

PROPOSAL FOR A 2011 Alliance to Advance Liberal Arts Colleges (AALAC) MELLON 23 WORKSHOP

***LEARNING AND TEACHING PHYSICAL SCIENCES IN THE LIBERAL ARTS COLLEGE AND
UNIVERSITY 2: IDENTIFICATION OF SUPPORTS FOR STUDENT SUCCESS***

This workshop is designed as a follow up to the Mellon 23 workshop entitled "Learning and Teaching Physical Sciences in the Liberal Arts College and University: Forging a Research Agenda," held in May 2010 at Swarthmore College. It will be used to design a well informed study of undergraduate student decision-making. In particular, the study will focus on critical decision points and the types of curricular planning and instruction for learning and teaching physical sciences that assist all students, including women, underrepresented minorities and first-generation students. The proposed approach will target the positive steps taken by students who are successful, in order to identify how all students can be supported. Project design will include 1) bringing the expertise and experiences of AALAC/Mellon 23 schools to the fore, 2) providing opportunities to learn from leading researchers in the field, and 3) engaging workshop participants in completing the project design during the workshop.

In order to accomplish these goals, we propose to design the workshop with a significant (online) preparatory component that will allow participants to share the work from their institutions that bears on the design of the study. Participants will arrive having reviewed these materials, and prepared to synthesize this information as a foundation for the program design. To facilitate the incorporation of current research methodologies in the study design, two leading researchers in the area will join the group for the full workshop. They will each give a plenary presentation designed to facilitate discussion of research design and methodology and will serve as consultants during the course of the workshop. To develop the research plan, small groups will hash out ideas and record them in online workspaces that can be viewed by the group as a whole. The entire group will review these documents and engage in synthetic discussion, and then disperse to working groups to proceed in developing the plan. This strategy was used successfully during a previous Mellon 23 meeting on broadening access in STEM to synthesize participants' experiences and recommendations for comprehensive programming to address diversity (<http://serc.carleton.edu/cismi/broadaccess/workshop09/index.html>).

The workshop will be supported by a website hosted by the Science Education Resource Center (<http://serc.carleton.edu/index.html>) and developed using their content management system. This system is designed to support virtual interactions among workshop participants prior to, during and after the workshop. Public pages will be used to support workshop registration, logistics and dissemination. Private spaces will be used to support sharing of expertise in preparation for the workshop and design of the research plan. If appropriate, the synthesis of current work will be made available through the workshop website.

WORKSHOP DETAILS

LOCATION

Swarthmore College, Swarthmore, PA

DATES AND TIME

Date to be determined. Expected length is 2 days.

APPLICATIONS

Due ~3 months prior to workshop

Faculty members from *AALAC/Mellon* 23 member institutions are invited to participate in this workshop.

Please submit applications to the workshop liaison, Lynne Molter, via email (see contact information below), and please include:

1. The name and contact information for the applicant,
2. A short description of the applicant's interest in participation in this workshop, which could include previous and current efforts in support of student success in the physical sciences, and
3. A brief letter of support from the Dean or Provost at the applicant's institution.

WORKSHOP LEADERS

Carleton College:

Joseph Chihade	Associate Professor, Department of Chemistry, Director of Biochemistry Concentration
Deborah Gross	Associate Professor and Chair, Department Chemistry, and Member of the Environmental and Technology Studies (ENTS) Program
Cathy Manduca	Director, Science Education Resource Center (SERC)
Ellen Iverson	Evaluation Director, Science Education Resource Center (SERC)

Swarthmore College:

Lynne Molter	Professor and Chair, Department of Engineering
K. Ann Renninger	Professor and Chair, Department of Educational Studies

Vassar College:

John McCleary	Professor of Mathematics
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Grinnell College:

Jim Swartz	Professor of Chemistry
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Claremont-McKenna, Scripps, and Pitzer Colleges:

Gretchen Edwalds-Gilbert	Associate Professor, Joint Science Department
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Furman University:

John Kaup	Coordinator of Science Education, Office of Integrative Research in the Sciences
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WORKSHOP LIAISON CONTACT INFORMATION

Lynne Molter, lmolter1@swarthmore.edu, 610-328-8078

PRELIMINARY BUDGET

<i>ITEM</i>	<i>ESTIMATED BUDGET</i>	<i>TOTAL COST</i>
Travel and accommodation for workshop participants	\$1000/ participant, funding 2 participants per institution, assuming funding available for 5 institutions	\$10,000
Workshop management	Web support, workshop organization, and workshop evaluation by SERC	\$5,000
Plenary speakers	Two speakers including travel and \$500 honorarium each	\$3,000
Meals	Meals for workshop participants	\$2,000
TOTAL		\$20,000

JOSEPH W. CHIHADÉ

Associate Professor of Chemistry, Carleton College, Northfield, MN

Email: jchihade@carleton.edu

PROFESSIONAL PREPARATION

Oberlin College, Oberlin, OH	Chemistry	B.A.	1989
Columbia University, New York, NY	Chemistry	Ph.D.	1996
Massachusetts Instit. of Technology, Cambridge, MA	Biochemistry		
The Scripps Research Institute, La Jolla, CA	Biochemistry		

APPOINTMENTS

2006 – present	Director of Biochemistry Concentration, Carleton College, Northfield, MN
2003 – present	Assistant, then Associate Professor of Chemistry, Carleton College, Northfield, MN
1999 – 2003	Assistant Professor of Chemistry, Williams College, Williamstown, MA
2002-2003	Assistant Professor leave in the laboratory of Karin Musier-Forsyth, U of Minnesota
1996-1999	NIH Postdoctoral Fellow
1989-1991	Peace Corps Volunteer – Secondary Science Educator, St. Stephen's Lwanya School, Busia, Kenya

PUBLICATIONS:

- A Streamlined Molecular Biology Module for Undergraduate Biochemistry Labs, Muth, G.W.; Chihade, J.W. *Biochemistry and Molecular Biology Education*, 36, 209 (2008).
- Translocation within acceptor helix of a major tRNA identity determinant, Lovato, M.A.; Chihade, J.W.; Schimmel, P. *EMBO Journal*, 20, 4846 (2001).
- Origin of mitochondria in relation to evolutionary history of eukaryotic alanyl-tRNA synthetase, Chihade, J.W.; Brown, J.R.; Schimmel, P.; Ribas de Pouplana, L., *Proceedings of the National Academy of Sciences, U.S.A.*, 97, 12153 (2000).
- Assembly of a catalytic unit for RNA microhelix aminoacylation using nonspecific RNA binding domains. Chihade, J.W.; Schimmel, P. *Proceedings of the National Academy of Sciences, U.S.A.*, 96, 12316 (1999).
- Strong Selective Pressure to Use G:U to Mark an RNA Acceptor Stem for Alanine. Chihade, J.W.; Hayashibara, K.; Shiba, K.; Schimmel, P. *Biochemistry*, 37, 9193 (1998).
- Pre-transfer Editing by Class II Escherichia coli Prolyl-tRNA Synthetases: Role of Aminoacylation Active Site in "Selective Release" of Noncognate Amino Acids, Hati, S.; Ziervogel, B.; SternJohn, J.; Wong, F.-C.; Nagan, M.C.; Rosen, A.E.; Siliciano, P.G.; Chihade, J.W.; Musier-Forsyth, K. *J. Biol. Chem.*, 281, 27862 (2006).

SYNERGISTIC ACTIVITIES

- Activities related to broadening access to the sciences at Carleton College: a) Director of Carleton Interdisciplinary Science and Math Initiative (CISMI) b) Member of the "Transitions Group" for Broadening Access to the sciences at Carleton College. c) Member of Carleton Equity and Diversity Initiative taskforce on "Learning Outside the Classroom." d) Carleton College faculty representative to workshops on diversity in the sciences, including Sloan Foundation Program on Student Migration Patterns. e) Research mentor for the Science Scholars program, an intensive two-week program for freshman and sophomore students struggling in science (2006).
- Activities related to science curriculum development: a) Development of seminar course in Chemical Biology b) Development of new laboratory course in biological chemistry. c) Developed non-majors chemistry course on pharmaceuticals. d) Developed intensive one month (Winter Study) course on the origins of life. e) Developed problem based curriculum for teaching Physical Organic Chemistry.

