

MIKE STIEFF

APPOINTMENTS

UNIVERSITY OF ILLINOIS, CHICAGO ASSISTANT PROFESSOR, CHEMISTRY/LEARNING SCIENCES	CHICAGO, IL 2010 – PRESENT
UNIVERSITY OF MARYLAND, COLLEGE PARK ASSISTANT PROFESSOR, CURRICULUM & INSTRUCTION	COLLEGE PARK, MD 2006 – 2010
UNIVERSITY OF CALIFORNIA, DAVIS ASSISTANT PROFESSOR, SCHOOL OF EDUCATION	DAVIS, CA 2004 – 2006
HAROLD WASHINGTON COLLEGE LECTURER, DEPARTMENT OF PHYSICAL SCIENCE	CHICAGO, IL 2003 – 2004
NORTHWESTERN UNIVERSITY CHEMISTRY TEACHER, CENTER FOR TALENT DEVELOPMENT	EVANSTON, IL 2002 – 2003

EDUCATION

NORTHWESTERN UNIVERSITY PH.D., LEARNING SCIENCES, COGNITIVE SCIENCE CERTIFICATE M.S. (ABD), CHEMISTRY	EVANSTON, IL JUNE 2004 JUNE 2000
DICKINSON COLLEGE B.S., CHEMISTRY, LATIN, MAGNA CUM LAUDE	CARLISLE, PA JUNE 1998
INTERCOLLEGIATE CENTER FOR CLASSICAL STUDIES LATIN AND CLASSICAL STUDIES	ROME, ITALY FEBRUARY 1997 - MAY 1997

AWARDS & HONORS

2010 WINNER, BEST PAPER AWARD 6TH INTERNATIONAL CONFERENCE, DIAGRAMS 2010
2010 NOMINEE, BEST STUDENT PAPER AWARD 9TH INTERNATIONAL CONFERENCE OF THE
LEARNING SCIENCES
2003 SPENCER DISSERTATION YEAR FELLOWSHIP FOR RESEARCH RELATED TO EDUCATION
NORTHWESTERN UNIVERSITY DISSERTATION YEAR FELLOWSHIP AWARD
NORTHWESTERN UNIVERSITY GRADUATE RESEARCH GRANT, COMPETITIVE CAMPUS RESEARCH
COGNITIVE SCIENCE FELLOWSHIP, INDEPENDENT, INTERDISCIPLINARY GRADUATE RESEARCH
HORACE E. ROGERS AWARD, POTENTIAL IN THE FIELD OF CHEMISTRY
C.V. STARR SCHOLARSHIP, ACADEMIC EXCELLENCE IN CLASSICS
MARY DICKINSON SCHOLARSHIP, OVERALL ACADEMIC EXCELLENCE
AMERICAN CHEMICAL SOCIETY'S 1998 OUTSTANDING CHEMISTRY MAJOR AWARD
PHI BETA KAPPA

RESEARCH INTERESTS

Design-based research, curriculum development, science education (chemistry), diagrammatic reasoning, mental imagery and spatial reasoning, expertise, individual and gender differences, visualization technology

