Classroom discourse in active learning environments," A Symposium Honoring the Work of Vicente Talanquer, recipient of the Spring 2021 ACS Award for Achievement in Research for the Teaching and Learning in Chemistry, American Chemical Society Spring 2021 National Meeting, April 2021. (invited)
4. Renée Cole, Ian Brown, Tom Wenzel, "Supporting faculty in implementing active learning in analytical chemistry," Active Learning in the Analytical Chemistry Curriculum Symposium, American Chemical Society Spring 2021 National Meeting, April 2021. (invited)
5. Renée Cole, "Promoting student engagement and meaningful learning in the classroom," FACSS SciX 2020, October 2020. (invited speaker for featured live stream session)
6. Renee Cole, Gil Reynders, Suzanne Ruder, Juliette Lantz, Kathryn Mauger-Sonnek, "Enhancing Learning by Improving Process Skills in STEM", STEM for All Video Showcase: Learning from Research and Practice, May 5-12, 2020. (<https://stemforall2020.videohall.com/presentations/1659>)
7. Renée Cole, "Going beyond content knowledge: Aligning outcomes, activities, and assessment that promote skill development," Chicago Symposium Series - Excellence in Teaching Mathematics and Science: Research and Practice, February 2020. (invited plenary speaker)
8. Renée Cole, Efraxia Kartsonaki, Gwendolyn Lawrie, "Assessment of student reasoning and interactions during online synchronous chats," Chemical Education with a Focus on Online Chemical Education Symposium, 54<sup>th</sup> Midwest Regional ACS Meeting, Wichita, KS, 2019. (invited)

9. Renée Cole, "Promoting productive student discourse in chemistry," Chemistry Education Research and Practice Gordon Research Conference, Lewiston, ME, June 2019. (invited plenary speaker)
10. Renée Cole, "Analysis of classroom discourse," Methods in Chemistry Education Research Meeting, Edinburgh, Scotland, May 2019. (invited plenary speaker)
11. Renée Cole, "Enhancing learning by promoting and assessing more than content knowledge," SABER West 2019, Irvine, CA, January 2019. (invited plenary speaker)
12. Renée Cole, Gilbert Reynders, Juliette Lantz, and Suzanne Ruder, "Assessing more than content knowledge: Aligning instruction that values practical skills," in Measurement & Evidence in Chemistry Education Symposium, 53<sup>rd</sup> Midwest Regional ACS Meeting, Ames, IA, 2018. (invited)
13. Renée Cole and Scott Lewis, "Contributing to the chemistry education research community across varying academic settings," Supporting the Growth & Impact of the Chemistry Education Research Community Symposium, 25<sup>th</sup> Biennial Conference on Chemical Education, Notre Dame, IN, 2018. (invited)
14. Renée Cole, "Characterizing the nature of classroom discourse," Qualitative Research in Chemical Education: The Pursuit of Whys & Hows Symposium, 25<sup>th</sup> Biennial Conference on Chemical Education, Notre Dame, IN, 2018. (invited)
15. Renée Cole and Jennifer Schmidt-McCormack, "Using instructional videos to improve student experiences and practices in upper-level laboratories," Joining the dots in laboratory learning Symposium, 25<sup>th</sup> IUPAC International Conference on Chemistry Education, Sydney, AU, 2018. (invited)
16. Renée Cole, Juliette Lantz, Suzanne Ruder, Courtney Stanford, and Gilbert Reynders, "Enhancing learning by assessing more than content knowledge," Translating assessment into the next dimension Symposium, 25<sup>th</sup> IUPAC International Conference on Chemistry Education, Sydney, AU, 2018.
17. Renée Cole, Juliette Lantz, Suzanne Ruder, Courtney Stanford, and Gilbert Reynders, "Enhancing learning by assessing more than content knowledge," NSF Grantees Poster Session, 125<sup>th</sup> American Society for Engineering Education Conference, Salt Lake City, UT, 2018. (invited)
18. Renée Cole and Thomas Wenzel, "Moving faculty from experimentation with to long-term adoption of engaged student learning in Analytical Chemistry," Curricular Innovations in Undergraduate Chemical Education Impacted by NSF, 255<sup>th</sup> American Chemical Society National Meeting, New Orleans, 2018. (invited)
19. Ashlie Wrenne and Renée Cole, "Assessing departmental climates for supporting innovative teaching practices," Poster Session Theme II: Supporting, Rewarding, and Building Capacity of STEM Faculty, AAC&U Transforming Undergraduate STEM Education Conference, San Francisco, CA, 2017
20. Renée Cole, "Planning for institutional change," Poster Session Theme V: Understanding Effective Strategies for Transforming Institutional Cultures of Undergraduate STEM Reform, AAC&U Transforming Undergraduate STEM Education Conference, San Francisco, CA, 2017
21. Juliette Lantz, Renée Cole and Gilbert Reynders, "Strategies for providing feedback to STEM students on intellectual and practical skills," Theme IV Session: Assessment and evidence for high-quality undergraduate STEM learning, AAC&U Transforming Undergraduate STEM Education Conference, San Francisco, CA, 2017
22. Renée Cole, Juliette Lantz, Suzanne Ruder, Jennifer Schmidt-McCormack, and Gilbert Reynders, "Enhancing learning by assessing process skills in STEM courses," New Directions in Chemistry Education Symposium, 52<sup>nd</sup> Midwest Regional ACS Meeting, Lawrence, KS, 2017. (invited)
23. Renée Cole and Courtney Stanford, "Facilitation matters: Analysis of instructor facilitation strategies and their influences on student argumentation," Putting CER into Practice: Using Chemistry Education Research to Inform Teaching Strategies Symposium, 254<sup>th</sup> ACS National Meeting, Washington DC, 2017.