COLLABORATORS AND STUDENTS

• Collaborators:

Gregory Muth, St. Olaf College
Martin Zysmilich, George Washington University
Karin Musier-Forsyth, Ohio State University

• Graduate and Post Doctoral Advisors:

David Horne, City of Hope Cancer Center, graduate advisor
Paul Schimmel, The Scripps Research Institute, post-doctoral advisor

• Undergraduate Students Mentored:

Carleton College: Michael Bonin '10, Jeremy Grevet '10, Koua Her '12, Eamon Flynn '09, John Hanks, '09, Jolene Mork '10 (Graduate student, CalTech), Karen Borchert '08 (Medical student, University of Minnesota), David Anderson '09, Julia Brown '08 (Graduate student, Cornell University), Nakita Natala '09 (Medical Student, University of Rochester), Maraia Ener '08 (Graduate student, CalTech), Lucas Riley '09, Yirong Zhu '09 (Medical Student, Michigan State University), Ali Khaki '07 (Medical Student, University of California, San Diego), Amelia Gauger '07 (Medical Student, University of Iowa), Andrew Nieuwkoop '06 (Graduate Student, University of Illinois), Gregory Ducker '06 (Graduate Student, University of California, Berkeley), Alice Agyiri '06 (Corporate Bank Analyst, Citicorp).
Williams College: Kristen LeChevet '02 (M.S. Johns Hopkins University), Alix Partnow '02 (D.V.M. University of Illinois), Alison Peet '03, Daniel Clayburgh '01 (M.D./Ph.D. University of Chicago), Marina Vivero '04, Jenica Chambers '04 (Ph.D., Duke University), Susan Levin '02 (Ph.D. University of California, San Francisco), Samantha Kim '01, Michele Pacholec '00 (Ph.D., Harvard University), Michael Hurwitz '00.

Gretchen Edwalds-Gilbert

A. Professional Preparation

Swarthmore College	Biology	Bachelor of Arts	1982
Cornell University Medical College/ Sloan-Kettering Inst.	Molecular Biology	Ph.D.	1993
University of Pittsburgh	Developmental Biology	Post-Doc	1992-1993
University of Pittsburgh School of Medicine	Molecular Immunology	Post-Doc	1993-1997
Beckman Research Institute of the City of Hope	Molecular Biology	Post-Doc	1998- 2000.

B. Appointments

Associate Professor of Biology, The Joint Science Department, Claremont McKenna, Pitzer, and Scripps Colleges, 2005-present.

Assistant Professor of Biology, The Joint Science Department, Claremont McKenna, Pitzer, and Scripps Colleges, Claremont CA, 2000-2005

Visiting Scientist, Beckman Research Institute of the City of Hope, Duarte, CA, 2000-present

Assistant Professor of Biology, Biology Department, North Central College, Naperville IL. 1997- 1998.

Instructor of Molecular and Human Genetics, University of Pittsburgh School of Medicine, Pittsburgh, PA. July 1996.

C. Selected Peer-Reviewed Publications (in chronological order)

(selected from 22 peer-reviewed publications)

1. Silverman, E., G. Edwalds-Gilbert, and R.-J. Lin. 2003. DExD/H-box Proteins and Their Partners: Helping RNA Helicases Unwind. *Gene*. 312:1-16.
2. Edwalds-Gilbert, G., D.-H. Kim, E. Silverman, and R.-J. Lin. 2004. Definition of a spliceosome interaction domain in yeast Prp2 ATPase. *RNA*. 10: 210-220.
3. Boon, K.-L., Auchynnikava, T., Edwalds-Gilbert, G., Barrass, J.D., Droop, A.P., Dez, C., and Beggs, J.D. 2006. Yeast Ntr1/Spp382 mediates Prp43 function in postspliceosomes. *Mol Cell Biol*. 16:6016-23.
4. Purvis-Roberts, K.L., G. Edwalds-Gilbert, A. S. Landsberg, N. Copp, L. Ulsh, D. Drew. 2009 Accelerated Integrated Science Sequence (AISS): An Introductory Biology, Chemistry and Physics Course for College Students. *Journal of Chemical Education*, 86: 1295-1298.

D. Synergistic Activities

Courses Taught

Accelerated Integrated Science Sequence (AISS) –developed from NSF-STEP grant, on which I am co-PI (team-taught with a chemist and physicist); Molecular Biology; Biochemistry (team-taught with a chemist); Introductory Biology

Other

1. Co-PI on NSF-STEP Grant: *Increasing Science Graduates Through Interdisciplinary Teaching and Research* (2005-2010).
2. Research mentor for high school students in the Scripps College Academy, an outreach program for young women from underserved areas designed to help them prepare to apply to and attend four-year colleges.
3. Lab leader for middle-school science outreach day
4. Recipient of a Mellon Foundation grant to develop a new lab on molecular consequences of environmental toxins for a non-majors course on the genetics of human disease and for an advanced course in molecular biology. Adapted the lab for an introductory majors course.
5. Past President of The Claremont Colleges Chapter of Sigma Xi. Served at the national level on regional and constituency group nominating committees and served on the Committee on Nominations (2004-2007)
6. Faculty Fellow (one of three) for the Irvine Diversity Grant at Pitzer College, 2004-2005, whose goals included deepening the discussion of diversity on campus and devising strategies for increased recruitment and retention of students of color in all disciplines.
7. Participant in Mellon 23 workshop on "Broadening Access to STEM fields," June 2009, Carleton College
8. Participant in Mellon 23 workshop on "Learning and Teaching Physical Sciences in the Liberal Arts College and University: Forging a Research Agenda," May 2010, Swarthmore College
9. Mellon 23 workshop planner/leader: "Feminism and Science: Building Bridges for Teaching and Research Innovation." The workshop will take place in late winter 2011 at The Claremont Colleges.
10. Joint Science Department project participant for Alfred P. Sloan Foundation funded project "Development of Predictive Models for Patterns of and Reasons for Retention and Migration in and out of STEM Fields." Lynne Molter, Swarthmore College, PI.
11. Contributor to Nature Education on the topic "Regulation of alternative splicing by signal transduction," in the Cell Biology-Cell Cycle Topic Room. July 2010

Collaborators and Other Affiliations

Collaborators

Ren-Jang Lin, Beckman Research Institute of The City of Hope, Department of Molecular Biology

Jean Beggs, University of Edinburgh

Graduate and Post-Graduate Advisors

Erik Falck-Pedersen, Weill Medical College of Cornell University (Ph.D. supervisor)

Christine Milcarek, University of Pittsburgh School of Medicine (post-doctoral advisor)

Ren-Jang Lin, Beckman Research Institute of The City of Hope, Department of Molecular Biology (post-doctoral advisor)

DEBORAH S. GROSS

PROFESSIONAL PREPARATION

BA, Chemistry (1991) Haverford College, Haverford, Pennsylvania
Ph.D, Chemistry (1996) University of California, Berkeley
Postdoctoral Research Fellow Atmospheric Chemistry (1996 – 1998) University of California, Riverside

APPOINTMENTS

2005 – Present Associate Professor of Chemistry, Carleton College, Northfield, MN (Chair, 2009 –)
Member of the Environmental and Technology Studies (ENTS) Program
1998 – 2005 Assistant Professor of Chemistry, Carleton College, Northfield, MN
Member of the Environmental and Technology Studies (ENTS) program

PUBLICATIONS RELATED TO PROJECT: (*undergraduate students underlined*)