PUBLICATIONS & PRESENTATIONS

PEER-REVIEWED JOURNALS & BOOK CHAPTERS

1. **Stieff, M.** Task-specificity and sex differences in strategy use. Manuscript submitted for publication.
2. **Stieff, M.**, Hegarty, M., Dixon, B.L., Clover, B., Ryu, M. The impact of strategy training and spatial ability on chemistry achievement and strategy use among men and women. Manuscript in preparation.
3. Stull, A. T., Hegarty, M., Dixon, B. L., **Stieff, M.** Use it or Lose it: Representational translation with concrete models. Manuscript submitted for publication.
4. **Stieff, M.**, Ryu, M., Dixon, B. L., & Hegarty, M. Problem solving strategies used by organic chemistry undergraduates. Manuscript submitted for publication.
5. Newcombe, N., & **Stieff, M.** Six myths about spatial thinking. Manuscript submitted for publication.
6. **Stieff, M.**, Yip, J., & Ryu, M. Speaking across levels—teacher and student discourse practices in the chemistry classroom. Manuscript submitted for publication.
7. **Stieff, M.** Improving representational competence using multi-representational learning environments. Manuscript submitted for publication.
8. **Stieff, M.** (2011). When is a molecule three-dimensional? A task-specific role for imagistic reasoning in advanced chemistry. *Science Education*, 95(2), 310-336.
9. **Stieff, M.**, Hegarty, M., Deslongchamps, G. (2011). Coordinating multiple representations in scientific problem solving: Evidence from concurrent verbal and eye-tracking protocols. *Cognition & Instruction*, 29(1), 123-145.
10. **Stieff, M.**, Hegarty, M., & Dixon, B. L. (2010). Alternative strategies for spatial reasoning with diagrams. In A. K. Goel, M. Jamnik, N. H. Narayanan (Eds.), *Diagrammatic Representation and Inference*. (pp. 115-127). New York, NY: Springer.
11. **Stieff, M.**, & Raje, S. (2010). Expert algorithmic and imagistic problem solving strategies in advanced chemistry. *Spatial Cognition & Computation*. 10(1), 53-81.
12. **Stieff, M.** (2007). Mental rotation and diagrammatic reasoning in science. *Learning and Instruction*, 17(2), 219-234.
13. **Stieff, M.** (2005). Connected Chemistry—A novel modeling environment for the chemistry classroom. *Journal of Chemical Education*, 82(3), 489-493.
14. **Stieff, M.**, Bateman, R., & Uttal, D. (2005). Teaching and learning with three-dimensional representations. In J. K. Gilbert (Ed.), *Visualization in science education* (pp. 93-120). Oxford: Oxford University Press.
15. **Stieff, M.**, & Wilensky, U. (2003). Connected Chemistry—Incorporating interactive simulations into the chemistry classroom. *Journal of Science Education & Technology*, 12(3), 285-302.
16. Crouch, R. D., **Stieff, M.**, Frie, J. L., Cadwallader, A. B., & Bevis, D. C. (1999). Selective deprotection of silyl-protected phenols using solid NaOH and a phase transfer catalyst, *Tetrahedron Letters*, 40, 3133-3136.

PEER-REVIEWED PUBLISHED PROCEEDINGS

1. **Stieff, M.** (2011). Fostering representational competence through argumentation with multi-representational displays. *Proceedings of the 9th International Conference on Computer-Supported Collaborative Learning*. Mahwah, NJ: Erlbaum.
2. **Stieff, M.**, Ryu, M., & Dixon, B. L. (2010). Students' use of multiple strategies for scientific problem solving. In K. Gomez, L. Lyons & J. Radinsky (Eds.), *Proceedings of the Ninth International Conference of the Learning Sciences (ICLS)* (Vol. 1, pp. 765-772). Mahwah, NJ: Erlbaum.
3. Cathcart, L., **Stieff, M.**, Marbach-Ad, G., Smith, A., & Frauwirth, K. (2010). Using Knowledge Space Theory to analyze concept maps in an undergraduate immunology course. *Proceedings of the Ninth International Conference of the Learning Sciences (ICLS)* (Vol. 1., pp. 952-959). Mahwah, NJ: Erlbaum.

4. **Stieff, M.**, & Raje, S. (2008). Expertise and spatial reasoning in advanced scientific problem solving. *Proceedings of the Eighth International Conference of the Learning Sciences (ICLS)*, pp. 366-373). Mahwah, NJ: Erlbaum.
5. **Stieff, M.**, & McCombs, M. (2006). Increasing representational fluency with visualization tools. *Proceedings of the Seventh International Conference of the Learning Sciences (ICLS)* (Vol.1, pp. 730-736). Mahwah, NJ: Erlbaum.
6. **Stieff, M.** (2005). Visualization and diagrammatic reasoning in genuine scientific problem solving. In T. Barkowsky, C. Freksa, M. Hegarty, & R. Lowe (Eds.), *Reasoning with mental and external diagrams: computation modeling and spatial assistance* (AAAI Tech. Rep. SS-05-06, pp. 121-126). Menlo Park, CA: AAAI Press.
7. Sherin, B., Kanter, D., Schwarz, J., **Stieff, M.**, Herman, P., & Mackenzie, S. (2002). Conceptual dynamics in project-based science. In P. Bell, R. Stevens, & T. Satwicz (Eds.), *Keeping Learning Complex: The Proceedings of the Fifth International Conference of the Learning Sciences (ICLS)* (pp. 429-436). Mahwah, NJ: Erlbaum.
8. **Stieff, M.**, & Wilensky, U. (2002). ChemLogo: An emergent modeling environment for teaching and learning chemistry. In P. Bell, R. Stevens, & T. Satwicz (Eds.), *Keeping Learning Complex: The Proceedings of the Fifth International Conference of the Learning Sciences (ICLS)* (pp. 451-458). Mahwah, NJ: Erlbaum.