24. Renée Cole, Suzanne Ruder, Courtney Stanford, Juliette Lantz, and Gilbert Reynders, “Enhancing Learning by Assessing Process Skills in STEM Courses,” Assessment Instruments for the ACS-Accredited Degree Program Symposium, 254<sup>th</sup> ACS National Meeting, Washington DC, 2017.
25. Renée Cole, Courtney Stanford, Charles Henderson, Jeff Froyd, Raina Khatri, and Debra Friedrichsen, “Designing for sustained adoption: Shifting from dissemination to propagation,” Poster Session, 2017 Conference on Transforming Research in Undergraduate STEM Education, Saint Paul, MN, 2017.
26. Renée Cole, Suzanne Ruder, Juliette Lantz, Gilbert Reynders, Jennifer Schmidt-McCormack, and Courtney Stanford, “Enhancing Learning by Assessing Process Skills in STEM Courses,” Poster Session, Gordon Research Conference: Chemistry Education Research & Practice, Lewiston, ME, 2017.
27. Renée Cole, Juliette Lantz, Suzanne Ruder, Courtney Stanford, Gilbert Reynders, and Jennifer Schmidt-McCormack, “Enhancing Learning by Assessing Process Skills in STEM Courses,” Poster Session, 15th Annual POGIL National Meeting, St. Louis, MO, 2017.
28. Renee Cole, Courtney Stanford, Alena Moon, Marcy Towns, “Using discourse analysis to inform the design of active learning materials,” State of the Art: Applying Chemistry Education Research to Practice Symposium, 253<sup>rd</sup> ACS National Meeting, San Francisco, CA, 2017. (invited)
29. Renee Cole, Courtney Stanford, Alena Moon, Marcy Towns, “Engaging students in connecting representational levels for better understanding of thermodynamics,” Engaging Students in Physical Chemistry Symposium, 253<sup>rd</sup> ACS National Meeting, San Francisco, CA, 2017. (invited)
30. Renee Cole, “I will go out having learned something: Reflections on student learning in physical chemistry,” ACS Award for Achievement in Research for the Teaching & Learning of Chemistry: Symposium in honor of Marcy H. Towns, 253<sup>rd</sup> ACS National Meeting, San Francisco, CA, 2017. (invited)
31. Renee Cole, Jennifer Schmidt-McCormack, Marc Muniz, and Scott Shaw, “Using instructional videos to improve student experiences and practices in upper-division laboratories,” Chemical Education Symposium, 51<sup>st</sup> Midwest Regional ACS Meeting, Manhattan, KS, 2016. (invited)
32. Sally Hunnicutt, Renee Cole, and Marc Muniz, “Which apple is best for fruit salad: A guided inquiry enzyme kinetics experiment,” Engaging Students in Physical Chemistry Symposium, 24<sup>th</sup> Biennial Conference on Chemical Education, Greeley, CO, 2016.
33. Suzanne Ruder, Renee Cole, and Juliette Lantz, “Enhancing learning by improving process skills in STEM: Development of materials,” Student-centered Learning with a Focus on Improving Process Skills in the Classroom and Laboratory Symposium, 24<sup>th</sup> Biennial Conference on Chemical Education, Greeley, CO, 2016.
34. Caryl Fish, Jennifer Schmidt-McCormack, Anne Falke, and Renee Cole, “Assessing process skills using student open-ended exams in analytical chemistry,” Student-centered Learning with a Focus on Improving Process Skills in the Classroom and Laboratory Symposium, 24<sup>th</sup> Biennial Conference on Chemical Education, Greeley, CO, 2016.
35. Renee Cole, Samuel Van Horne, and Jaime Emberger, “TILE: Tranform, interact, learn, and engage for success in STEM education,” Poster Session, Envisioning the Future of Undergraduate STEM Education (EnFUSE): Research and Practice Conference, Washington, DC, 2016.
36. Renee Cole, Jaime Emberger, and Samuel Van Horne, “TILE: Tranform, interact, learn, and engage for success in STEM education,” Curricular Innovations in Undergraduate Chemical Education Impacted by NSF Symposium, 250<sup>th</sup> ACS National Meeting, San Diego, CA, 2016. (invited)
37. Renee Cole, “Facilitating and assessing process skills in the classroom,” George C. Pimentel Award in Chemical Education Symposium in honor of Richard S. Moog, 250<sup>th</sup> ACS National Meeting, San Diego, CA, 2016. (invited)
38. Suzanne Ruder, Renee Cole, Juliette Lantz, “Developing materials to assess process skills in active learning classrooms,” Process Oriented Guided Inquiry Learning (POGIL) Symposium, 250<sup>th</sup> ACS National Meeting, San Diego, CA, 2016. (invited)