- Baltensperger, U.; Chirico, R.; DeCarlo, P. F.; Dommen, J.; Gaeggeler, K.; Heringa, M.; Li, M.-L.; Prevot, A.; Alfarra, M. R.; Gross, D. S.; Kalberer, M. "Recent developments in the mass spectrometry of atmospheric aerosols" *Eur. J. Mass Spectrom.*, **2010**, *16*, 389 - 395.
- Gross, D.S.; Atlas, R.; Rzeszutowski, J.; Turetsky, E.; Christensen, J.; Benzaid, S.; Olson, J.; Smith, T.; Steinberg, L.; Sulman, J.; Ritz, A.; Anderson, B.; Nelson, C.; Musicant, D. R.; Chen, L.; Snyder, D. C.; Schauer, J. J. "Environmental chemistry through intelligent atmospheric data analysis," *Environ. Model. Softw.* **2010**, *25*, 760-769 doi: 10.1016/j.envsoft.2009.12.001
- Snyder, D. C.; Schauer, J. J.; Gross, D. S.; Turner, J. R. "Estimating the contribution of point sources to atmospheric metals using single-particle mass spectrometry," *Atmospheric Environment*, **2009**, *43*, 4033-4042 doi:10.1016/j.atmosenv.2009.05.011.
- Friedman, B.; Herich, H.; Kammermann, L.; Gross, D. S.; Arneth, A.; Holst, T.; Cziczo, D. J. "Subarctic atmospheric aerosol composition: 1. Ambient aerosol characterization," *J. Geophys. Res.*, **2009**, *114*. D13203 doi:10.1029/2009JD011772.
- Herich, H.; Kammermann, L.; Friedman, B.; Gross, D. S.; Weingartner, E.; Lohmann, U.; Spichtinger, P.; Gysel, M.; Baltensperger, U.; Cziczo, D. J. "Subarctic atmospheric aerosol composition: 2. Hygroscopic growth properties," *J. Geophys. Res.*, **2009**, *114*, D13204, doi:10.1029/2008JD011574.
- Gross, D. S.; Gälli, M. E.; Kalberer, M.; Prevot, A. S. H.; Dommen, J.; Alfarra, M. R.; Duplissy, J.; Gaeggeler, K.; Gascho, A.; Metzger, A.; Baltensperger, U. "Real-Time Measurement of Oligomeric Species in Secondary Organic Aerosol with the Aerosol Time-of-Flight Mass Spectrometer" *Anal. Chem.* **2006**, *78*, 2130 – 2137 doi: 10.1021/ac060138l
- Anderson, B. J.; Gross, D. S.; Musicant, D. R.; Ritz, A. R.; Smith, T. G.; Steinberg, L. E. "Adapting K-Medians to Generate Normalized Cluster Centers." *Proceedings of the Sixth SIAM International Conference on Data Mining*, Joydeep Ghosh, Diane Lambert, David Skillcorn, Jaideep Srivastava, editors, Society for Industrial and Applied Mathematics, Bethesda, MD, **2006**, 165-175.
- Gross, D. S., Barron, A. R., Warren, B. S., Sukovich, E. M., Jarvis, J. C., Suess, D. T., Prather, K. A. "Stability of Single Particle Tracers for Differentiating Between Heavy- and Light-Duty Vehicle Emissions", *Atmospheric Environment*, **2005**, *39*, 2889.
- Okada, S., Kweon, C.-B., Stetter, J. C., Foster, D. E., Shafer, M. M., Christensen, C. G., Schauer, J. J., Schmitt, A. M., Silverberg, A. M., Gross, D. S., "Measurement of Trace Metal Composition in Diesel Engine Particulate and its Potential for Determining Oil Consumption: ICPMS and ATOFMS Measurements", *Society of Automotive Engineers Technical Papers Series* **2003**, Number 2003-01-0076.
- Gard, E. E.; Kleeman, M. J.; Gross, D. S.; Hughes, L. S.; Allen, J. O.; Morrical, B. D.; Ferguson, D. P.; Dienes, T.; Gälli, M. E.; Johnson, R. J.; Cass, G. R.; Prather, K. A. "Direct Observation of Gas-Particle Interchange in the Atmosphere" *Science*, **1998**, *279*, 1184-1187.

SYNERGISTIC ACTIVITIES

- Member of the steering committee for the “Transitions Group” for Broadening Access to the sciences at Carleton College, tasked with agenda setting and planning for the campus efforts.
- Organize and coordinate the Focusing on Cultivating Scientists (FOCUS) cohort, a program to support a cohort of science-interested students from underrepresented backgrounds and/or under-resourced high school backgrounds in the sciences; Mentoring first and second cohorts of FOCUS students.
- Carleton College faculty representative to workshops on diversity in the sciences, including Harvard Diversity in the Sciences workshop, Oct. 2006; Biology Scholars Program Workshop on the Science of Diversifying Science, June 2007 and site visit, Aug. 2007; Sloan Foundation Program on Student Migration Patterns.
- Carleton College site coordinator for North Star STEM Alliance (NSF LSAMP program through University of Minnesota)
- Co-PI (incoming PI), Carleton College NSF S-STEM grant “Cohort Development: Growing a Community of URM Scientists at Carleton,” 2009 – 2013.
- Co-PI, Mellon 23 Workshop: Learning and Teaching Physical Sciences in the Liberal Arts College and University, 2009-1010
- Visiting Scientist: a) October 2005 – January 2006, Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Villigen, Switzerland; worked on laboratory (smog chamber) studies as well as field measurement to differentiate vehicle and wood combustion emissions; b) February – August, 2006, Particle Technology Laboratory, Department of Mechanical Engineering, University of Minnesota; worked on a variety of projects related to particulate emissions from biofuel combustion.

COLLABORATORS AND STUDENTS

- **Significant Collaborators:** Professor Peter H. McMurry, Department of Mechanical Engineering, University of Minnesota; Professor James J. Schauer, Environmental Chemistry and Technology Program, University of Wisconsin – Madison; Professor David R. Musicant, Department of Mathematics and Computer Science, Carleton College; Dr. Urs Baltensperger, Director, Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Villigen, Switzerland; Dr. Daniel Cziczo, Research Scientist, Pacific Northwest National Laboratory; Dr. Laura Iraci, Research Scientist, NASA Ames Research Center, Moffett Field, CA; Professor Benjamin de Foy, Department of Earth and Atmospheric Sciences, St. Louis University, MO.
- **Graduate and Post Doctoral Advisors:** Graduate: Evan R. Williams, Department of Chemistry, University of California, Berkeley; Postdoctoral: Kimberly A. Prather, Department of Chemistry, University of California, San Diego (then at U.C. Riverside).
- **Undergraduate Research Students Mentored:** Since 1999, 21 undergraduate students have worked in my group for 27 student-summers. Of these students, 4 have obtained Ph.D. degrees in Chemistry from UC Berkeley (2), UC San Diego (1), and UW-Madison (1), one has obtained a Ph.D. in Geosciences at UW, Seattle, and one has obtained a Ph.D. in Ecology and Evolutionary Biology from Princeton. Three are in the process of obtaining their Ph.D.s in Chemistry (at UCLA, Northwestern, and UW, Seattle) and one is in the process of obtaining a Ph.D. in Atmospheric Science (UW, Seattle). One student has a masters in Atmospheric Science from UW, Seattle. One student has obtained a D.D.S., three have obtained or are in the process of obtaining an M.D., 4 are employed in scientific areas, and two are current undergraduate students at Carleton College.

Ellen Roscoe Iverson

Science Education Resource Center, Carleton College, Northfield, MN 55057
Phone 507-222-5749 eiverson@carleton.edu

Professional Preparation

University of Minnesota, Scientific and Technical Communications, B.S. 1989
University of Minnesota, College of Architecture, Environmental Design, B.S. 1989
University of Minnesota, Scientific and Technical Communications, M.S. 1993
University of Minnesota, Post-graduate Evaluation Certificate, anticipated completion 2011

Appointments

Evaluation Director, Science Education Resource Center, Carleton College (November 2008-present)
Web Development and Evaluation, Science Education Resource Center, Carleton College (March 2003-November 2008)
Technology Manager, Marathon Multimedia, a Learner's Digest International business (April 2000-March 2003)
Operations Manager, Marathon Multimedia, a Learner's Digest International business (June 1996-April 2000)
Technical Assistant to 3rd line Manager/Staff Programmer, IBM (August 1989-June 1996)

Publications

Most Related

Manduca, Cathryn A., David W. Mogk, Barbara Tewksbury, R. Heather Macdonald, Sean P. Fox, Ellen R. Iverson, Karin Kirk, John McDaris, Carol Ormand, and Monica Bruckner (2010). SPORE: Science Prize for Online Resources in Education: On the Cutting Edge: Teaching Help For Geoscience Faculty: Science, v. 327, no. 5969, pp. 1095-1096.

