Discipline-Based Education Research

MaryKay Orgill

Professor

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- Fellow, Royal Society of Chemistry
- Fellow, American Chemical Society
- Former Chair, ACS Division of Chemical Education
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Areas of Expertise

- Chemistry Education
- Biochemistry Education

Research Summary:

I am interested in using qualitative research techniques to examine and improve undergraduate chemistry teaching and learning. Currently, this involves looking at how students understand concepts and solve problems in chemistry classes, how they visualize different chemical concepts, how they use language to make sense of chemical concepts, and how a systems thinking approach to chemistry teaching might be used to help students learn chemistry more meaningfully. I have also been involved in a number of projects that provide professional development opportunities to faculty and K-12 teachers.

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The Journal of Negro Education, 88 (3), 249-268

Postsecondary Underrepresented Minority STEM Students' Perceptions of Their Science Identity

Schetema Nealy Charles R. Drew University of Medicine and Science
MaryKay Orgill University of Nevada, Las Vegas

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J-STEM

RESEARCH REPORT

Faculty Perceptions of the Factors Influencing Success in STEM fields

Eshani Gandhi-Lee[1], Heather Skaza, Erica Marti, PG Schrader, MaryKay Orgill
University of Nevada, Las Vegas, USA

JOURNAL OF CHEMICAL EDUCATION
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pubs.acs.

ACS Editors' Choice

Introduction to Systems Thinking for the Chemistry Education Community

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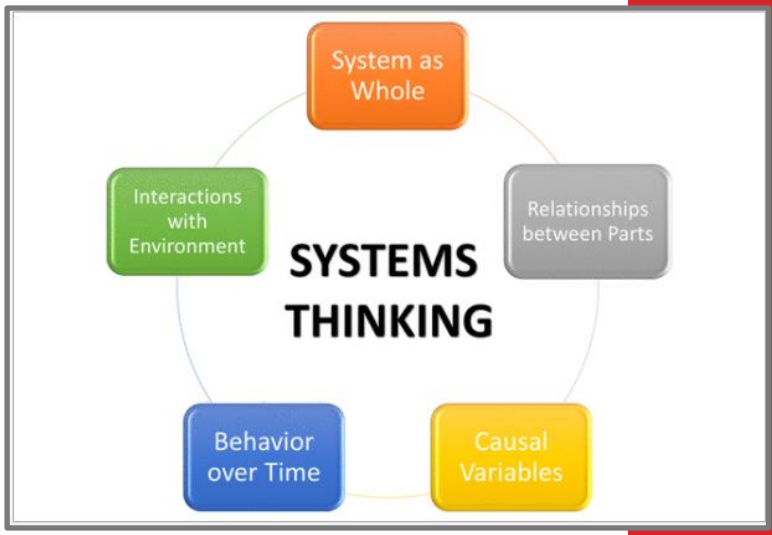
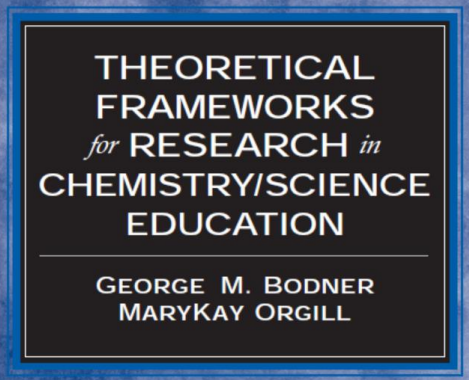


Multicultural Education

Supporting English Language Learners in College Science Classrooms

Insights from Chemistry Students

Eshani N. Lee, MaryKay Orgill, & CarolAnne Kardash



DOI: 10.1039/C4RP00256C (Paper) Chem. Educ. Res. Pract., 2015, **16**, 731-746

Biochemistry instructors' perceptions of analogies and their classroom use

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[b]*Department of Chemistry and Biochemistry, University of California, San Diego, USA*
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Measuring student motivation in chemistry classrooms

- **Dr. Guizella A. Rocabado**
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- Department of Chemistry and Biochemistry
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Expertise

My expertise lies in chemistry education research, with a particular focus on the development of instruments and the application of advanced measurement and statistical techniques to evaluate the effectiveness of evidence-based instructional practices. A central passion and area of expertise is understanding and measuring student attitudes and motivation, particularly as they relate to engagement and success in chemistry learning environments. I specialize in designing tools that capture meaningful learning outcomes, affective dimensions, and instructional impacts. In addition to my methodological strengths, I bring experience in science communication, translating complex scientific ideas into accessible language for diverse audiences. I also have expertise in program evaluation, using data-driven approaches to assess and improve the design, implementation, and outcomes of educational initiatives in STEM fields.