39. Renee Cole and Courtney Stanford, "Supporting student understanding of chemistry through the use of guided inquiry materials and instructor facilitation," Active and Inquiry Learning in the Chemistry Classroom and Laboratory Symposium, Pacificchem 2015, Honolulu, HI, 2015.
40. Renee Cole, Samuel Van Horne, and Jaime Emberger, "TILE: Transform, interact, learn, and engage for success in STEM education," NSF Programs that Support Undergraduate Education Symposium, 50<sup>th</sup> Midwest Regional ACS Meeting, St. Joseph, MO, 2015. (invited)
41. Renee Cole, Charles Henderson, Jeff Froyd, Courtney Stanford, Raina Khatri, and Debra Gilbuena, "Increasing the Impact of Educational Innovations", Poster Session, Gordon Research Conference : Chemistry Education Research & Practice, Lewiston, ME, 2015.
42. Renee Cole and Sally Hunnicutt, "How to make the most appealing fruit salad: An inquiry-based enzyme kinetics physical chemistry laboratory," Experiments for Physical Chemistry Laboratory Symposium, 249<sup>th</sup> ACS National Meeting, Denver, CO, 2015.
43. Renee Cole and Courtney Stanford, "Using results from discourse analysis to improve the practice of facilitation in active learning classrooms," Chemistry Education Research Symposium: Connecting Research to Practice, 248<sup>th</sup> ACS National Meeting, San Francisco, CA, 2014.
44. Renee Cole, Courtney Stanford, Jeff Froyd, Raina Khatri, and Charles Henderson, "Increasing the impact of STEM education projects," NSF-Catalyzed Innovation in the Undergraduate Curriculum Symposium, 248<sup>th</sup> ACS National Meeting, San Francisco, CA, 2014. (invited)
45. Renee Cole and Wendy Schatzberg, "Assessment of ANAPOGIL implementations: Insights from analysis of ACS exam, SALG, and CHEMX data," Chemistry Education Research Symposium, 248<sup>th</sup> ACS National Meeting, San Francisco, CA, 2014.
46. Renee Cole, Chris Bauer, Caryl Fish, and Juliette Lantz, "Student-centered instruction and the assessment of process skills: The evaluation of student work," Student-Centered Learning with a Focus on Improving Process Skills in the Classroom and Laboratory Symposium, 23<sup>rd</sup> Biennial Conference on Chemical Education, Allendale, MI, 2014. (invited)
47. Renee Cole, Charles Henderson, Jeff Froyd, Debbi Gilbuena, Raina Khatri, and Courtney Stanford, "Designing for impact: Recommendations for curriculum developers and change agents," The Role of Education in Responsible Research and Innovation Symposium, 23<sup>rd</sup> IUPAC International Conference on Chemistry Education, Toronto, Canada, 2014.
48. Renee Cole, Juliette Lantz, "The ANAPOGIL Project: Guided inquiry learning in analytical chemistry," Chemistry Education Research: Projects & Applications in Practice Symposium, 23<sup>rd</sup> IUPAC International Conference on Chemistry Education, Toronto, Canada, 2014.
49. Renee Cole, Nicole Becker, and Courtney Stanford, "Discourse analysis as a tool to examine teaching and learning in the classroom," Tools of Chemistry Education Research Symposium, 247<sup>th</sup> American Chemical Society Meeting, Dallas, TX, 2014. (invited)
50. Renee Cole, Nicole Becker, and Marcy Towns, "Collaborative discourse as a way to scaffold students' use of symbolic representations," Creative Approaches to Physical Chemistry Instruction Symposium, 246<sup>th</sup> American Chemical Society National Meeting, Indianapolis, IN, 2013.
51. Courtney Stanford, Renee Cole, Charles Henderson, Jeff Froyd, Raina Khatri, & Debbie Gilbuena, "Increasing the impact of STEM education projects," Chemistry Education Poster Session, 246<sup>th</sup> American Chemical Society National Meeting, Indianapolis, IN, 2013.
52. Renee Cole, Courtney Stanford, Charles Henderson, Jeff Froyd, & Raina Khatri, "Increasing the Impact of STEM Education Projects", Poster Session, Chemistry Education Research & Practice Gordon Research Conference, Newport, RI, 2013.
53. Renee Cole, Marcy Towns, and Nicole Becker, "Examining student reasoning in physical chemistry," Chemistry Education Research Symposium, 245<sup>th</sup> American Chemical Society National Meeting, New Orleans, LA, 2013.
54. Juliette Lantz & Renee Cole, "A New approach to analytical chemistry: The development of process-oriented guided inquiry learning materials, Poster Session, NSF-TUES PI meeting, Washington, DC, January 24, 2013.