CONFERENCE PRESENTATIONS & INVITED LECTURES

1. **Stieff, M.** (2011, July). Fostering representational competence through argumentation with multi-representational displays. Paper presented at the *9th International Conference on Computer-Supported Collaborative Learning*. Hong Kong, China.
2. **Stieff, M.** (2011, June). Developing representational competence in the chemistry classroom. Invited talk presented at the 2011 Gordon Research Conference on Chemistry Education Research & Practice. Davidson, NC.
3. **Stieff, M.** (2011, March). Representational competence in multi-representational molecular animations. Paper presented at the Annual Meeting of the American Chemical Society. Anaheim, CA.
4. Yip, J. C., Jaber, L. Z., & **Stieff, M.** (2011, April). Examining changes in students' coordination of verbal and pictorial chemical representations in response to instruction. Paper presented at the American Educational Research Association. New Orleans, LA.
5. **Stieff, M.** (2011, April). Mediating sex differences in science achievement with analytical heuristics. In A. Jaeger (Chair), "Learning with Spatial, Embedded and Embodied Representations." Symposium presented at the American Educational Research Association. New Orleans, LA.
6. **Stieff, M.**, Dixon, B.L., Ryu, M., Clover, B., Hegarty, M. (2011, April). Training Selective Strategy Use for Spatial Problem Solving in Science. Paper presented at the American Educational Research Association. New Orleans, LA.
7. Stull, A. T., Hegarty, M., Dixon, B. L., & **Stieff, M.** (2011, April). Chemistry models: facilitating cognition through external manipulatives. Poster presented at the American Educational Research Association. New Orleans, LA.
8. **Stieff, M.** (2011, February). Visualization technologies for teaching chemistry. Invited talk presented in Learning Sciences Practicum in Learning Environment Design. Northwestern University, Evanston, IL.
9. Stull, A. T., Hegarty, M., **Stieff, M.**, & Dixon, B. L. (2010, November). Individual differences in use of external representations in spatial thinking. Paper presented at the Annual Meeting of the Psychonomics Society. St. Louis, MO.