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Dr. Alison Sloat

Professor-in-Residence

College of Sciences

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STEM Outreach Programs

- Las Vegas Urban Forest Center
- STEM Teacher Development Academy and Resident Scientists-in-Schools Program
- Rebel Science Camp
- Rebel STEM Explorers Summer Camp
- Science & Nature Discovery Summer Camp

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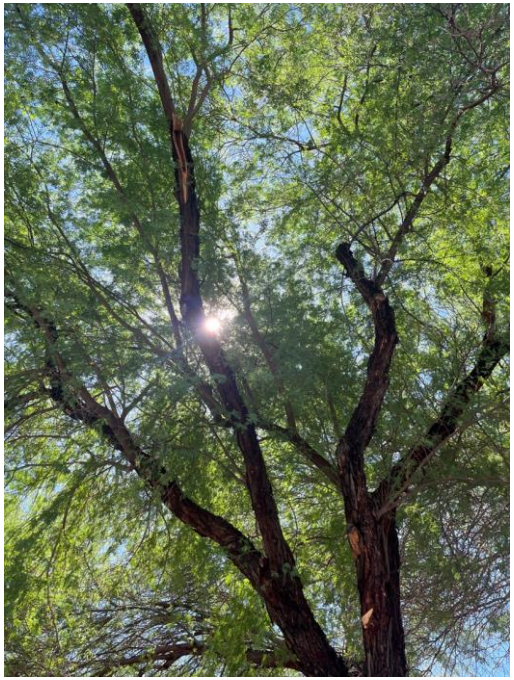
Las Vegas Urban Forest Center

- Plant 3,000 trees in underserved areas of Clark County
- Educate 45 Arborists-in-Training
- Community tree planting education and workshops
- 5-years, $5 million from USDA Forest Service



USDA FOREST SERVICE
URBAN AND COMMUNITY FORESTRY GRANTS

LAS VEGAS
Urban Forest Center
Urban
Tree Conservation Corps

Want to help? Contact:

Dr. Alison Sloat
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STEM Education Research

Dr. Jenifer C. Utz

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School of Life Sciences

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Expertise

- Undergraduate STEM education
- Digital learning resources
- Mammalian hibernation

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Facilitating academic achievement for a diverse undergraduate population

- Effects of self-testing:

Voluntary Web-Based Self-Assessment Quiz Use is Associated With Improved Exam Performance, Especially for Learners with Low Prior Knowledge

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Abstract
This study examined students' voluntary use of digital self-assessment quizzes as a resource for learning in a large anatomy and physiology lecture course. Students (n = 238) could use 16 chapter quizzes and four analogous unit quizzes to rehearse and self-assess knowledge. Most students (75%) engaged in occasional use of self-assessment quiz items; repeated use was uncommon (12%), as was lack of use (13%). Exam performance differed between quiz use groups. Quiz use improved exam performance more among students who entered the course with low prior knowledge of concepts from the prerequisite course. Cumulatively for all students and all exams, repeated self-assessment quiz users significantly outperformed occasional users (+7.5%) and non-users (+11.9%) on course exams. Incorporation of optional learning resources can enhance the learning success of students.

- Effects of skill training:

Journal of Educational Psychology

Can a Brief, Digital Skill Training Intervention Help Undergraduates "Learn to Learn" and Improve Their STEM Achievement?

Matthew L. Bernacki
University of North Carolina, Chapel Hill

Lucie Vosicka and Jenifer C. Utz
University of Nevada, Las Vegas

Students who drop out of their science, technology, engineering, and math (STEM) majors commonly report that they lack skills critical to STEM learning and career pursuits. Many training programs exist to develop students' learning skills and they typically achieve small to medium effects on behaviors and performance. However, these programs require large investments of students' and instructors' time and effort, which limits their applicability to large lecture course formats commonly employed in early undergraduate STEM coursework. This study examined whether brief, digital training modules designed to help students apply learning strategies and self-regulated learning principles effectively in their STEM courses can impact students' behaviors and performance in a large biology lecture course. Results indicate that a 2-hr *Science of Learning* to Learn training had significant effects on students' use of

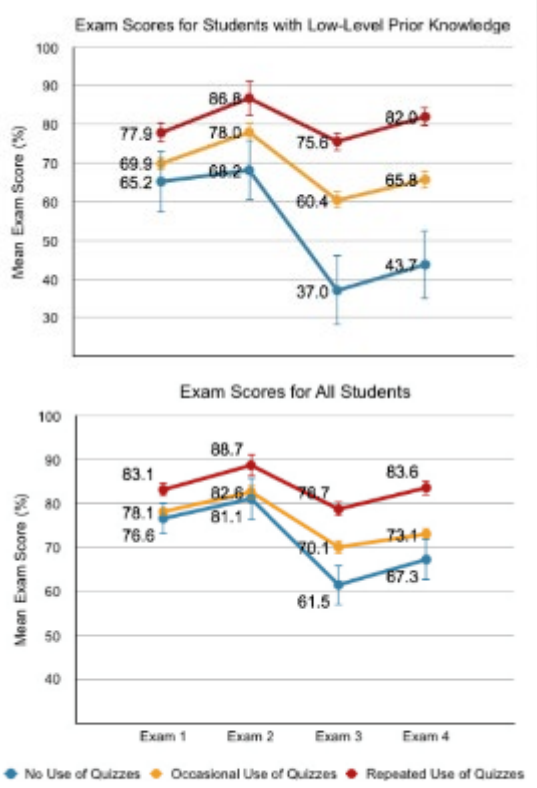

Figure 3. Effect of Self-Assessment Quiz Use on Exam Performance Symbols represent means ± standard error of the mean.