McMartin, F., E. Iverson, A. Wolf, J. Morrill, G. Morgan, C. Manduca (2008). The Use of Online Digital Resources and Educational Digital Libraries in Higher Education. The International Journal on Digital Libraries Special Issue on Digital Libraries and Education. Co-Editor: Lillian Cassel, Sarah Giersch, Mimi Recker. Springer Publications. 8(2).
[<http://dx.doi.org/10.1007/s00799-008-0036-y>]

Manduca, C.A., S. Fox, and E.R. Iverson (2006). Digital Library as Network and Community Center. D-Lib, 12(12). [<http://www.dlib.org/dlib/december06/manduca/12manduca.html>]

Manduca, C.A., E. Iverson, S. Fox, F. McMartin (2005). Influencing User Behavior through Digital Library Design: An Example from the Geosciences. D-Lib, 11(5).
[<http://www.dlib.org/dlib/may05/fox/05fox.html>]

Manduca, C.A., Iverson, E.R., Fox, S.P., McMartin, F. (2005). Influencing User Behavior through Digital Library Design: An Example from the Geosciences, D-Lib, vol 11(5). (*Recipient of the Geoscience Information Society's Best Paper Award for 2006*)

Other Significant

Wolf, A., F. McMartin, E. Iverson, C. Manduca, J. Morrill, and G. Morgan. (2007). Use of online digital learning materials and digital libraries: comparison by discipline. Proceedings of the 2007 conference on Digital libraries, ACM Press, New York. p 500.

McMartin, F., A. Wolf, E. Iverson, C. Manduca, J. Morrill, and G. Morgan. (2007). What do faculty need and want from digital libraries? Proceedings of the 2007 conference on Digital libraries,

ACM Press, New York. p 493.

McMartin, F., E. Iverson, C. Manduca, A. Wolf, G. Morgan (2006). Factors Motivating Use of Digital Libraries. Proceedings of the 6th ACM/IEEE-CS joint conference on Digital libraries, ACM Press.

Synergistic Activities

*Evaluator: Co-Evaluator "On the Cutting Edge" NSF (Grant DUE-0127310).

Evaluator Teaching with Data (QSSDL) NSDL Pathway NSF (Grant 0840642).

Co-Evaluator "MARGINS Data in the Classroom" NSF (Grant DUE- 0633081).

Co-Evaluator "Tracing the Effects of Faculty Development into Student Learning Outcomes" Funded by Spencer Foundation.

Co-Evaluator "Carleton Interdisciplinary Science & Math Initiative" Funded by Howard Hughes Medical Institute.

* Member of STEM Exchange Evaluation working group;

Member of American Evaluation Association and the Qualitative Methods TIG;

Member of the American Geophysical Union.

*Presenter of scholarly work:

Willett, G., E.R. Iverson (2010). Researching, Supporting, and Funding Faculty Development Initiatives: A Synergistic Approach. Presented at 2010 Conference of The Association of American Colleges and Universities (AAC&U) on Faculty Roles in High-Impact Practices. Philadelphia, PA.

Manduca, C., S. Fox, E. Iverson (2009). Pedagogies in Action: A Community Service Weaving Teaching Methods to Examples for Learning. Presented at 2009 NSDL Annual meeting, Washington, D.C.

Iverson, E., C.A. Manduca, J.R. McDaris, and S. Lee (2009). Refining MARGINS Mini-Lessons Using Classroom Observations. *Eos Trans. AGU*, 90(52), Fall Meet. Suppl., Abstract ED13D-0616

Iverson, E., N. Grawe, C. Manduca, S. Fox, (2008). Quantitative Reasoning—Across Curriculum, Across Campus, and Beyond. Presented at the 2008 POD Annual Conference.

Iverson, E., McMartin, F. (2008) Googled: What Evaluation Reveals About How We Use the Web. Presented at American Evaluation Association 2008 Annual Conference.

Iverson, E.R., C.A. Manduca, J.A. McLaughlin, R.H. Macdonald, (2005), Enhancing your Teaching and Developing New Leadership: Impact of the On the Cutting Edge Professional Development Program, *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract ED42A-02.

Collaborators and Co-Editors

Collaborators: G. Abers (Boston University), G. Alter (University of Michigan), P. Bierman (University of Vermont), W. Condon (Washington State University), J.P. DeWitt (University of Michigan), A. Egger (Visionlearning), W. Frey (University of Michigan), J. Garfield (CAUSE), N. Grawe (Carleton College), L. Hoelter (University of Michigan), M. Huber (Carnegie Foundation), T. Ledley (TERC), S. Lee (Lesley University), R.H. Macdonald (College of William & Mary), B. Mason (comPADRE), C. McAuliffe (TERC), D. McConnell (North Carolina State University), J.A. McLaughlin (Managing for Results), F. McMartin (Broad Based Knowledge), G. Morgan (University of Illinois), D. Mogk (Montana State University), J. Morrill (Morrill Solutions Research), D. Reed (San Jose State University), R. Richardson (University of Arizona), C. Rutz (Carleton College), J. Ryan (University of South Florida), M. Savina (Carleton College), H. Staudigel (ERESE), B. Tewksbury (Hamilton College), L. Vacher (University of South Florida), G. Willett (Carleton College).

Graduate Advisors: N/A

Thesis Advisor and Postgraduate-Scholar Sponsor: N/A

John G. Kaup

Coordinator of Science Education
Office of Integrative Research in the Sciences
Furman University
Greenville, SC 29613

Tel. (864) 294-3773
E-mail: john.kaup@furman.edu

a) Professional Preparation

- Xavier University, B.S. Chemistry, 1990
- University of Utah, Ph.D. Physical Chemistry, 1997
Thesis Advisor: Professor William H. Breckenridge
- Furman University, Postdoctoral Fellow / Visiting Assistant Professor, 1997-2000
Supervisor: Professor Lon B. Knight

b) Appointments

- Coordinator of Science Education, Furman University 2010-present
- Senior Lecturer, Clemson University, 2007-2010
- Lecturer, Clemson University, 2000-2007
- Visiting Assistant Professor, Furman University 1997-2000

c) Publications

- (1) A.W.K. Leung, J.G. Kaup, D Bellbert, J.G. McCaffrey and WH Breckenridge, "Spectroscopic Characterization of the Weakly Bound $\text{Ca}(4s4d\sigma^3D_3)\bullet\text{Ar}[^3\Sigma^+]$ State : Evidence for a Substantial Maximum in the Potential Curve at Long Range." *J. Chem Phys.* **111**, 2484 (1999).
- (2) A.W.K. Leung, J.G. Kaup, D Bellbert, J.G. McCaffrey and W.H. Breckenridge, "Spectroscopic Characterization of Excited $\text{Ca}(4s4d\delta^3D_3)\bullet\text{RG}[^3\Delta_{1,2}]$ States (RG= Ar, Kr, Xe): No "Heavy-Atom" Mixing of $\text{RG}(nd\delta)$ Character into the Wave functions. *J. Chem. Phys.* **111**, 981 (1999).
- (3) L.B. Knight, Jr., J.G. Kaup, B. Petzoldt, R. Ayaad, T.K. Ghanty and E.R. Davidson, "Electron spin resonance studies of $^{45}\text{Sc}^{17}\text{O}$, $^{89}\text{Y}^{17}\text{O}$ and $^{139}\text{La}^{17}\text{O}$ in rare gas matrices: Comparisons with *ab initio* electronic structure and nuclear hyperfine calculations," *J Chem Phys.* **110**, 5658 (1999).
- (4) J.G. Kaup and W.H. Breckenridge, "Spectroscopic Characterization of the Metastable $3p\pi^3\Pi_0^+, \sigma$ -Valence States and the $4s^3\Sigma^+$ Rydberg States of the MgKr and MgXe van der Walls Molecules," *J. Chem. Phys.* **107**, 10492 (1997).
- (5) E.O. Kochenour, D.S. Jolley, J.G. Kaup, D.L. Patrick, K.D. Roach and L.A. Wenzler "Supplemental Instruction: An Effective Component of Student Affairs Programming." *Journal of College Student Development* **38**, 577 (1997).
- (6) L.B. Knight, Jr., T.J. Kirk, J. Herlong, J.G. Kaup and E.R. Davidson, "Electron spin resonance matrix isolation studies of $^{27}\text{Al}^{16,17}\text{O}$, $^{69,71}\text{Ga}^{16,17}\text{O}$ and $^{115}\text{In}^{16,17}\text{O}$: observed hyperfine interactions compared with *ab initio* theoretical results," *J. Chem. Phys.* **107**, 7011 (1997).
- (7) J.G. Kaup and W.H. Breckenridge, "Spectroscopic Characterization of the Excited Valence $\text{MgXe}(3d\delta^3\Delta_1)$, $\text{MgXe}(3d\pi^3\Pi_0)$ and $\text{MgXe}(3d\sigma^3\Sigma^+)$ van der Walls States," *J. Chem. Phys.* **107**, 6014 (1997).
- (8) J.G. Kaup and W.H. Breckenridge, "Bond Energies of CaAr^+ , CaKr^+ and CaXe^+ from Resonant Two-color Photoionization Thresholds," *J. Chem. Phys.* **107**, 4451 (1997).