10. **Stieff, M.** (2010, November). Sex differences in strategy use for spatial problem solving. Invited lecture presented at University of Illinois, Department of Psychology Cognitive Psychology Brown Bag, Chicago, IL.
11. Stull, A. T., Hegarty, M., **Stieff, M.**, & Dixon, B. L. (2010, August). Concrete models as aids to representational translation of molecular diagrams. Paper presented at the 2010 Meeting of the Cognitive Science Society. Portland, OR.
12. **Stieff, M.**, Hegarty, M., & Dixon, B. L. (2010, August). Alternative strategies for spatial reasoning with diagrams. Paper presented at Diagrams 2010. Portland, OR.
13. Ryu, M., & **Stieff, M.** (2010, May). Students' use of multiple strategies for spatial thinking in chemistry. Paper presented at the Annual Meeting of the American Educational Research Association, Denver, CO.
14. Yip, J., & **Stieff, M.** (2010, May). Examining teacher decision making during enactments of novel technology-infused curricula. Paper presented at the Annual Meeting of the American Educational Research Association, Denver, CO.
15. Cathcart, L., **Stieff, M.**, Marbach-Ad, G., Smith, A., & Frauwirth, K. (2010, March). Using Knowledge Space Theory to analyze concept maps. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (NARST), Philadelphia, PA.
16. **Stieff, M.** (2010, March). Alternative strategies for problem solving in science. Invited lecture presented at the Annual REESE PI Meeting of Center for Advancing Research & Communication. Pentagon City, VA.
17. **Stieff, M.** (2010, March). Careers in science education. Invited lecture presented at University of Maryland, Department of Chemistry, College Park, MD.
18. **Stieff, M.** (2010, February). Spatial & diagrammatic reasoning in scientific problem solving. Invited lecture presented at University of Illinois, Institute for Learning Sciences, Chicago, IL.
19. **Stieff, M.** (2010, February). Investigations into teaching & learning in chemistry. Invited lecture presented at University of Illinois, Department of Chemistry, Chicago, IL.
20. **Stieff, M.** (2010, February). The affordances of technology-infused learning environments in stem classrooms. Invited lecture presented at the University of Maryland, College of Information Studies, College Park, MD.
21. **Stieff, M.** (2010, February). What makes a methodology? Invited panelist for College of Education Graduate Student Association Brown Bag, University of Maryland, College of Education, College Park, MD.
22. **Stieff, M.** (2010, January). Chalk Talk: The future of science, technology, engineering, and mathematics education. Invited panelist for University of Maryland, College of Education, College Park, MD.
23. **Stieff, M.** (2009, November). Characterizing student problem solving strategies in undergraduate chemistry. Invited lecture presented at Clemson University, Department of Chemistry, Clemson, SC.
24. **Stieff, M.** (2009, November). Multi-method designs for identifying spatial thinking in scientific problem solving. Invited lecture presented at University of Chicago, Department of Psychology, Chicago, IL.
25. Raje, S., & **Stieff, M.** (2009, August). Role of spatial reasoning in advanced chemistry problem-solving. Paper presented at ChemEd2009, Radford, VA.
26. Ryu, M., & **Stieff, M.** (2009, August). University faculty's perceptions on visuo-spatial reasoning and success in science. Paper presented at ChemEd2009, Radford, VA.
27. **Stieff, M.** (2009, July). In M. Stieff (Chair), *Assessment workshop*. Workshop conducted at the Gordon Research Conference on Visualization in Science & Education, Oxford, UK.
28. **Stieff, M.** (2009, May). Task-specificity of spatial thinking in advanced scientific problem solving. Invited lecture presented at the Conference on Spatial Thinking in Education, Evanston, IL.
29. **Stieff, M.** (2009, May). Understanding teacher & student problem solving strategies in college science. Invited lecture presented at the EDCI Research Colloquium, University of Maryland, Department of Curriculum & Instruction, College Park, MD.