55. Charles Henderson, Renee Cole, Jeff Froyd, & Raina Khatri, "Collaborative Research: Increasing the Impact of TUES Projects Through Effective Propagation Strategies: A How-To Guide for PIs", Poster Session, NSF-TUES PI meeting, Washington, DC, January 24, 2013.
56. Raina Khatri, Charles Henderson, Renee Cole, & Jeff Froyd, "Change is Hard: Improving the Propagation of Educational Innovations," American Association of Physics Teachers 2012 Summer Meeting, Philadelphia, PA, 2012.
57. Renee Cole, Marcy Towns, and Nicole Becker, "Examining student reasoning in physical chemistry," Chemical Education Research Symposium, 47<sup>th</sup> ACS Midwest Regional Meeting, Omaha, NE, 2012. (invited)
58. Renee Cole, Wendy Schatzberg, and Juliette Lantz, "Quantitative analysis of the ANAPOGIL project," Research in Chemical Education Symposium, 244<sup>th</sup> American Chemical Society National Meeting, Philadelphia, PA, 2012.
59. Renee Cole, Christopher Bauer, Caryl Fish, and Juliette Lantz, "Assessing more than content knowledge," Inquiry in Support of Student Learning: Meaningful Uses of Assessment Data Symposium, 22<sup>nd</sup> Biennial Conference on Chemical Education, State College, PA, 2012.
60. Renee Cole and Juliette Lantz, "The ANAPOGIL project: Incorporating guided inquiry into analytical chemistry," Inquiry-Based Student-Centered Instruction Symposium, 22<sup>nd</sup> International Conference on Chemistry Education, Rome, Italy, 2012.
61. Marcy Towns, Nicole Becker, Renee Cole, "Using discourse to enhance student understanding of physical chemistry," Chemistry Education Research Symposium, 22<sup>nd</sup> IUPAC International Conference on Chemistry Education, Rome, Italy, 2012.
62. Renee Cole, "Using discourse to enhance student understanding in chemistry," Plenary Lecture, Royal Australian Chemical Institute ChemEd 2012 Conference, Adelaide, Australia, 2012. (invited)
63. Renee Cole, "Mentoring in the classroom," George C. Pimentel Award in Chemical Education: Symposium in Honor of Diane M. Bunce, 243<sup>rd</sup> American Chemical Society National Meeting, San Diego, CA, 2012. (invited)
64. Renee Cole, Marcy Towns, and Nicole Becker, "Using discourse to enhance student understanding of Physical Chemistry," Poster Session, Transforming Education Conference, West Lafayette, IN, 2011.
65. Renee Cole, "Using discourse to enhance student understanding in physical chemistry," Adventures in Teaching in Physical Chemistry Symposium, 242<sup>nd</sup> American Chemical Society National Meeting, Denver, CO, 2011.
66. Renee Cole, "POGIL in Physical Chemistry," POGIL Across the Curriculum and Around the World Symposium, 43<sup>rd</sup> IUPAC World Chemistry Congress, San Juan, Puerto Rico, 2011. (invited)
67. Juliette Lantz and Renee Cole, "ANAPOGIL project: POGIL in analytical chemistry," POGIL Across the Curriculum and Around the World Symposium, 43<sup>rd</sup> IUPAC World Chemistry Congress, San Juan, Puerto Rico, 2011. (invited)
68. Marcy Towns, Nicole Becker, Renee Cole, Chris Rasmussen, George Sweeney, and Megan Wawro, "Physical chemistry classroom practices: What can Toulmin analysis tell us about discourse in a discussion oriented classroom," Research in Chemical Education Symposium, 241<sup>st</sup> American Chemical Society National Meeting, Anaheim, CA, 2011.
69. Renee Cole, "Designing for Discourse," Process Oriented Guided Inquiry Learning (POGIL): POGIL Across the Curriculum Symposium, 241<sup>st</sup> American Chemical Society National Meeting, Anaheim, CA, 2011. (also presented as a poster at Sci-Mix)
70. Renee Cole, "Strategies for engaging students in learning," Current Issues in Teaching in the Undergraduate Curriculum Symposium, 45<sup>th</sup> Midwest Regional American Chemical Society Meeting, Wichita, KS, 2010.
71. Renee Cole and Juliette Lantz, "ANA-POGIL project: Bringing process oriented guided inquiry learning to analytical chemistry classrooms," Royal Australian Chemical Institute Conference, Melbourne, Australia, 2010.

72. Renee Cole, Marcy Towns, Chris Rasmussen, Nicole Becker, George Sweeney, and Megan Wawro, "Adapting a Methodology for Documenting Collective Growth to an Undergraduate Physical Chemistry Class," Conference on Transforming Research in STEM Undergraduate Education, Orono, ME, 2010. (invited)
73. Renee Cole, Marcy Towns, Chris Rasmussen, Nicole Becker, George Sweeney, and Megan Wawro, "Adapting a Methodology for Documenting Collective Growth to an Undergraduate Physical Chemistry Class," 55<sup>th</sup> Pentasectional Meeting of the American Chemical Society, Norman, OK, 2010. (invited)
74. Marcy Towns, Nicole Becker, Renee Cole, Chris Rasmussen, Megan Wawro, and George Sweeney, "Adapting a Methodology for Documenting Collective Growth to an Undergraduate Physical Chemistry Class," NSF Catalyzed Innovations in the Undergraduate Curriculum Symposium, 239<sup>th</sup> American Chemical Society National Meeting, San Francisco, CA, 2010. (invited)
75. Renee Cole, Juliette Lantz, and Chris Bauer, "Insights from the ANAPOGIL project: Challenging the barriers for adopting active learning," Debunking the Myths of Teaching and Learning Symposium, 239<sup>th</sup> American Chemical Society National Meeting, San Francisco, CA, 2010. (invited)
76. Renee Cole and Juliette Lantz, "ANA-POGIL project: Bringing process oriented guided inquiry learning to analytical chemistry classrooms," Advances in Teaching Analytical Chemistry Symposium, 239<sup>th</sup> American Chemical Society National Meeting, San Francisco, CA, 2010.
77. Meagan O'Brien<sup>†</sup> and Renee Cole, "Analysis of ANA-POGIL," Undergraduate Research Poster Session: Chemical Education, 239<sup>th</sup> American Chemical Society National Meeting, San Francisco, CA, 2010.
78. Renee Cole, Marcy Towns, Chris Rasmussen, Nicole Becker, George Sweeney, and Megan Wawro, "Adapting a Methodology for Documenting Collective Growth to an Undergraduate Physical Chemistry Class," Conference on Research in Undergraduate Mathematics Education, Raleigh, NC, 2010.
79. Renee Cole, "Connecting Research and Practice," Gordon Research Conference: Chemical Education Research and Practice, Waterville, ME, 2009. (invited plenary speaker)
80. Renee Cole and Juliette Lantz, "New approach to analytical chemistry: The development of process-oriented guided inquiry learning materials," NSF Catalyzed Innovations in the Undergraduate Curriculum Symposium, 237<sup>th</sup> American Chemical Society National Meeting, Salt Lake City, UT, 2009. (invited)
81. Heather Beers<sup>†</sup> and Renee Cole, "Impact of curricular innovations on spatial ability of chemistry students," Undergraduate Research Poster Session: Chemical Education, 237<sup>th</sup> American Chemical Society National Meeting, Salt Lake City, UT, 2009.
82. Timothy Robbins<sup>†</sup>, Scott McKay and Renee Cole, "Modern sport and chemistry: What a golf fanatic should know," Undergraduate Research Poster Session: Chemical Education, 237<sup>th</sup> American Chemical Society National Meeting, Salt Lake City, UT, 2009.
83. Chris Bauer, Renee Cole, and Karen Anderson, "Reliability and validity of POGIL assessment rubric using controlled modification of a classroom activity," Process-Oriented Guided Inquiry Learning (POGIL) - The POGIL Project: Activities and Assessment Symposium, 237<sup>th</sup> American Chemical Society National Meeting, Salt Lake City, UT, 2009.

