

Jeffrey R. Raker

Department of Chemistry
University of South Florida
4202 East Fowler Avenue, CHE205
Tampa, Florida 33620

Chemistry Building 203C (office)
Chemistry Building 203A & B (laboratory)
(813) 974-0169 (office)
jraker@usf.edu

Education

- Doctor of Philosophy, Chemistry (Chemical Education)** 2011
"Connecting scientific research and classroom instruction: Developing authentic problem sets for the undergraduate organic chemistry curriculum"
Purdue University, West Lafayette, Indiana
Advisor: Dr. Marcy H. Towns
Content specialty: Organic Chemistry
- Master of Arts, College Student Personnel** 2005
Bowling Green State University, Bowling Green, Ohio
- Bachelor of Science with Distinction, Chemistry (ACS Certified)** 2003
Ohio Northern University, Ada, Ohio
Option: Leadership Studies

Professional Experience

- Assistant Professor of Chemistry** 2013 – present
Department of Chemistry, University of South Florida
- Postdoctoral Research Associate** 2011 – 2013
ACS Examinations Institute, Iowa State University
Advisor: Dr. Thomas A. Holme
- Visiting Instructor** Summer 2011
Department of Chemistry, Purdue University
- Graduate Research Assistant** 2006 – 2011
Department of Chemistry, Purdue University
- Graduate Teaching Assistant** 2006 – 2008, 2010 – 2011
Department of Chemistry, Purdue University
Head Teaching Assistant (Fall 2008)

Teaching Experience (as instructor of record)

- Department of Chemistry, University of South Florida** 2013 – present
Organic Chemistry 2: ~180 students (Fall 2013)
- Department of Chemistry, Iowa State University** 2012 – 2013
General Chemistry (2nd semester for STEM majors): 184 students (Spring 2013)
General Chemistry (one-semester course): 144 students (Fall 2012)
- Department of Chemistry, Purdue University** Summer 2011
Organic Chemistry (2nd semester for Chemical Engineering majors): 31 students

Publications

Peer-Reviewed Articles:

9. **Raker, J. R.**, Trate, J., Holme, T. A., & Murphy, K. A. (accepted). Adaptation of an instrument for measuring the cognitive complexity of organic chemistry exam items. *Journal of Chemical Education*. DOI: [TBA].
8. **Raker, J. R.**, Holme, T. A., & Murphy, K. A. (accepted). The ACS Exams Institute undergraduate chemistry anchoring concepts content map II: Organic chemistry. *Journal of Chemical Education*. DOI: [TBA].
7. Grunert, M. L., **Raker, J. R.**, Murphy, K., & Holme, T. A. (accepted). Polytomous versus dichotomous scoring on multiple-choice examinations: Development of a rubric for rating partial credit. *Journal of Chemical Education*. DOI: [TBA]
6. Emenike, M., **Raker, J. R.**, & Holme, T. (ASAP). Validating chemistry faculty members' self-reported familiarity with assessment terminology. *Journal of Chemical Education*. DOI: 10.1021/ed400094
5. **Raker, J. R.**, Emenike, M. E., & Holme, T. A. (2013). Using structural equation modeling to understand chemistry faculty familiarity of assessment terminology: Results from a national survey. *Journal of Chemical Education*, 90(8), 981-987.
4. Towns, M. H., **Raker, J. R.**, Becker, N., Harle, M., & Sutcliffe, J. (2012). The biochemistry tetrahedron and the development of the taxonomy of biochemistry external representations. *Chemistry Education Research and Practice*, 13, 296-306.
3. **Raker, J. R.**, & Towns, M. H. (2012). Designing undergraduate-level organic chemistry instructional problems: Seven ideas from a problem-solving study of practicing synthetic organic chemists. *Chemistry Education Research and Practice*, 13, 277-285.
2. **Raker, J. R.**, & Towns, M. H. (2012). Problem types in synthetic organic chemistry research: Implications for the development of curricular problems for second year level organic chemistry instruction. *Chemistry Education Research and Practice*, 13, 179-185.
1. **Raker, J. R.**, & Towns, M. H. (2010). Benchmarking problems used in second year level organic chemistry instruction. *Chemistry Education Research and Practice*, 11, 25-32.