- (9) J.G. Kaup and W.H. Breckenridge, "Spectroscopic Characterization of the Singly- excited $\text{CaAr}(4d\pi^3\text{I}_0)$, $\text{CaAr}(4d\delta^3\Delta_1)$ States and the Doubly Excited $\text{CaAr}(4p\pi^4\pi^3\Sigma^-)$ State," *J. Chem. Phys.* **107**, 5676 (1997).
- (10) J.G. Kaup and W.H. Breckenridge, "Singlet-to-Triplet Energy Transfer within $\text{M}(\text{RG})_N$ van der Waals Clusters ($\text{M}=\text{Mg, Zn}$; $\text{RG}=\text{Ar, Kr, Xe}$)," *J. Phys. Chem.* **99**, 13701 (1995).

d) Synergistic Activities

- Science Education/Outreach coordinator for Furman's \$1.2 M Howard Hughes Medical Institute Undergraduate Science Education award. Manages mentoring program connecting nearly 50 Furman students with URM middle school student from inner city science and technology academy. Coordinates research experience for area HS teachers and graduate course which connects research experience to deliverables in the classroom. Coordinates research experience/exposure for HS students from the Governor's School for Science and Math as well as local URM students selected from Furman sponsored Bridges to a Brighter Future college readiness program.
- Developed and delivered curricular materials in the areas of scientific ethics and communicating science. Developed novel pedagogy in the Physical Chemistry Laboratory course through combining directed inquiry with social computing. Presented results at national research (ACS) and education (BCCE) conferences. Facilitated introduction of dual degree major in chemistry and education (Chemistry HS teaching) to enable strong content development while meeting statewide teaching certification requirements.
- American Chemical Society (ACS) Leadership roles at both the national and local level. Coordinated undergraduate programming at national (Salt Lake 2010) and regional (SERMACS 2007) ACS meetings. Faculty mentor for undergraduate chemistry chapter; developed Clemson chapter into nationally recognized group through expansion of their outreach and research focused activities; aided chapter in securing funding for outreach and travel expenses. Local section alternate councilor (2008-2010); currently focusing on community outreach and strengthening collaborations with HS chemistry teachers.
- Facilitated outreach opportunities through both ACS related activities [National Chemistry Week (NCW) and Chemists Celebrate Earth Day (CCED)] as well as through unique service learning (SL) course required of chemistry majors at Clemson University. Developed, implemented and assessed over 12 separate SL projects over three year time span (2007-2009).
- Service Learning (SL) leadership development. Served as Service Alliance Teaching Fellow (2008-2010); delivered faculty workshops focused on SL in the sciences and provided support to faculty developing science focused outreach components in their courses. Led Creative Inquiry (CI) team (2007-2009) which was focused on "Enhancing Science Education through Service Learning"; mentored 12 chemistry undergraduates that facilitated SL projects during five semesters of funding.

e) Collaborators and Other Affiliations

Thesis Advisor: Professor William H. Breckenridge, Department of Chemistry, University of Utah.
Postdoc Advisor: Professor Lon B. Knight, Department of Chemistry, Furman University.

Biographical Sketch

Cathryn Allen Manduca

Science Education Resource Center, Carleton College, Northfield, MN 55057 cmanduca@carleton.edu

Professional Preparation

Williams College	Geology	B.A., 1980
California Institute of Technology	Geology	M.S., 1982
California Institute of Technology	Geology	Ph.D., 1988

Appointments

2007-	Executive Director, National Association of Geoscience Teachers
2002 -	Director, Science Education Resource Center
1999-2001	DLESE Outreach Coordinator
1994-2000	Coordinator, Keck Geology Consortium
1995-1997	Asst. Prof. of Science at Rochester Community College
1994	Asst. Prof. of Physics at St. Olaf College
1992-2001	Research Associate in Geology at Carleton College
1989-1992	Asst. Prof. of Geology at Carleton College

Publications

Publications related to this project

- Manduca, C.A., Mogk, D., Tewksbury, B., Macdonald, R.H., Fox, S.P., Iverson, E.R., Kirk, K., McDaris, J., Ormand, C., Bruckner, M. (2010). SPOR: Science Prize for Online Resources in Education: On the Cutting Edge: Teaching Help For Geoscience Faculty: Science, v. 327, no. 5969, pp. 1095-1096.
- Manduca, C.A. (2008). Working with the Discipline - Developing a Supportive Environment for Education. In Evidence on Promising Practices in Undergraduate Science, Technology, Engineering, and Mathematics (STEM) Education, S. Singer et al. (Eds.). NAS. Washington, D.C.
- Bralower, T., Manduca, C.A., and Feiss, P.G. (2008). Preparing a New Generation of Citizens and Scientists to face Earth's Future, Liberal Education, v 94, n 2.
- Macdonald, R.H., Manduca, C.A., Mogk, D., Tewksbury, B. (2005). Teaching Methods in Undergraduate Geoscience Courses: Results of the 2004 On the Cutting Edge Survey of U.S. Faculty, Jour. of Geos. Ed. v. 53 n. 3, 237-252.
- Manduca, C., H. Macdonald, and G. Feiss (2008), Education: Preparing Students for Geosciences of the Future, Geotimes 53 (4), 59.

Other publications

- Jee, Benjamin D., David Uttal, Dedre Gentner, Cathryn Manduca, Thomas Shipley, Brad Sageman, Carol J. Ormand, & Basil Tikoff (2010). Analogical thinking in geoscience education: Jour. of Geos.Ed., v. 58, n. 1, pp. 2-13.
- Kastens, K., C.A. Manduca, C. Cervato, R. Frodeman, C. Goodwin, L.S. Lieben, D.W. Mogk, T.C. Spangler, N.A. Stillings, and S. Titus (2009). How Geoscientists Think and Learn, Eos Trans. AGU, 90(31), 265.
- Manduca, C.A., E. Baer, G. Hancock, R.H. Macdonald, S. Patterson, M. Savina and J. Wenner (2008), Making Undergraduate Geoscience Quantitative. EOS, 89(16), 149-150.
- Manduca, C.A., S. Fox, and E.R. Iverson (2006). Digital Library as Network and Community Center. D-Lib, 12(12) [<http://www.dlib.org/dlib/december06/manduca/12manduca.html>].
- Manduca, C. A., and I. Cifuentes (2007), Developing Earth and Space Scientists for the Future, Eos Trans. AGU, 88(38), 373.

Synergistic Activities

- 1) *Professional development and on-line resource development projects*: Invited NAS presentation: Working within the Discipline (2008); Pedagogies in Action website development, PI (2005-2010); PKAL Pedagogies of Engagement project, Leadership Team (2008-2010); Starting Point for Economics Faculty, co-PI (2008-); Quantitative Social Science Digital Library, co-PI (2008-) National Numeracy Network, Website Consultant, (2008-); Visionlearning, Advisory Board (2007-); SENCER Digital Library, Consultant (2008-); Quantitative Inquiry, Reasoning, and Knowledge in Student Writing, co-PI

(2007-); Reconsidering the Textbook, Workshop Convener (2006); Big Science at Small Schools, A Genomics Collaboration, Leadership Team (2006-2010); ACM-FACE program website development, Consultant (2009-); MERLOT ELIXR video development project, Contributing Partner (2007-2009). Preparing Teachers to Teach Earth Science, workshops and website development (2003-); MARGINS mini-lesson development project, PI (2007-2009) Spheres of Influence-Shaping the Future of Earth System Science Education, Convener (1996).

2) *Research on faculty and student learning*: Tracing the Effects of Faculty Development into Student Learning Outcomes at Carleton, co-PI, (2008-); Synthesis of Research on Learning in the Geosciences, PI (2008-); Spatial Intelligence Learning Center –Undergraduate Geoscience Education Team (2006-); Scaffolding Conceptually Driven Genomics Education, co-PI, (2008-); Bringing Research on Learning to the Geosciences, workshop and website, PI (2002-2004).