+ 51 additional presentations prior to 2009

### Invited Lectures

54. "Building a Path to Success: Improving learning experiences through constructive alignment of course components," University of Pittsburgh, virtual presentation, September 2021.

53. "Enhancing learning by promoting student engagement & development of more than content knowledge," University of Wisconsin – La Crosse, virtual presentation, February 2021.
52. "Enhancing learning by developing and assessing more than content knowledge," Missouri University of Science and Technology, virtual presentation, November 2020.
51. "Enhancing learning by developing and assessing more than content knowledge," Middle Tennessee State University, virtual presentation, April 2020.
50. "Enhancing learning by developing and assessing more than content knowledge," University of Buffalo, Buffalo, NY, February 2020.
49. "Enhancing learning by developing and assessing more than content knowledge," University of California-Davis, Davis, CA, February 2020.
48. "Assessing more than content knowledge," University of Utah, Salt Lake City, UT, November 2019.
47. "Enhancing learning by promoting and assessing more than content knowledge," Georgia State University, Atlanta, GA, October 2019.
46. "Enhancing learning by assessing more than content knowledge," University of Leicester, Leicester, England, May 2019.
45. "Enhancing learning by assessing more than content knowledge," University of York, York, England, May 2019.
44. "Using instructional videos to improve student experiences and practices in upper-level laboratories," University of Washington, Seattle, WA, April 2019.
43. "Enhancing learning by assessing more than content knowledge," University of Wisconsin – La Crosse, La Crosse, WI, April 2019.
42. "Enhancing learning by assessing more than content knowledge," University of Wisconsin-Madison, Madison, WI, October 2018.
41. "Planning for success in institutional change," University of North Carolina – Charlotte, Charlotte, NC, May 2018.
40. "Using discipline-based education research to inform teaching strategies and design of instructional materials," University of North Carolina – Charlotte, Charlotte, NC, May 2018.
39. "Using Chemistry Education Research to Inform Teaching Strategies and Design of Instructional Materials to Engage Students in Learning Chemistry," Illinois State University, Normal, IL, April 2018.
38. "Enhancing learning by assessing more than content knowledge," Washington and Lee University, Lexington, VA, March 2018.
37. "Using Discourse to Enhance Student Understanding in Chemistry," Monash University – Clayton, Melbourne, Australia, February 2018.

36. "Enhancing Learning by Assessing More than Content Knowledge," University of Melbourne, Melbourne, Australia, February 2018.
35. "Enhancing Learning by Assessing More than Content Knowledge," Monash University – Parkville, Melbourne, Australia, February 2018.
34. "Using Discourse to Enhance Student Understanding in Science," Monash University – Parkville, Melbourne, Australia, February 2018.
33. "Using Discourse to Enhance Student Understanding in Chemistry," University of Queensland, Brisbane, Australia, February 2018.
32. "Using Discourse to Enhance Student Understanding in Chemistry," University of South Florida, Tampa, FL, April 2017.
31. "Winning Arguments in STEM," 12<sup>th</sup> Annual Sonia Kowalesky Day Keynote Speaker, University of Iowa, Iowa City, IA, March 2017.
30. "Using Discourse to Enhance Student Understanding in Chemistry," College of Saint Benedict/Saint John's University, St. Joseph, MN, February 2017.
29. "Using Discourse to Enhance Student Understanding in Chemistry," University of New Hampshire, Durham, NH, November 2016.
28. "Using Discourse to Enhance Student Understanding in Chemistry," Duke University, Durham, NC, October 2016.
27. "Using Instructional Videos to Improve Student Experiences and Practices in Upper-Division Laboratories," Virginia Commonwealth University, Richmond, VA, October 2016.
26. "Using Discourse to Enhance Student Understanding in Chemistry," Purdue University, West Lafayette, IN, September 2016.
25. "Using Chemistry Education Research to Inform the Practice of Teaching Chemistry" Southern Illinois Local ACS Section Meeting, Cape Girardeau, MO, April 2016.
24. "Using Discourse to Enhance Student Understanding in Chemistry," Mark Twain Local ACS Section Meeting, Quincy, IL, November 2015.
23. "Using Discipline-Based Education Research to Inform Teaching Strategies and Design of Instructional Materials," Department of Biology Seminar, University of Iowa, November 2015.
22. "Using Chemistry Education Research to Inform the Practice of Teaching Chemistry" – Western Connecticut Local ACS Section Meeting, Westport, CT, May 2015.
21. "Using Discourse to Enhance Student Understanding in Chemistry," University of California – San Diego, May 2015.