Grants

Activities in Review:

NSF-EHR Core Research Grant Submitted July 2013
"Characterizing the undergraduate chemistry degree program: Faculty perspectives on program-level learning goals." Jeffrey R. Raker (PI). Total funds requested: \$299,982.

NSF-EHR Core Research Grant Submitted July 2013
"Impact of spatial ability and representational complexity on student performance." Kimberly J. Linenberger (PI, Kennesaw State University). I will be a consultant for this project conducting structural equation modeling analyses of student performance data. Total funds requested: \$299,943. Consultant funds requested: \$27,000.

Unfunded Activities:

NSF-DUE Transforming Undergraduate Education in STEM Program Grant May 2012
"Improved instruction in chemistry, biochemistry and forensic biology through a new and renewed focus on mass and mass spectrometry." Submitted by Kimberly Broekemeier (PI, Ohio Northern University), Chris Bowers (Co-PI, ONU), Dennis De Luca (Co-PI, ONU), Bradley Wile (Co-PI, ONU), and Jake Zimmerman (Co-PI, ONU). I would have been the external evaluator. Total funds requested: \$200,000. Evaluation funds requested: \$10,800. (originally submitted May 2011; resubmitted May 2012)

Howard Hughes Medical Institute Grant

Submitted by Ron Peterson (PI, Ohio Northern University), Rob Anderson (Co-PI, ONU), Amy Aulhouse (Co-PI, ONU), Chris Bowers (Co-PI, ONU), Kimberly Broekemeier (Co-PI, ONU), Dennis De Luca (Co-PI, ONU), and Jake Zimmerman (Co-PI, ONU). Total funds requested: \$1,181,240. I would have been the external evaluator. Evaluation funds requested: \$64,000.

Awards and Honors (select)

Doctoral Graduate Student Excellence Award	2011
Purdue Graduate Student Government, Purdue University, West Lafayette, Indiana	
Frampton Province Court of Honor, Alumni Honor Society	2009
Kappa Alpha Order, Lexington, Virginia	
Phi Lambda Upsilon, Chemistry Graduate Student Honorary	2007
Department of Chemistry, Purdue University, West Lafayette, Indiana	
Order of Omega, National Fraternity and Sorority Honorary	2004
Bowling Green State University, Bowling Green, Ohio	
Omicron Delta Kappa, National Leadership Honorary	2002
Ohio Northern University, Ada, Ohio	
Mortar Board, National Scholastic, Leadership, Service Honorary	2002
Ohio Northern University, Ada, Ohio	
Eagle Scout Award	1999
Troop 135, Uniontown, Ohio, Buckeye Council, Boy Scouts of America	

Presentations**National/International Meetings:**

27. Slade, M. C., Pohl, N. L., **Raker, J. R.**, Kobilka, B., Stanley, L. M. (2013). Live and let dye: A simulated research experience for the organic teaching laboratory in which a novel fluoruous dye molecule is targeted. 246th ACS National Meeting, Indianapolis, Indiana.
26. **Raker, J. R.** & Holme, T. A. (2013; poster). Exploring the motivational impact of resurrection points: The odds of not over performing on a general chemistry final exam. Gordon Research Conference: Chemistry Education Research & Practice, Salve Regina University, RI.
25. Linenberger, K. J., Slade, M. C., Addis, E., Elliott, E. R., Mynhardt, G., **Raker, J. R.** (2013; poster). Training the foot soldiers of inquiry: Development and evaluation of a graduate teaching assistant learning community. Gordon Research Conference: Chemistry Education Research & Practice, Salve Regina University, RI.
24. **Raker, J. R.** (invited talk, 2013). A statistically significant difference: My transformation from a qualitative to a quantitative researcher. 245th ACS National Meeting, New Orleans, Louisiana.
23. **Raker, J. R.**, Linenberger, K. J., Murphy, K., & Holme, T. A. (2013; poster). Using advanced statistical analyses in chemical education research: Applications of structural equation modeling, cluster analysis, and multinomial logistic regression. 245th ACS National Meeting, New Orleans, Louisiana.
22. Murphy, K. L., Holme, T. A., **Raker, J. R.**, & Zenisky, A. L. (2013). Electronic delivery of ACS Exams and the content map for the undergraduate curriculum: Merging how students perform with what students know. 245th ACS National Meeting, New Orleans, Louisiana.
21. Bauer, C., Emenike, M., Reed, J., **Raker, J.**, & Holme, T. (2012). Validity and application of a pre/post survey assessing children's attitudes and motivation at informal chemistry outreach events. 244th ACS National Meeting, Philadelphia, PA.
20. Trate, J. M., **Raker, J. R.**, Holme, T., & Murphy, K. (2012). Novice problem solving of organic chemistry items. 244th ACS National Meeting, Philadelphia, PA.
19. **Raker, J. R.**, Emenike, M., Schroeder, J., Murphy, K., & Holme, T. (2012). Current assessment practices in post-secondary chemistry departments: Results from a national survey. 22nd Biennial Conference on Chemical Education, University Park, PA.