3) *Management experience*: Manduca has been managing large NSF grants since 1991 when she became the director of the Keck Geology Consortium, a distributed REU program that involved 12 institutions running 6-8 research project, 3 professional development programs, and a research symposium each year. As director of SERC, a soft money funded center with 11 employees that was established in 2001, Manduca has continued to manage distributed projects involving faculty from multiple institutions and including major aspects of the On the Cutting Edge program and the Building Strong Geoscience Departments. Manduca also serves as Executive Director of NAGT.

4) *Professional society activities*: AAAS: Education Section Nominating Committee (2007-) Fellow, 2009; National Association of Geoscience Teachers: Executive Director (2007-), Distinguished Lecturer (2000-2001), National Officer (2001-2005), President (2003), Web master (2004-2006). American Geophysical Union: Excellence in Geophysical Education Prize (2004), Committee on Education and Human Resources (1998-2002, Chair 2004-2008). American Institute of Physics: Advisory Committee on Physics Education (2006-), Chair (2008-). Project Kaleidoscope: Networking Advisory Board (2002-2004). Sigma Xi: Education Committee (2004-2007), Executive Committee (2000-2001, 1997-1998), Long Range Planning Committee (1996-1999). Geological Society of America: Fellow, 2010.

Collaborators & Other Affiliations

Geoff Abers (Boston U.), Eric Baer (Highline Comm. C.), Scott Bair (Ohio St.), Lois Banta (Williams), Paul Bierman (U. Vermont), David Blockstein (NCSE), Tim Bralower (Penn St.), Susan Buhr (CIRES), Tom Carey (Cal St. Sys.), Anthony Carpi (John Jay C.), Cinzia Cervato (Iowa St.), Jeff Clark (Lawrence), LuAnn Dahlman (NOAA), Anne Egger (Stanford U.), Geoff Feiss (William & Mary), Trish Ferrett (Carleton), Bob Frodeman (N. Texas), Joan Garfield (U. MN), Ed Geary (UCAR), Dedre Gentner (Northwestern), Charles Goodwin (UCLA), David Gosselin (U. NE-Lincoln), Steve Graham (Stanford U.), Nathan Grawe (Carleton), Michelle Hall (Science Educ. Solutions), Greg Hancock (William & Mary), Cynthia Howell (NREL), Ben Jee (Northwestern), Kim Kastens (Columbia), Tamara Ledley (TERC), Lynn Liben (Penn St.), Scott Linneman (Western Washington), Heather Macdonald (William & Mary), Bruce Mason (U. Oklahoma), Christine Massey (U. Vermont), Carla McAuliffe (TERC), Mark McCaffery (CIRES), David McConnell (NCSU), Flora McMartin (Berkeley), Dave Mogk (Montana St.), Brandon Muramatsu (MIT), Bev Nagel (Carleton), Jeanne Narum (PKAL), Nora Newcombe (Temple U), Frank Niepold (NOAA), Dennis Pearl (Ohio St.), Heather Petcovic (Western Michigan); Don Reed (California St.-San Jose), Randall Richardson (U. Arizona), Carol Rutz (Carleton), Jeff Ryan (U. South Florida), Mary Savina (Carleton), Jodi Schwarz (Vassar), Tim Shipley (Temple U.), Susan Singer (Carleton), David Steer (U. Akron), Neil Stillings (Hampshire), Jim Swartz (Grinnell), Rebecca Teed (Wright St.), Barb Tewksbury (Hamilton), Basil Tikoff (U. WI), David Uttal (Northwestern), Len Vacher (U. South Florida), Jenn Wenner (U. WI-OshKosh), Alan Wolf (U. WI), Roger Woodard (NCSU).

Graduate Advisors: Leon T. Silver and Hugh P. Taylor, California Institute of Technology.

Thesis Advisor and Postgraduate-Scholar Sponsor: Rebecca Teed, Suzanne Savanic, Heather Rissler, Gudrun Willet.

John McCleary

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Vassar College
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Education

- Ph.D. in Mathematics Temple University, 1979; doctoral advisor, James Stasheff.
- M.A. in Mathematics Temple University, 1976
- B.A. in Mathematics LaSalle College, 1974

Employment

Vassar College

- Appointed to the Elizabeth Stillman Williams Chair of Mathematics, 2009–
- Chair of the department, 2009–, 2003–04, 2000–02, spring 1997–98, 1986–89.
- Professor, 1993–, Associate professor, 1987–93, Assistant professor, 1979–87.

Bates College

- Assistant professor, 1978–79.

Visiting Positions

- Research-in-Pairs, Mathematisches Forschungsinstitut Oberwolfach, Germany, 10/2009.
- Mathematical Sciences Research Institute, Berkeley, CA, 9/06–10/06, *Applications of Algebraic Topology*.
- Visiting Fellow, Clare Hall College, University of Cambridge, 2002–03. Life Member, 2003–.
- Professeur invité, Université Louis Pasteur, Strasbourg, France, 1996–97.
- Mathematical Sciences Research Institute, Berkeley, CA, 1989–90, special year in algebraic topology.
- Visiting researcher, University of Sydney, Sydney, Australia, 6/87–9/87.
- Gästforscher, SFB 170 (Geometrie und Analysis), Math. Institut, Göttingen, Germany, 1984–85.
- Summer member, Institute for Advanced Study, Princeton, 1982, 1983.

Scholarly Interests

Algebraic Topology, Homological Algebra, Differential Geometry, and the History of Mathematics. Author or editor of seven books including *A First Course in Topology: Continuity and Dimension*, *User's Guide to Spectral Sequences*, and *Geometry from a Differentiable Viewpoint*; more than 25 papers in journals or chapters in books; numerous invited reviews.

Other Professional Activities

- Instructor at *MathPath*, July, 2008. A summer camp for students (ages 11–14) interested in mathematics.
- Directed a lecture/discussion, *Conducting an orchestra/conducting a seminar*, on the teaching of Freshman seminars at Furman College, October, 2007.
- Participated in the workshop, *Art of Teaching Mathematics*, at Harvey Mudd College, June, 2007 (Mellon supported conference).
- Participated in the Teagle Foundation workshop: *Faculty-driven Value-added Assessment a working conference*, Alexandria, Virginia, February 9–11, 2006.
- Instructor for an LMS/EPSRC Short Instructional Course on Algebraic Topology, given to UK graduate students, University of Wales, Swansea, 10–16, July, 2005.
- Served on panel for the AMS (American Mathematical Society) and MAA (Mathematical Association of America) entitled *Dialog 2004* on funding opportunities for the NSF, Division of Mathematical Sciences, Washington, DC, April 30–May 1, 2004.
- Led summer REU programs at Vassar (URSI): two students on combinatorial algebraic topology, 2009; one student on Jordan curves, 2004; three students on odd perfect numbers, 2000; four students on non-Euclidean Geometry, 1987.
- Participated in the Curriculum Policy Workshop on the Preparation of Math Majors in the First Two Years, MSRI, Berkeley, CA, February, 2001.

- Member of the Joint AMS-MAA Committee on Archives, 1997-99.
- Organizer of Conference, *Higher Homotopy Structures in Topology and Mathematical Physics*, 6/96, Vassar College.
- Organizer (with David Rowe) of Conference on *the History of Modern Mathematics*, 6/88, Vassar College.
- Outside examiner on Ph.D. thesis defense in topology, Universidad de La Rioja (Spain), November, 2007; Queen's University (Canada), August 1990. Outside examiner on Ph.D. thesis defense in the history of mathematics, CUNY, April, 1992.
- Outside examiner of students for the Honors Program, Swarthmore College, 1988 (Topology and Algebra), 1989 (Topology and Analysis), 2007, 2008 (Topology). Head Examiner, 2008.
- Outside evaluator in Mathematics Department Review; Williams College, November, 2008; Union College, April, 2000; Rider College, May, 1988; Goucher College, April, 1987.

LYNNE ANN MOLTER

Department of Engineering
Swarthmore College, Swarthmore, PA 19081

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a. Professional Preparation

B.S., Engineering, and B.A., Mathematics, 1979, Swarthmore College, Swarthmore, PA.
S.M., Electrical Engineering and Computer Science, 1983, Massachusetts Institute of Technology, Cambridge, MA, "Integrated Optical Picosecond Signal Processing Devices."
Sc.D., Electrical Engineering and Computer Science, 1987, Massachusetts Institute of Technology, Cambridge, MA, "Integrated Optical Multiple Waveguide Coupler Switches and Lenses."

b. Appointments

1987-present: Chair, Professor, Associate Professor and Assistant Professor, Department of Engineering at Swarthmore College.