20. "Using Discourse to Enhance Student Understanding in Chemistry," University of Northern Colorado, April 2015.
19. "Using Discourse to Enhance Student Understanding in Chemistry," Middle Tennessee State University, March 2015.
18. "Using Chemistry Education Research to Inform the Practice of Teaching Chemistry," Hendrix College, November 2014.
17. "Using Discipline-Based Education Research to Inform Teaching Strategies and Design of Instructional Materials," University of Arkansas – Little Rock, November 2014.
16. "Using Discourse to Enhance Student Understanding in Chemistry," Lewis University, October 2014.
15. "Using Discourse Analysis to Explore Classroom Facilitation and Learning in Physical Chemistry," University of North Carolina – Charlotte, February 2014.
14. "Using Discourse to Enhance Student Understanding in Chemistry," Loyola University Chicago, February 2013.
13. "Connecting Chemical Education Research to the Practice of Teaching," University of Nebraska – Omaha, October 2012.
12. "Connecting Chemical Education Research to the Practice of Teaching," Drake University, September 2012
11. "Using Discourse to Enhance Student Understanding in Chemistry," University of North Carolina – Wilmington, September 2012.
10. "Adapting a Methodology for Documenting Collective Growth to an Undergraduate Physical Chemistry Class," Clemson University, March 2011.
9. "Developing Strategies for Engaging Students in Learning Science," Clemson University, March 2011.
8. "Developing Strategies for Engaging Students in Learning Science," University of Iowa, January 2011.
7. "Strategies for engaging students in learning science," University of Nebraska, January 2011.
6. "Strategies for engaging students in learning science," University of Arizona, December 2010.
5. "Connecting chemical education research to the practice of teaching," University of North Dakota, September 2010.
4. "Connecting chemical education research to the practice of teaching," Miami University, Ohio, December 2009.
3. "Connecting chemical education research to the practice of teaching," University of Texas – San Antonio, October 2009.

2. "Encouraging visualization and developing student spatial ability in chemistry," Central Oklahoma ACS local section. October 2008.

1. Women in Science Tea, University of Missouri, Columbia. September 2008.

### Consultancies

AP Chemistry Development Committee, College Board

Advisory Board – Chemistry in Context 9<sup>th</sup> Edition, American Chemical Society

Project evaluator – Collaborative Research: US-Brazil IRES: Development and Applications of Microfluidic Devices (NSF 04-036) PIs: Carlos Garcia, University of Texas San Antonio; Frank Gomez, California State University Los Angeles.

Advisory Board – Before, During and After Class Learning Cycle Activities (NSF-DUE-CCLI-0920654) PI: John Gelder, Oklahoma State University.

Project evaluator – Collaborative Research: Learning in the Chemistry Laboratory: Exploring the Gap between student and faculty goals for meaningful learning (NSF-DUE-CCLI-0536776) PIs: Stacey Lowry Bretz, Miami University, Ohio and Marcy Towns, Purdue University.

Project evaluator – Educating Green Citizens and Scientists for a Sustainable Future (NSF-DUE-CCLI-0633227) PI: Liz Gron, Hendrix College.

Steering Committee – Collaborative Research: The POGIL Project (NSF-DUE-CCLI-0618746) PIs: Richard Moog, Franklin & Marshall College; Diane Bunce, Catholic University; and Jennifer Lewis, University of South Florida.

Steering Committee – POGIL in the large classroom (FIPSE) PIs: Andrei Straumanis, College of Charleston and Suzanne Ruder, Virginia Commonwealth University.

### Students and Research Associates Supervised

<u>Degree objective:</u>	<u>Student name</u>	<u>Years</u>	
Postdoctoral fellows	Ashlie Wrenne	2016 -2018	Anne Arundel Community Coll
	Marc Muniz	2014 -2015	Rutgers Univ.
	Wendy Schatzberg	2012-2013	Dixie State Univ.
Graduate students	Leslie Bolda	2020 -	
	Andrea Van Wyk	2019 –	
	Hannah Nennig	2019 –	
	Rebekkah Hodges	2019 -	
	Nicole States	2018 -	
	Kathryn Mauger-Sonnek	2017 - 2021	
	Rayford Harrison	2017 – 2020	Augustana College
	Ian Brown	2015 – 2021	Saint Louis University
	Marika Takemura	2016 -2019	
	Gilbert Reynders III	2015-2019	Sauk Valley Comm. College
	Jennifer Schmidt-McCormack	2012–2017	St. Ambrose University

Chamathca Malwathumullage	2013-2015	
Jaime Emberger	2013-2016	
Courtney Stanford	2012-2016	Ball State University

#### Undergraduate students

Carina Bruno	2020-2021
Katherine Esquivel	2019-2020
Sidney Spurgeon	2018-2019
Hao Fu	2017-2018
Khaimook Grosshuesch	2016-2017
Hain Moon	2014-2016
Jacob Byer	2013-2016
Haley McCoy	2012
Colby Teeman	2010
Meagan O'Brien	2009-2010
Heather Beers	2008
Jill Williamson	2006-2008
Kimberly Linenberger	2005-2006
Ellen Matson	2005-2006
Lindsey Bohn	2005-2006
Anthony Kammerich	2005-2006
Britta Zernicke	2005-2006
Cheryl Ragan	2004-2005
Cary Lyon	2004
Rebecca Tucker	2003
Eunice Kimeu	2002
Melissa Tomalka	2001
Carmelita Tibai	2001