30. Cathcart, L.A., Marbach-Ad, G., Smith, A.C., **Stieff, M.**, & Frauwirth, K.A. (2009, May). *Concept Mapping as a Teaching and Assessment Tool in an Undergraduate Immunology Course*. Poster session presented at the American Society for Microbiology Conference for Undergraduate Educators, Fort Collins, CO.
31. **Stieff, M.**, Ryu, M., & Yip, J. (April, 2009). Speaking across levels-teacher & student perspectives of chemistry. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.
32. **Stieff, M.**, & Garvin, M. (2009, April). Identity, power & curriculum modifications in teacher-research collaborations. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.
33. Raje, S., & **Stieff, M.** (2009, April). An examination of the cognitive mechanisms underlying chemistry misconceptions. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.
34. **Stieff, M.**, Hegarty, M., & Dixon, B. L. (2009, February). Alternative strategies for problem solving in science. Poster presented at the Annual REESE PI Meeting of Center for Advancing Research & Communication, Washington, D.C.
35. **Stieff, M.**, & Hegarty, M. (2008, February). Assessing the relationship between spatial abilities and participation in college science. Invited poster presented at the Spatial Intelligence and Learning Center Virtual Conference, Chicago, IL.
36. **Stieff, M.** (2008, January). *SIMS: Simulations & modeling in science*. Invited lecture presented at the Regional Educators Annual Chemistry Teaching Symposium (REACTS). University of Maryland Department of Chemistry, College Park, MD.
37. **Stieff, M.**, & Hegarty, M. (2007, October). Assessing the relationship between spatial abilities and participation in college science. Invited poster presented at the NSF Science of Learning Centers Awardees' Meeting, Arlington, VA.
38. **Stieff, M.** (2007, September). Visual literacy in science education. Invited lecture presented at the University of Maryland Center for Teaching Excellence, College Park, MD.
39. **Stieff, M.** (2007, July). *Alternative strategies for problem solving with visual representations*. Invited plenary talk presented at the Gordon Research Conference on Visualization in Science & Education, Smithfield, RI.
40. **Stieff, M.** (2007, July). In M. Stieff (Chair), *Assessment workshop*. Workshop conducted at the Gordon Research Conference on Visualization in Science & Education, Smithfield, RI.
41. **Stieff, M.** (2007, April). Barriers to problem solving with simultaneous displays of multiple dynamic representations. In M. Stieff (Chair), *Teaching and learning with external representations in math and science*. Symposium conducted at the Annual Meeting of the American Educational Research Association, Chicago, IL.
42. **Stieff, M.** (2007, November). *Imagistic and diagrammatic reasoning in science*. Invited lecture presented at Purdue University, Department of Chemistry, West Lafayette, IN.
43. **Stieff, M.** (2007, October). *Visualization & diagrammatic reasoning in undergraduate chemistry*. Invited lecture presented at University of Maryland, Department of Chemistry, College Park, MD.
44. **Stieff, M.** (2007, February). *Imagistic and diagrammatic reasoning in science*. Invited lecture presented at Reed College, Department of Chemistry, Portland, OR.
45. **Stieff, M.** (2007, September). Visual literacy in science education. In S. Benson (Chair), *Why Don't My Students See What I See? Visual Literacy in Undergraduate Studies*. Workshop presented at the UMD Center for Teaching Excellence, College Park, MD.
46. **Stieff, M.** (2006, September). *Designing effective assessments*. In M. Shultz (Chair), *Future Directions for Visualizations in Science and Education*. Workshop at National Science Foundation, Arlington, VA.
47. **Stieff, M.** (2005, July). *Assessing visualization tools*. In M. Stieff (Chair), *Assessment Workshop*. Workshop conducted at the Gordon Research Conference on Visualization in Science & Education, Oxford, UK.

48. **Stieff, M.** (2005, July). *Visualization as a problem solving strategy in chemistry*. Poster session presented at the 2005 Gordon Research Conference on Visualization in Science & Education, Oxford, UK.
49. **Stieff, M.** (2005, April). Dichotomous use of external representations in science learning. In O. Parnafes (Chair), *Meaning making with representations: contrasting perspectives*. Symposium conducted at the Annual Meeting of the American Educational Research Association, Montreal, QC.
50. **Stieff, M.** (2005, April). *A theoretical framework for integrating cognitive ability and domain knowledge in science learning*. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, QC.
51. **Stieff, M.** (2004, November). *Implementing and assessing interactive simulations for chemistry*. Invited lecture presented at American River College, Department of Chemistry, Sacramento, CA.
52. **Stieff, M.** (2004, July). *Targeting visualization use in organic chemistry*. Paper presented at the Eighteenth Biennial Conference on Chemical Education, Ames, IA.
53. **Stieff, M.**, Stillings, N., Arasasingham, R., Taagepera, M., & Wamser, C. (2004, April). *Characterizing chemistry problem solving with convergent approaches from chemistry, education, and psychology*. Paper presented at the National Association for Research in Science Teaching, Vancouver, BC.
54. **Stieff, M.** (2003, September). *Problem solving strategies in undergraduate organic chemistry*. Paper presented at the American Chemical Society National Meeting, New York, NY.
55. **Stieff, M.**, Sherin, B., & Uttal, D. (2003, July). *Mental imagery and problem solving in organic chemistry*. Poster session presented at the Gordon Conference on Visualization in Science & Education, Oxford, UK.
56. **Stieff, M.** (2003, June). *Imagery and problem solving in advanced science*. Invited lecture presented at the Annual Meeting of the Cognitive Science Program, Northwestern University, Evanston, IL.
57. **Stieff, M.** (2003, March). *Incorporating interactive simulations into the chemistry classroom*. Paper presented at Chicago Symposium Series on Excellence in Teaching Mathematics and Science: Research and Practice, Chicago, IL.
58. **Stieff, M.** (2003, February). NetLogo modeling tools for the science classroom. Invited lecture presented in LS-435: Science Teaching, Northwestern University, Evanston, IL.
59. **Stieff, M.**, & Wilensky, U. (2002, June). *Modeling chemistry as an emergent phenomenon*. Poster session presented at the Gordon Conference on Innovations in College Chemistry Teaching, New London, CT.
60. **Stieff, M.** (2002, May). Aspects of spatial cognition in chemistry problem solving. Invited lecture presented in PSYCH-314: Special Topics in Spatial and Environmental Cognition, Northwestern University, Evanston, IL.
61. Sherin, B., Kanter, D., Schwarz, J., & **Stieff, M.** (2002, April). *A framework for capturing conceptual dynamics in complex science interventions*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
62. **Stieff, M.**, & Wilensky, U. (2001, June). *Connected Mathematics: Making sense of complex phenomena through building object-based parallel models*. Poster session presented at the National Education Computing Conference, Chicago, IL.
63. Wilensky, U., & **Stieff, M.** (2001, June). *Modeling complex systems with multi-agent logos*. Workshop presented for Logosium 2001 at the National Education Computing Conference, Chicago, IL.