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Developing the Skill and Will to Succeed in STEM Scholarship Program

A primary goal of this scholarship program is to diversify and increase the number of students entering STEM professions

- The School of Life Sciences welcomed the first cohort of 17 Succeed in STEM Scholarship recipients in 2019
- Over $420,000 of scholarship support will be distributed across the lifetime of this 5-year program

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Hibernation physiology

- Rewarming from torpor:

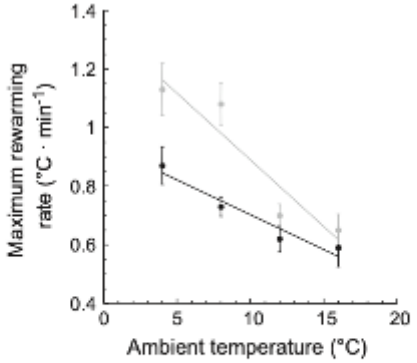


Fig. 3. Effect of ambient temperature on maximum rate of rewarming for natural and prematurely induced arousal from torpor. Symbols represent means ± SE for natural (black) and induced (gray) arousal; $n = 5$. There is a significant effect of T_a on the maximum rate of rewarming for both natural and induced arousals, $p < 0.05$, $r^2 = 0.93$, $r^2 = 0.88$ respectively. There is a significant effect of arousal type on the maximum rate of rewarming, $p < 0.05$.

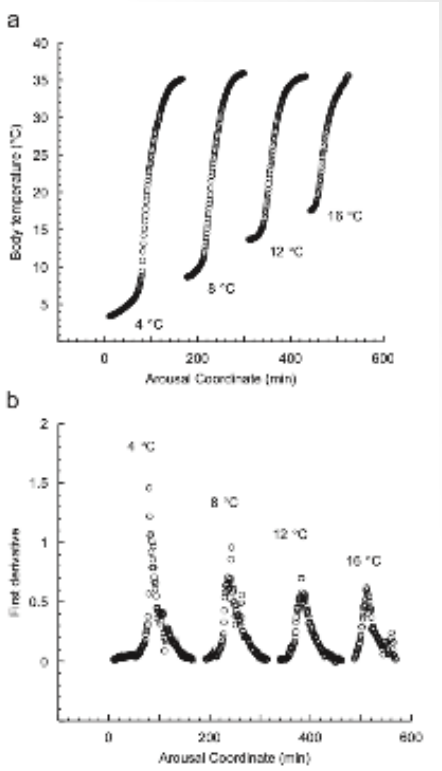
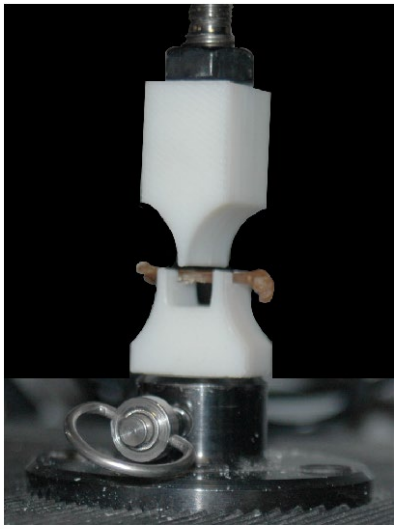
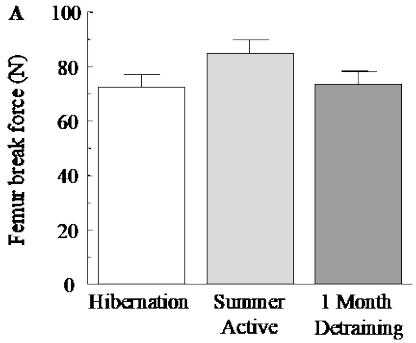
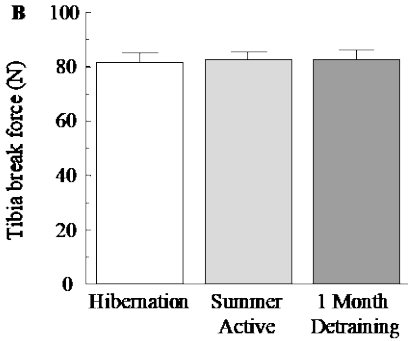


Fig. 2. Body temperature as a function of time during arousals from one individual. (A) Body temperature was measured every minute for a squirrel housed at 4, 8, 12, and 16 °C. (B) Instantaneous rate changes as demonstrated by plotting the first derivative as a function of time across the same range of ambient temperatures.

- Resistance to bone disuse atrophy:







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