18. Slade, M., Linenberger, K., **Raker, J. R.**, & Addis, E. A. (2012). Preparing STEM teaching assistants for project-based laboratory experiences: Reflections from four learning community facilitators. 22nd Biennial Conference on Chemical Education, University Park, PA.
17. Slade, M., **Raker, J. R.**, Linenberger, K., Kobilka, B., & Pohl, N. (2012). Lost in SciFinder: Development and impact of a pseudo-research experience in a second-semester chemistry majors lab. 22nd Biennial Conference on Chemical Education, University Park, PA.
16. **Raker, J. R.**, Linenberger, K., Slade, M., & Pohl, N. (2012). "Thinking and working like a chemist:" Comprehensive assessment of a pseudo-research experience in a second-semester chemistry majors lab. 22nd Biennial Conference on Chemical Education, University Park, PA.
15. Holme, T., Schroeder, J., Murphy, K., & **Raker, J. R.** (2012). Chemistry discipline content maps: Identification and refinement of "Anchoring Concepts" that span the undergraduate chemistry curriculum. 22nd Biennial Conference on Chemical Education, University Park, PA.
14. Trate, J. M., **Raker, J. R.**, Holme, T., & Murphey, K. (2012). Rating the complexity of organic chemistry items. 22nd Biennial Conference on Chemical Education, University Park, PA.
13. **Raker, J. R.**, Murphy, K., & Holme, T. (2012). Cognitive complexity and student performance on chemistry tests. 22nd International Conference on Chemical Education, Rome, Italy.
12. **Raker, J. R.**, Murphy, K., & Holme, T. (2012; poster). Comparing general and organic chemistry content maps: Understanding the differences in content coverage. Transforming Research in Undergraduate STEM Education Conference 2012, St. Paul, Minnesota.
11. **Raker, J. R.**, Emenike, M., Murphy, K., & Holme, T. (2012). Results of a national survey of faculty familiarity with assessment terminology. 243rd ACS National Meeting, San Diego, CA.
10. Caruthers, H., **Raker, J. R.**, & Holme, T. (2012). Understanding factors that influence engineering students performance in a one-semester versus two-semester general chemistry course. 243rd ACS National Meeting, San Diego, CA.
9. **Raker, J. R.**, & Towns, M. H. (2012). Application of a practice-based instructional design methodology for the development of undergraduate organic chemistry curricular materials. 243rd ACS National Meeting, San Diego, CA.
8. **Raker, J. R.**, Grunert, M., Murphy, K., & Holme, T. (2012; poster). Adding partial credit to multiple-choice ACS Exams: Process and Results. (General CHED Posters & Sci-Mix). 243rd ACS National Meeting, San Diego, CA.
7. **Raker, J. R.**, & Towns, M. H. (2010). *Practicing organic chemists' experiences problem solving in the research laboratory*. 239th ACS National Meeting, San Francisco, CA.
6. **Raker, J. R.**, & Towns, M. H. (2010). *Implications of using problem typologies to evaluate sophomore-level organic chemistry curricular problems*. 239th ACS National Meeting, San Francisco, CA.
5. **Raker, J. R.** (2009; poster). *Authenticating the curriculum: A methodology for incorporating the research experiences of practicing chemists into undergraduate organic chemistry instruction*. Gordon Research Conference: Chemistry Education Research & Practice, Colby College, MA.
4. **Raker, J. R.**, & Towns, M. H. (2009). *Synthesis research ab initio: Understanding the problem-solving experiences of three early career organic synthesis graduate students*. 237th ACS National Meeting, Salt Lake City, UT.
3. **Raker, J. R.**, & Towns, M. H. (2009; poster). *What's the problem?: An investigation of organic chemistry classroom problems through the lens of several problem-solving typologies*. 237th ACS National Meeting, Salt Lake City, UT.
2. **Raker, J. R.**, & Towns, M. H. (2008). *Understanding synthesis problem solving through narratives: A pilot study of organic chemists' research experiences*. 20th Biennial Conference on Chemical Education, Bloomington, IN.
1. **Raker, J. R.**, & Towns, M. H. (2008; poster). *Informal chemistry education: The Boy Scouts of America meets the National Science Education Standards*. 20th Biennial Conference on Chemical Education, Bloomington, IN.