## SERVICE

### Profession

#### *American Chemical Society*

- 2022 MidWest Regional ACS Meeting Program Chair (2021- )
- Associate editor for the *Journal of Chemical Education* (2011- )
- Committee on Professional Training, Associate Member (2022)
- Women Chemists Committee Associate Member/Member (2012-2015/2016-2021)
  - ◆ Program Chair (2017 - 2021)
- ACS Award Selection Committee (2020 - )
- *Division of Chemical Education*
  - ◆ Biennial Conference Committee (2017 - ; co-Chair 2022)
  - ◆ Councilor to ACS (2011- 2016)
  - ◆ Chemical Education Research Committee (2011- 2016)(Chair 2014-2016)
  - ◆ Executive Committee (2008- 2016)
  - ◆ Diagnostic of Undergraduate Chemistry Knowledge ACS Exam Committee (2010-2012)
  - ◆ Alternate Councilor to ACS (2008-2010)
  - ◆ Committee on Computers in Chemical Education (2002-2010)
  - ◆ Taskforce to develop a strategic plan for the division (2007)
  - ◆ Meeting co-chair: 231<sup>st</sup> ACS National Meeting, Atlanta, GA (2006)
  - ◆ Taskforce for promotion and hiring in chemical education (2006-2007)

- ◆ Program Committee (2002-2008)
- ◆ General Chemistry Blended ACS Exam Committee (2004-2006)
- ◆ 2003 General Chemistry ACS Exam Committee (2000-2002)
- ◆ Midwest Regional Awards Committee (2010 – 2015, 2017)
- Reviewer for the National Science Foundation
  - ◆ DUE – CCLI/TUES/IUSE
  - ◆ Chemistry - REU
- Reviewer for the National Institute of Health
  - ◆ Challenge Grants
- Irish Enhancement of Teaching and Learning International Review Panel
- Reviewer for peer-reviewed journals
  - ◆ *Journal of Chemical Education*
  - ◆ *Chemistry Education Research and Practice*
  - ◆ *Journal of Research in Science Teaching*
  - ◆ *International Journal of STEM Education*
  - ◆ *Journal of College Science Teaching*
  - ◆ *Journal of Mathematical Behavior*
  - ◆ *Advances in Physiology Education*
  - ◆ *Journal of Engineering Education*
  - ◆ *Journal of Science Education and Technology*
  - ◆ *Educational Assessment*
  - ◆ *PLOS One*
  - ◆ *CBE-Life Sciences Education*
  - ◆ *Educational Psychology*
  - ◆ *Chemical Educator*
  - ◆ *Frontiers Psychology*
  - ◆ *Heliyon*
  - ◆ *International Journal of Quantum Chemistry*
- Reviewer for publishers of textbooks and other educational materials

#### **Department of Chemistry – University of Iowa**

- 2018 – present            Executive Committee
- 2018 – present            Scheduling Committee (Chair)
- 2018 – 2021                Director of Undergraduate Studies
- 2018 – 2021                Undergraduate Curriculum Committee (Chair)
- 2016 – 2018                Safety Committee
- 2016 – 2018                Diversity and Climate Committee (Chair 2016-2017)
- 2014 - 2021                Undergraduate Assessment Committee (Chair 2014-2018)
- 2014 – present             Academic Advisor
- 2013 – 2016                Outreach and Engagement Committee
- 2014-2016                 Undergraduate Recruitment Committee
- 2011-2014                 Graduate Admissions and Recruiting Committee (Chair 2012 - 2014 )
- 2011-2012                 Colloquium Committee
- 2012-2013                 Chemistry Education Research Faculty Search Committee (Chair)

#### **University of Iowa**

- 2020 – present            HHMI Inclusive Excellence Project Director
- 2020                         Associate Dean for Undergraduate Education Search Committee, (co-chair)

- 2019 – 2021 Path Forward Student Success Committee
- 2019 Women in STEM Ambassadors (WiSA) panelist
- 2018 Associate Provost for Undergraduate Education Search Committee
- 2018 CLAS representative for December Undergraduate Commencement
- 2018 - 2020 CLAS Faculty Development Awards Committee
- 2017 – 2019 Academic and Curriculum Planning Advisory Group
- 2016 – present CIRTl at UIOWA Advisory Board
- 2016 – 2020 CIRTl Summer Series Presenter
- 2015 – 2016 Student Success Task Force (chair of the Course Planning & Sequencing subcommittee)
- 2015 – 2018 Advisory Committee for the UI-Kirkwood Center
- 2014 – present AAU STEM Initiative Point of Contact for UI
- 2012 - 2016 Learning Spaces Advisory Council
- 2015 Excel Lecturer for OnIowa
- 2013 - 2015 Online Evaluation Committee (co-chair)
- 2014 Office of Teaching, Learning, and Technology Transition Committee
- Science Education Faculty Search Committee (2013-2014, 2014-2015, 2015-2016, 2021-2022)
- Conduct workshops for the UI Center for Teaching

#### **State of Iowa**

- 2012-2013 Iowa Chemistry Transition Guide Taskforce

#### **University of Central Missouri**

- 2008-2010 Academic Planning Council
- 2007-2010 Teacher Education Council
- 2008-2009 Program coordinator for secondary science education for NCATE/DESE accreditation and site visit
- 2006 Taskforce on Campus Culture: Scholarship, Teaching, and Entrepreneurship
- 2006 Professional Education Portfolio Committee
- 2005–2008 University Curriculum Committee
- 2004–2005 CMSU Retention Taskforce
- 2005 CMSU Summer Bridge Program
- 2001–2005 General Education Committee (Chair 2002-2005)
- 2001–2005 Assessment Committee
- 2001–2002 Secondary Education Advisory Group
- 2000–2002 Arts and Sciences Awards Committee Chair
- Science Program Review Committee - NCATE accreditation
- Event coordinator and judge for Region IV Regional Science Olympiad
- Judge for the Annual Science Day science fair competition

#### **Professional Development Workshops Facilitated:**

##### **Supporting Student Learning Nationally & Internationally**

Renée Cole, Caryl Fish, Juliette Lantz, and Suzanne Ruder, “Special POGIL eSeries: Developing Questions to Facilitate and Provide Evidence of Student Process Skills,” January 2021.