RESEARCH FUNDING EXPERIENCE**CURRENT SUPPORT**

REPRESENTATION TRANSLATION WITH CONCRETE & VIRTUAL MODELS IN CHEMISTRY 2010-2013
NATIONAL SCIENCE FOUNDATION, \$446,583, PRINCIPAL INVESTIGATOR

Identify the cognitive mechanisms that are supported by the use of concrete manipulatives during problem solving in undergraduate science, specifically organic chemistry.

THE CONNECTED CHEMISTRY CURRICULUM 2010-2013

U.S. DEPT. OF EDUCATION, INSTITUTE FOR EDUCATION SCIENCES (ITQ), \$1,121,093, PRINCIPAL INVESTIGATOR

Create and evaluate the efficacy of comprehensive computer-based curriculum for improving learning, student achievement, and pedagogy in high school chemistry classrooms.

ALTERNATIVE STRATEGIES FOR PROBLEM SOLVING IN SCIENCE 2007-2011

NATIONAL SCIENCE FOUNDATION, \$688,178, PRINCIPAL INVESTIGATOR

Examine strategy choice and application by undergraduate students and faculty in introductory chemistry.

Design novel pedagogy based on strategy choice and evaluate effectiveness for improving achievement.

COMPLETED SUPPORT

PEDAGOGICAL EXPERTS IN EDUCATION TECHNOLOGY FOR TEACHING SCIENCE 2010-2011

MARYLAND HIGHER EDUCATION COMMISSION (ITQ), \$185,793, PRINCIPAL INVESTIGATOR

Expand professional development program into Baltimore City Public Schools. Train teachers in using inquiry curricula and evaluate scalability of technology-based intervention, Connected Chemistry.

ASSESSING THE RELATIONSHIP BETWEEN SPATIAL ABILITIES AND PARTICIPATION IN COLLEGE SCIENCE 2008-2009

NATIONAL SCIENCE FOUNDATION, \$60,000, CO-PRINCIPAL INVESTIGATOR

Correlate spatial ability, gender, dropout rates and achievement in undergraduate science.

DISCIPLINARY EXPERTS IN SCIENCE EDUCATION RESEARCH 2007-2009

NATIONAL SCIENCE FOUNDATION, \$1,311,074, CO-PRINCIPAL INVESTIGATOR

Develop novel doctoral programs to improve the preparation of science education researchers.

GENDER-SPECIFIC STRATEGIES FOR PROBLEM SOLVING IN SCIENCE 2007

UNIVERSITY OF MARYLAND GENERAL RESEARCH BOARD, \$9,550, PRINCIPAL INVESTIGATOR

Design and conduct protocol analyses to explore gender differences in problem solving strategy choice in undergraduate organic chemistry.