Regional Meetings:

2. Baluyut, J. Y., Reed, J. J., Linenberger, K. J., **Raker, J. R.**, & Holme, T. A. (2012; poster). Statistical analysis tools for chemical education research. 64th Southeastern Regional Meeting of the ACS. Raleigh, North Carolina.
1. **Raker, J. R.**, & Holme, T. A. (2012). Cluster analyses of national survey data of postsecondary faculty and departmental assessment practices. 47th Midwest Regional ACS Meeting. Omaha, Nebraska.

Invited Talks at Colleges & Universities:

1. **Raker, J. R.** (2011, May). *Designing Sophomore-level Organic Chemistry Instructional Problems: Ideas from a Problem-solving Study of Practicing Organic Chemists*. Invited seminar for the ACS Examinations Institute, Iowa State University, Ames, Iowa.

Service

Profession – Meeting Organization:

2. Co-organizer of a symposium for the 246th ACS National Meeting. Indianapolis, Indiana. *Research in chemistry education*. (2013). R. Cole (University of Iowa) & **J. R. Raker**.
1. Co-organizer and presider of a symposium for the 239th ACS National Meeting. San Francisco, California. *Research on children learning chemistry*. (2010). M. O'Donnell (Miami University – Ohio), **J. R. Raker**, & S. L. Bretz (Miami University – Ohio).

Profession – Peer Reviews:

4. Reviewer for *Chemistry Education Research and Practice*. 2012-present.
3. Reviewer for the *Journal of Chemical Education*. 2011-present.
2. Reviewer for *Affective Dimensions in Chemistry Education* (book). (1 chapter). 2013.
1. Reviewer for the *Peer-Reviewed Chemical Education Research Symposium*, 22nd Biennial Conference on Chemical Education (3 reviews). 2012.

Department:

2. Member, Chemical Education Division. Department of Chemistry, University of South Florida, Tampa, Florida. 2013-present.
1. Member, Graduate Recruiting Committee. Department of Chemistry, University of South Florida, Tampa, Florida. 2013-present.

University:

6. Facilitator, STEM Teaching Assistant Learning Community. Iowa State University, Ames, Iowa. 2012-2013.
5. Member, University Grade Appeals Board. Purdue University, West Lafayette, IN. 2008-2011.
4. Member, Campus Appeals Board. Purdue University, West Lafayette, Indiana. 2008-2010.
3. Member, Outstanding Graduate Faculty Mentor Selection Committee. Graduate School. Purdue University, West Lafayette, Indiana. 2009.
2. Member, Student Affairs Committee, University (Faculty) Senate. Purdue University, West Lafayette, Indiana. 2007-2008.
1. Member, Synergies Work Group, University Strategic Planning Committee. Purdue University, West Lafayette, Indiana. 2007-2008.

Community:

4. Deputy Province Commander for Academic Affairs. Frampton Province, Kappa Alpha Order, Lexington, Virginia. 2007-2011.
3. Alumni Advisory Committee, Epsilon Rho Chapter, Kappa Alpha Order. Purdue University, West Lafayette, Indiana. 2006-2011.
2. Big Brother, Big Brothers & Big Sisters. Lafayette, Indiana. 2009-2010.
1. Missionary to Bolivia, South America. St. Thomas Aquinas Center, Purdue University, West Lafayette, Indiana. May 2009.