Renée Cole, “Feedback-focused Rubrics to Develop Student Intellectual & Practical Skills,” Chicago Symposium Series - Excellence in Teaching Mathematics and Science: Research and Practice, February 2020.

Renée Cole, “Strategies for Assessing and Providing Feedback to STEM Students on Intellectual and Practical Skills,” Spelman College, Atlanta, GA, October 2019.

Renee Cole and Teresa Bixby, “Strategies for Assessing and Providing Feedback to STEM Students on Intellectual and Practical Skills,” Great Lakes Regional ACS Meeting, Naperville, IL, May 2, 2019.

Courtney Stanford, Renee Cole, Suzanne Ruder, and Gilbert Reynders “Enhancing Learning by Assessing Professional Skills in Student Group Interactions and Written Work,” 25<sup>th</sup> Biennial Conference on Chemical Education, Notre Dame, IN, August 2018.

Renee Cole, “Enhancing Learning by Assessing Professional Skills in Student Group Interactions and Written Work,” 125<sup>th</sup> American Society for Engineering Education Conference, Salt Lake City, UT, June 24-28, 2018.

Charles Henderson and Renée Cole, “Scaling Effective Teaching Practices”, 2016 AAC&U Transforming Undergraduate STEM Education Conference, Boston, MA, November 4, 2016.

Charles Henderson, Renee Cole, Jeffrey Froyd, Rhaina Khatri, “Designing for Institutionalization of Educational Innovations”, VentureWell Workshop, Atlanta, GA October 9-10, 2016.

Renee Cole and Courtney Stanford, “Designing for Sustained Adoption: Writing proposals and developing innovations that have broader impact,” 24<sup>th</sup> Biennial Conference on Chemical Education, Greeley, CO, 2016.

Charles Henderson, Renee Cole, Jeffrey Froyd, Debbi Gilbuena, Rhaina Khatri, Courtney Stanford “Designing for Impact” workshop, Pilot online workshop, October 2015.

Charles Henderson, Renee Cole, Jeffrey Froyd, Debbi Gilbuena, Rhaina Khatri, Courtney Stanford “Designing for Impact workshop, Pilot workshop in St. Louis, MO, October 3-5, 2014.

Renee Cole, Good Teaching Re-framed: Teaching Content Through Inquiry, University of Iowa, Iowa City, IA, 2013.

Renee Cole and Jean Florman, Digging Deep to Design Inquiry-Guided Activities, National Forum on Active Learning Classrooms, University of Minnesota, Minneapolis, MN, 2013.

Renee Cole, Introduction to POGIL Workshop, Massey University, Palmerston North, New Zealand, 2013.

Renee Cole, Introduction to POGIL Workshop, Victoria University of Wellington, Wellington, New Zealand, 2013.

Renee Cole, Introduction to POGIL workshop as part of the Small Group Discovery Experience Workshop, University of Adelaide, Adelaide, Australia, 2013.

Renee Cole, Digging Deep: How to Design Inquiry-Guided Activities, University of Iowa, Iowa City, IA, 2013.

Charles Henderson & Renee Cole, “Propagating Educational Innovations to have an Impact on Faculty Practice”, Workshop A2 presented at the NSF-TUES PI meeting, Washington, DC, January 24, 2013.

Renee Cole, Fundamentals of Teaching with Guided Inquiry, University of Iowa, Iowa City, IA, 2012.

Renee Cole & Amy Hanson, Introduction to Scholarship of Teaching and Learning Workshop, Southwest Regional POGIL meeting, University of Redlands, Redlands, CA, 2011.

Renee Cole & Amy Hanson, Scholarship of Teaching and Learning II Workshop: Planning a SoTL Project, Southwest Regional POGIL meeting, University of Redlands, Redlands, CA, 2011.

Renee Cole & Tricia Shepherd, Advanced Writing Workshop: Using Rubrics to Improve Activities and Provide Feedback, Southwest Regional POGIL meeting, University of Redlands, Redlands, CA, 2011.

Renée S. Cole, Introductory POGIL Workshop and SoTL workshop, Charles Sturt University, Wagga Wagga, Australia, 2010.

Renée S. Cole, Introductory POGIL Workshop and POGIL Writing Workshop, Flinders University, Adelaide, Australia, 2010.

Renée S. Cole, Introductory POGIL Workshop and POGIL Writing Workshop, University of Adelaide, Adelaide, Australia, 2010.

Renée S. Cole, Introductory POGIL Workshop, James Cook University, Townsville, Australia, 2010.

Renée S. Cole, Vicky Minderhout, and Dan Bedgood, Introductory POGIL Workshop, Royal Australian Chemical Institute Conference, Melbourne, Australia, 2010.

Renée S. Cole, Vicky Minderhout, and Dan Bedgood, Introductory POGIL Workshop, Higher Education Research and Development Association Conference, Melbourne, Australia, 2010.

Renée S. Cole, Cheryl Bailey, Jeff Pribyl, Stephen Prilliman, and Susan Richardson, POGIL 3-day Workshop, Grand Valley State University, Allendale, MI 2009.

Renée S. Cole, Stephen Prilliman, and Bruce Wellman, POGIL (Process Oriented Guided Inquiry Learning) Workshop, Ft. Collins, CO 2008.

Andrei Straumanis, Renée S. Cole, and Bruce Wellman, POGIL (Process Oriented Guided Inquiry Learning) Workshop, Kansas State University, Manhattan, KS 2008.

+ 15 additional workshops for the POGIL, MID, and New Traditions projects