CREATING COGNITIVE DISSONANCE IN A COMPUTER GAME ENVIRONMENT 2007-2009

NATIONAL SCIENCE FOUNDATION SEED GRANT, \$6,000, PRINCIPAL INVESTIGATOR

Investigate depth of conceptual change in undergraduate physics after instruction via virtual gaming environments.

PEDAGOGICAL EXPERTS IN EDUCATION TECHNOLOGY FOR TEACHING SCIENCE 2009-2010

MARYLAND HIGHER EDUCATION COMMISSION (ITQ), \$191,377, PRINCIPAL INVESTIGATOR

Develop and administer professional development program for Prince George's County Public Schools chemistry teachers. Train teachers in using and developing technology-infused lessons. Evaluate academic gains in science from technology-based interventions.

- STUDENT VIEW OF VISUALIZATION: WHAT DO THEY SEE?** 2004-2005
 NATIONAL SCIENCE FOUNDATION SEED GRANT, \$5,000, CO-PRINCIPAL INVESTIGATOR (M. SHULTZ, PI)
 Designed and conducted protocol analyses for eye-tracking studies of student problem solving in advanced chemistry via Flash animations and molecular modeling software.
- INCORPORATING SIMULATIONS AND MODELING IN GENERAL CHEMISTRY** 2004-2006
 THE CAMILLE & HENRY DREYFUS FOUNDATION, \$78,032, PRINCIPAL INVESTIGATOR
 Directed work circle team of researchers and teachers to develop 10 simulation-based curriculum activities for high school chemistry. Implemented activities and assess learning outcomes with field observations, student interviews, and pre-post test measures.
- ADDRESSING MISCONCEPTIONS IN CLIMATE CHANGE THROUGH VISUALIZATION** 2004-2006
 NATIONAL SCIENCE FOUNDATION SEED GRANT, \$5,000, PRINCIPAL INVESTIGATOR (D. GEELAN, B. MARTIN, PIs)
 Designed misconceptions inventory regarding climate and change. Assessed conceptual change in seventh grade students who learn climatology via NASA visualization images.
- KNOWLEDGE REPRESENTATION AND MANIPULATION IN ORGANIC CHEMISTRY** 2002-2004
 THE SPENCER FOUNDATION, \$40,000, PRINCIPAL INVESTIGATOR
 Collected and analyzed field observations, psychometrics, achievement assessments, and clinical interviews for 200 students to discriminate diagrammatic and spatial reasoning in college chemistry.

TEACHING EXPERIENCE

ASSISTANT PROFESSOR

- COMPUTERS IN EDUCATION** SPRING 2007, 2008
 DOCTORAL, SCHOOL OF EDUCATION, UNIVERSITY OF MARYLAND-COLLEGE PARK
- EPISTEMOLOGIES OF EDUCATIONAL RESEARCH** SPRING 2006-2010
 DOCTORAL, SCHOOL OF EDUCATION, UNIVERSITY OF MARYLAND-COLLEGE PARK
- RESEARCH TRENDS IN SCIENCE EDUCATION** FALL 2006-2008
 DOCTORAL, SCHOOL OF EDUCATION, UNIVERSITY OF MARYLAND-COLLEGE PARK
- PROBLEM SOLVING IN & OUT OF SCHOOLS** SPRING 2006
 DOCTORAL, SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA-DAVIS
- DESIGN OF LEARNING ENVIRONMENTS** WINTER 2006
 DOCTORAL, SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA-DAVIS
- RESEARCH METHODS IN SCIENCE EDUCATION** WINTER 2005
 DOCTORAL, SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA-DAVIS
- PSYCHOLOGY OF SCHOOL LEARNING** SPRING 2005, 2006
 DOCTORAL, SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA-DAVIS
- INTRODUCTION TO EDUCATIONAL PSYCHOLOGY** FALL 2004, 2005
 UNDERGRADUATE, SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA-DAVIS

LECTURER

ORGANIC CHEMISTRY 2003-2004
DEPARTMENT OF PHYSICAL SCIENCE, HAROLD WASHINGTON COLLEGE

TEACHER

HONORS CHEMISTRY 2002-2003
CENTER FOR TALENT DEVELOPMENT, NORTHWESTERN UNIVERSITY

FUNDAMENTALS OF CHEMISTRY SUMMER 2003
CENTER FOR TALENT DEVELOPMENT, NORTHWESTERN UNIVERSITY

TEACHING ASSISTANT

COGNITIVE SCIENCE FOUNDATIONS OF THE LEARNING SCIENCES FALL 2001
DEPARTMENT OF LEARNING SCIENCES, NORTHWESTERN UNIVERSITY