Research interests (assisted by students) include Photonics, Photonic Crystal Devices, Optoelectronics, Solid State Physics, Guided Wave Phenomena, Integrated Optics, Quantum Electronics, Electromagnetics; Student Learning in Science, Technology, Engineering, and Mathematics (STEM) Fields, Retention of Students in STEM fields.

Teach courses including communication systems, electromagnetic field theory, electric circuits, linear systems, physical electronics, and electronics.

c. Publications (* indicates student co-author)

- E. A. Cheever, L. A. Molter, and B. A. Maxwell, "A Remote Wireless Sensing and Control Laboratory," presented at American Society of Engineering Education Annual Conference, Nashville, TN, June 2003.
- J. G. Makin* and L. A. Molter, "Generalized Switching, Splitting, and Multiplexing Operations Using Circular Arrays of Coupled Waveguides," presented at Optical Fiber Communication (OFC) Conference and Exposition, Session MF, Atlanta, GA, March 24, 2003.
- J. Hudgings,* L. A. Molter, and M. Dutta, "Design and Modeling of Passive Optical Switches and Power Dividers Using Non-Planar Coupled Fiber Arrays," IEEE J. Quantum Electronics, QE-36(12), 1438-1444, December 2000.
- E. R. Thoen,* L. A. Molter, and J. P. Donnelly, "Exact Modal Analysis and Optimization of $N \times N \times 1$ Cascaded Waveguide Structures with Multimode Guiding Sections," IEEE J. Quantum Electronics, QE-33(8), 1299-1307, August 1997.
- C. G. R. Geddes* and L. A. Molter, "Nonlinear Optical Slab Waveguide Devices in AlGaAs/GaAs," presented at the Conference on Lasers and Electrooptics, Paper CTu123, Baltimore, MD, May 22-26, 1995.
- E. R. Thoen,* L. A. Molter, and J. P. Donnelly, "Analysis of Multiple Input $N \times M$ Waveguide Couplers with Multimode Guiding Sections," presented at the Conference on Lasers and Electrooptics, Paper CTh1 21, Baltimore, MD, May 22-26, 1995.
- E. R. Theon,* L. A. Molter, and J. P. Donnelly, "Analysis of $N \times M$ Waveguide Splitters and Couplers with Multimode Guiding Section," presented at the International Symposium on Guided-Wave Optoelectronics: Device Characterization, Analysis, and Design, Polytechnic University, New York, NY, October 1994.
- D. J. Jones* and L. A. Molter, "A Generalized Method for Coupled Mode Analysis of Fiber Optic Arrays," IEEE J. Quant. Electronics, QE-30(1), 119-125, January 1994.

d. Synergistic Activities

Development of Predictive Models for Patterns of and Reasons for Retention and Migration in and out of STEM Fields

PI: Lynne A. Molter. Supported by the Alfred P. Sloan Foundation (2010-2012); collaboration of 44 universities and colleges.

Why Students Leave STEM Fields: Development of a Common Survey Tool.

PIs: Robert Koff and Larry Handlin, Washington University in St. Louis, and Lynne A. Molter and K. Ann Renninger, Swarthmore College. Supported by the Sloan Foundation, and partially supported by the Johnson Foundation (2007-2009).

Retaining Students in Natural Science and Engineering Majors: Understanding the Problem in the Small College.

Co-PIs: Lynne A. Molter and K. Ann Renninger. Supported by the Alfred P. Sloan Foundation (2007-2008) to characterize retention problems in STEM fields in the small liberal arts college.

The Role of Scientific Literacy in the Liberal Arts Curriculum.

PI: Lynne A. Molter. Supported by William and Flora Hewlett Foundation (2000-2004) to assess and improve the scientific background of all Swarthmore students.

Facilitator

- National Research Council (NRC) Board on Engineering Education, Planning Meeting on Implementation of Engineering Criteria 2000, Seattle, WA, June 1998.
- Integrating Math and Science Teaching (IMAST), faculty facilitator (1995-1998) for 25 local teachers to enable substantive changes in their curricula.

Workshop Participant

- ABET (Accreditation Board for Engineering and Technology)/ASEE National Conference on Outcomes Assessment for Engineering Education, Washington DC, September 1997.
- NRC (National Research Council)/NSF Undergraduate Convocation: From Analysis to Action: Undergraduate Education in Science, Mathematics, Engineering, and Technology, Washington, DC, April 1995.
- NSF Presidential Young Investigator Colloquium on America's Academic Future, Report Title NSF91150.

e. Collaborators & Other Affiliations

i. Collaborators:

Cheever, Erik: Swarthmore College
Geddes, Cameron: Lawrence Berkeley Laboratory
Herczfeld, Peter: Drexel University
Hudgings, Janice: Mount Holyoke College
Jemison, William: Lafayette College
Jones, David: University of British Columbia
Koff, Robert: University of Washington in St. Louis
Makin, Joseph: University of California, Berkeley
Maxwell, Bruce: Swarthmore College
Renninger, K. Ann: Swarthmore College
Thoen, Erik: Massachusetts Institute of Technology

ii. Graduate Advisor: Haus, Hermann A., Massachusetts Institute of Technology

iii. Thesis Examiner: Flood, Kevin, University of Pennsylvania

K. ANN RENNINGER, Ph. D.

a. Professional Preparation

- Educational Testing Service, Developmental Psychology, Post-doctoral Fellow, 1985-6
- Bryn Mawr College, Education and Child Development, Ph.D., 1983
- Bryn Mawr College, Education and Child Development, M.A., 1979
- University of Pennsylvania, B.A., 1973

b. Appointments

- 1980- present, Swarthmore College, Swarthmore, PA, Department of Educational Studies, Professor and Chair
- 1974-77, George School, Newtown, PA, teacher

c. Publications

i. Five publications related to the proposed project

- Hidi, S. & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist*, 41 (2), 111-127.
- Renninger, K.A. (2000). Individual interest and its implications for understanding intrinsic motivation. In C. Sansone & J.M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance*. (pp.373-404). New York: Academic Press.
- Renninger, K. A., & Hidi, S. (2002). Student interest and achievement: Developmental issues raised by a case study. In A. Wigfield & J. S. Eccles (Eds.), *Development of Achievement Motivation* (pp. 173-195). New York: Academic Press.
- Renninger, K. A. (2010). Working with and cultivating interest, self-efficacy, and self-regulation. In D. Preiss & R. Sternberg (Eds.), *Innovations in educational psychology: Perspectives on learning, teaching and human development* (pp. 158-195). New York: Springer.
- Renninger, K. A., Bachrach, J. E., & Posey, S. K. E. (2008). Learner interest and achievement motivation. In M. Maehr, S. Karabenink, & T. Urdan (Eds.), *Social psychological perspective on motivation and achievement. Volume 15: Advances in Motivation and Achievement* (pp. 461-492). London: Emerald.

ii. Five significant publications

- Renninger, K.A. (1998). Developmental psychology and instruction: Issues from and for practice. In I.E. Sigel & K.A. Renninger (Vol. Eds.) *Child psychology in practice, Volume 4*. In W. Damon (Gen. Ed.), *Handbook of child psychology* (pp. 211-274), 5th edition. New York, NY: John Wiley and Sons.
- Renninger, K. A. (2009). Learner interest and identity: An inductive model for instruction. *Educational Psychologist*, 44(2), 105-118.
- Renninger, K. A. (2007). *Interest and motivation in informal science learning*. White Paper prepared for the Committee on Learning Science in Informal Environments of the National Academy of Education.
- Renninger, K. A., Sansone, C., & Smith, J. L., (2004). Love of learning. In C. Peterson & M. E. P. Seligman (Eds.) *Character strengths and virtues: A classification and handbook*. New

York: Oxford University Press.