LEARNING AND UNDERSTANDING: A COGNITIVE SCIENCE APPROACH WINTERS 2001/02/03
DEPARTMENT OF LEARNING SCIENCES, NORTHWESTERN UNIVERSITY

INTRODUCTION TO ORGANIZATION THEORY & LEARNING FALL 2002 & WINTER 2003
DEPARTMENT OF LEARNING SCIENCES, NORTHWESTERN UNIVERSITY

LABORATORY INSTRUCTOR

ORGANIC CHEMISTRY 1998-2000
DEPARTMENT OF CHEMISTRY, NORTHWESTERN UNIVERSITY

BENCHCHEM-GENERAL CHEMISTRY 1995-1997
DEPARTMENT OF CHEMISTRY, DICKINSON COLLEGE

PROFESSIONAL & SERVICE ACTIVITIES**NATIONAL****REVIEWER**

NATIONAL SCIENCE FOUNDATION (REESE, ISE & DRK-12 PROGRAMS; PANEL CHAIR)

JOURNAL OF CHEMICAL EDUCATION

COGNITION & INSTRUCTION

LEARNING & INSTRUCTION

JOURNAL OF RESEARCH IN SCIENCE TEACHING

JOURNAL OF THE LEARNING SCIENCES

INTERNATIONAL JOURNAL OF COMPUTERS FOR MATHEMATICAL LEARNING

ANNUAL MEETING OF THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION

ANNUAL MEETING OF THE COGNITIVE SCIENCE SOCIETY

INTERNATIONAL CONFERENCE FOR THE LEARNING SCIENCES

TREASURER, LEARNING SCIENCES SPECIAL INTEREST GROUP 2010-2012
AMERICAN EDUCATIONAL RESEARCH ASSOCIATION

GORDON CONFERENCE WORKSHOP COMMITTEE, CHAIR 2005, 2007, & 2009
 GORDON CONFERENCE ON VISUALIZATION IN SCIENCE AND EDUCATION

NARST OUTSTANDING PAPER REVIEW COMMITTEE, REVIEWER 2006
 NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING

NCSES ORGANIZING COMMITTEE, CHAIR 2006
 NORTHERN CALIFORNIA SCIENCE EDUCATION SYMPOSIUM

UNIVERSITY OF MARYLAND, COLLEGE PARK

EDCI ADVISORY BOARD 2007-2010
 DEPARTMENT OF CURRICULUM & INSTRUCTION

EDCI PROMISING RESEARCHER FELLOWSHIP COMMITTEE 2007-2009
 DEPARTMENT OF CURRICULUM & INSTRUCTION

GEMSTONE PROGRAM EVALUATOR 2007-2008
 UNIVERSITY OF MARYLAND-COLLEGE PARK

COLLEGE OF EDUCATION ACADEMIC SENATE 2006-2008
 DEPARTMENT OF CURRICULUM & INSTRUCTION

COLLEGE OF EDUCATION STRATEGIC WEB DEVELOPMENT TEAM 2006-2008
 DEPARTMENT OF CURRICULUM & INSTRUCTION

UNIVERSITY OF CALIFORNIA, DAVIS

SEMINAR SERIES COMMITTEE, CHAIR 2005-2006
 SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA, DAVIS

POLICY COMMITTEE, CHAIR 2005-2006
 SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA, DAVIS

ACADEMIC PLANNING COUNCIL, SCIENCE EDUCATION REPRESENTATIVE 2005-2006
 SCHOOL OF EDUCATION, UNIVERSITY OF CALIFORNIA, DAVIS

SPECIAL ACADEMIC PROGRAMS COMMITTEE OF UNDERGRADUATE COUNCIL, MEMBER 2005-2006
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INTERNATIONAL SOCIETY OF THE LEARNING SCIENCES, MEMBER

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