Renninger, K. A. & Wozniak, R. H. (1985). Effect of interest on attention shift, recognition, and recall in young children. *Developmental Psychology* 21, 624-632.

d. Synergistic Activities

- Advisory Board, NSF Project: CODEE (Consortium for Ordinary Differential Equation Experiments; Harvey Mudd College), 2009- present
- Advisory Board, NSF Project: Utility Value Project (University of Wisconsin), 2008- present.
- Co-PI, Mellon 23 Workshop: Learning and Teaching Physical Sciences in the Liberal Arts College and University, 2009-1010.
- Co-PI, Sloan Foundation project: Retaining students in Natural Science and Engineering Majors: Understanding the problem in the small college, 2007-2010.
- Co-PI, Sloan Foundation project: Why students leave STEM fields: Development of a common survey tool, 2007-2009.
- Consultant on Motivation and Interest, Committee on Learning Science in Informal Environments of the National Academy of Education, 2006-2007.
- Co-PI, NSF Science of Learning Center Catalyst grant, Engaged Learning in Online Communities, 2005-2007.
- Evaluation, Flora and William Hewlett Foundation Grant to Swarthmore College, The Role of Scientific Literacy in the Liberal Arts Curriculum, 2001-2005.
- Evaluation, NSF Project: Online Mentoring Grant to The Math Forum at Drexel University, 2002-2004.
- Evaluation, NSF Project: Training and Resources for Assembling Interactive Learning Systems (TRAILS), a collaboration of The Math Forum and SRI International, 2002-2005.
- Research and Evaluation, The Math Forum, 1992- present.
- Advisory Panel, NASA Explorer Schools Project, 2004-2006.
- Advisory Board, Syracuse University Science of Learning Center, Engaging Learning in the 21st Century, 2004-2006.
- Participant, NSF Supported Workshop on Cyber Learning (Ed Lazowska and Roy Pea, Chairs), January 2005.
- Participant, Organizer, and Writer, NSF-sponsored Participant Interaction in Digital Library Workshop, Drexel University, February, 2004.
- Participant and contributor, NSF NSDL Evaluation Workshop, October , 2003.
- CILT Mini-Grant Recipient, with Shumar, Hoadley, Recker, & Schlager, May 2003.
- CILT Community Tools Workshop Coordinating Committee, 2002.
- Participant, STEM-Lab Workshop on supporting shared tools for NSDL research, February 2002
- Task Force on Web Methodology, Association of Internet Researchers, 2000-2003.
- Co-Editor, *Child Psychology and Practice*, Vol. 4, *Handbook of Child Psychology* (Richard Lerner and William Damon, Gen Eds.), 1998, 2006.
- Editorial Boards, *Applied Developmental Psychology*; *Cognition and Instruction*, *Motivation and Emotion*
- Project and Grant Reviewer, Italian Ministry for Universities and Research, National Academy of Education, MIUR- COFIN, National Science Foundation, Spencer Foundation, SSHRC/CRSH.

Jim E. Swartz

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Education:

B.S. (Chemistry) Stanislaus State College (Turlock, CA) 1973
Ph.D. (Chemistry) University of California at Santa Cruz, CA 1978
Postdoctoral Research Associate, California Institute of Technology 1978-1980

Professional Experience:

Vice President for Academic Affairs and Dean of the College, Grinnell College	1998-2008
Department of Chemistry, Grinnell College, Dack Professor of Chemistry, Director Center for Science in the Liberal Arts, Professor, Associate Professor, 1986-1993; Assistant Professor, 1980-1986)	2008-present, 1993-present;
Director, Pew Midstates Science and Mathematics Consortium	July 1995-June 2002
Legislative Aid, U.S. House of Representatives Rep. Claudine Schneider (R.I.)	Aug.-Dec. 1989
Visiting Professor, University of Minnesota	1986-1987

Representative Publications:

Five Publications closely related to proposed project:

1. "Traditional and Non-traditional Sources of Future Research Scientists", Testimony before the Investigations and Oversight Subcommittee, Science, Space, and Technology, U.S. House of Representatives, July 11, 1991, Congressional Register, p. 62-78.
2. Swartz, J.E., G.M. Vojta, and L.E. Erickson, "Hands-On Use of High Field NMR without the NMR", J. Chem. Ed., 1994, **71**, 12, 1069-1070.
3. Structures for Science: A Handbook for Planning Facilities for Undergraduate Natural Science Communities (Volume 3). Copyright: Project Kaleidoscope, Washington, DC, (1995), 234 pp (co-author and co-editor).
4. Swartz, J.E. and K. Schladetzky, "Experimental Illustration of the Utility of Lewis Structures – an FTIR Experiment for Introductory Chemistry", J. Chem. Ed., 1996, **73**, 2, 188-190.
5. Scott, H. J. Chenette, and J. Swartz, "The Integration of Technology into Learning and Teaching in the Liberal Arts", Liberal Education (AAC&U), 2002, **88**, 2, 30-35.

Other significant publications:

1. Loffredo, D., J. E. Swartz and E. Kariv-Miller, "Reductive Cyclization of o-(3-Butenyl)-fluorobenzene at Mercury and Lead Cathodes", J. Org. Chem., 1989, **54**, 5953.
2. Swartz, J.E., E. Kariv-Miller, and S. Harrold, "A Homogeneous Redox Catalysis Study of the Reductive Cyclization of 6-Hepten-2-one. Unusual Effects of the Nature and Concentration of the Catalyst." J. Am. Chem. Soc., 1989, **111**, 1211.
3. Swartz, J.E., T.J. Mahachi and E. Kariv-Miller, "Electrochemical Reduction of Ketones Mediated by Dimethylpyrrolidinium-Mercury. Reductive Cyclization of Unsaturated Ketones and Redox Catalysis Studies," J. Am. Chem. Soc., 1988, **110**, 3622.
4. Swartz, J.E., T.T. Stenzel, "Electrochemical Initiation of Aromatic S_{RN}1 Reactions Using Redox Catalysts," J. Am. Chem. Soc., 1984, **106**, 2560.

Synergistic Activities (eight examples):

1. Project Kaleidoscope, Co-Chair of the Facilities Task Force (1995-2000). I provided facilities planning perspective on Project Kaleidoscope activities and assisted in planning workshops on planning science facilities. Co-PI and project coordinator for current pilot project on Pedagogies of Engagement.
2. Director, Pew Midstates Science and Mathematics Consortium (July 1995-June 2002). In this role I directed a group of ten private undergraduate colleges and two research universities in collaborations on faculty development, curricular development, and research. We sponsored two undergraduate research symposia, four faculty/curricular development workshops and twenty other collaborative activities per year. The budget was approximately \$150,000/year.
3. Co-PI and Member of the Executive Council of the ChemLinks Consortium (1994-2000). This group, funded for 7 years by the National Science Foundation, developed curricular materials for introductory chemistry. My area of oversight was evaluation and dissemination efforts. The ChemLinks Consortium involved about 20 institutions and 200 faculty, and collaborated with the Modular Chemistry Consortium to produce materials which were commercially published. Elaine Seymour (University of Colorado) and Joshua Gutwill (Berkeley) carried out most assessment duties.
4. Senior Personnel, NSF-ROLE (also funded by HHMI) (1999-2003). Collaborative project (originally 4 liberal arts colleges; now over 70 institutions across sectors) to assess student learning in undergraduate research. David Lopatto (Grinnell) and Elaine Seymour (University of Colorado), PIs.
5. Directed Consortium for a Stronger Minority Presence, now Coalition for Faculty Diversity (1998-2006), a group liberal arts colleges offering pre- and postdoctoral fellowships. Built program from 8 to of about 35 institutions and established an ongoing set of program activities.

Collaborators and Other Affiliations:

1. Collaborators over past 60 months (other than students):
Sandra Laursen (University of Colorado, Boulder), Elaine Seymour (University of Colorado), David Lopatto, Grinnell College; various academic administrators at Oberlin and Smith Colleges and the Associate Colleges of the Midwest. Jeanne Narum, Louise Hainline, Judy Dilts, Brad Lister, Cathy Manduca, and Trish Ferrett on current NSF funded Pedagogies of Engagement Pilot Project.
3. Graduate and Postdoctoral Advisors: Dr. Joseph F. Bunnett, Professor Emeritus, University of California at Santa Cruz, Dr. Fred C. Anson, Professor of Chemistry, California Institute of Technology.
4. Student Sponsor: Mentor/advisor to 75 undergraduate research students 1980-1998. Mentor/research advisor to 2 graduate students (University of Minnesota) in 1986-88.