

MARY KATHERINE WATSON

Phone: (843) 817-9407
mwatson9@citadel.edu

171 Moultrie Street
Charleston, SC 29464

EDUCATION

- PhD** **Georgia Institute of Technology,** August 2013
Civil & Environmental Engineering; Atlanta, GA
Dissertation: Assessment and Improvement of Sustainability
Education in Civil and Environmental Engineering
Committee: Michael O. Rodgers (chair), Nelson Baker,
Randall Guensler, Donna Llewellyn, James Mulholland,
Caroline Noyes, Kari Watkins
- MS** **Georgia Institute of Technology,** June 2011
Environmental Engineering; Atlanta, GA
Project: Biotransformation of Alkanoylcholines by a Mixed
Methanogenic Culture
Advisor: Spyros G. Pavlostathis
- MS** **Clemson University, Biosystems Engineering** May 2009
Thesis: Growth and Modeling of Freshwater Algae as a Function
of Media Inorganic Content
Advisor: Caye M. Drapcho
- BS** **Clemson University, Biosystems Engineering** May 2007
Graduated Magna Cum Laude (GPA: 3.88)
Minor in Environmental Engineering

ACADEMIC APPOINTMENTS

The Citadel, The Military College of South Carolina; Charleston, SC (2018 - present)
Associate Professor, Department of Civil and Environmental Engineering

The Citadel, The Military College of South Carolina; Charleston, SC (2013 - 2018)
Assistant Professor, Department of Civil and Environmental Engineering

PROFESSIONAL CERTIFICATIONS

Certified VALUE Rubric Scorer – Critical Thinking (August 2020)

American Association of Colleges and Universities

Trained and calibrated to score student products with the Critical Thinking VALUE Rubric based on completed training and acceptable calibration.

Envision™ Sustainability Professional (August 2014)

Institute for Sustainable Infrastructure; Washington, DC

Trained to use the Envision® sustainable infrastructure rating system as a guide to address triple bottom line sustainability dimensions in the design, construction, and operation of infrastructure.

Engineer in Training (April 2008)

National Council of Examiners for Engineering and Surveying; Seneca, SC
Passed the Fundamentals of Engineering Exam administered in South Carolina

Public Policy Certificate (May 2011)

Georgia Institute of Technology; Atlanta, GA
Completed 12 graduate credit hours in Public Policy

FUNDED RESEARCH

Encouraging Civil Engineering Retention through Community and Self-Efficacy Building
(\$999,915)

National Science Foundation, Scholarships in STEM (May 2018 – Apr. 2023)

M.K. Watson, (Principal Investigator), K.C. Bower, W.J Davis, S.T. Ghanat, T.A. Wood

The purpose of this grant is to encourage persistence of diverse, academically-talented, low-income students in civil engineering by providing scholarships and opportunities to develop self-efficacy while engaged in a community of practice. Major program elements include development of experiences to offer early, barrier math and chemistry courses outside of curricular norms.

Quantitative and qualitative methods are being employed to contribute to understanding of how self-efficacy impacts persistence among diverse students.

Impacts of Unprecedented Shift to Online Learning on Students' Cognitive Load and Readiness for Self-Directed Learning (\$110,612)

National Science Foundation, Rapid Response Research (RAPID)/Improving Undergraduate STEM Education (IUSE) (May 2020 – Apr. 2021)

M.K. Watson (Principal Investigator) and K. Skenes

The goal of this project is to assess the impacts of a mid-semester shift to online education caused by COVID-19 on engineering students' cognitive load and self-directed learning readiness (SDLR).

Specifically, we are using the Nasa Task Load Index (TLX) to compare workload between face-to-face and online modalities across Spring and Fall 2020 semesters. We are also tracking longitudinal changes in SDLR among students using the SDLR scale. Ultimately, we aim to provide insights for design of online course offerings, whether planned or unplanned.

Sustainable Design Framework for Developing and Assessing Engineering Students' Cognitive Flexibility (\$292,317)

National Science Foundation, Research in Engineering Education (Aug. 2015 – Sept. 2021)

E.M. Barrella, M.K. Watson (Co-Principal Investigator), and R. Anderson

The primary goals of the project are to distill common principles/core competencies that can be used as a framework for teaching sustainable design and to assess outcomes of applying Rubric on students' cognitive flexibility. We are focusing on collecting electroencephalogram (EEG) data to measure cognitive load during systems thinking activities and validation of a cross-disciplinary rubric to scaffold student engagement in sustainable design (thereby reducing cognitive load).

ASCEND: Advancing STEM Careers by Empowering Network Development (\$999,899)

National Science Foundation, ADVANCE (Aug. 2019 – Jul. 2024)

S. Kirk, M. Bertagnolli, C. Bruce, P. Flatt, H. Schepmann, C. Swanier, V. Turgeon, and M.K. Watson (Senior Personnel)

This project aims to develop and study regional, discipline-based peer-mentoring networks among mid-career female STEM faculty at teaching-focused institutions. Faculty and administrator fellows are chosen based on a competitive application process and participate in monthly, virtual mentoring events, as well as annual, in-person regional meetings.

HONORS AND AWARDS

Teaching and Learning Awards

New Faculty Excellence in Teaching Award (2016)

Committee on Faculty Development, American Society of Civil Engineers

Awarded to an untenured faculty on the basis of outstanding teaching record, as well as service to students.

New Faculty Excellence Award (2016)

The Citadel, The Military College of South Carolina

Awarded to an untenured faculty on the basis of excellence in the classroom, as well as related service and scholarship.

Harry C. Saxe Teaching Award (2014, 2016)

Civil and Environmental Engineering Department, The Citadel

Awarded to the most outstanding instructor, as selected by the civil engineering faculty.

Outstanding New Teaching Award (2015)

Southeastern Section, American Society for Engineering Education

Awarded to a full-time faculty with no more than four years of experience, based on participation in development of courses/curricula and development or authorship of instructional materials that enhance student learning.

Certificate of Appreciation (2014, 2015)

Naval ROTC Unit, The Citadel

Selected by senior, contracted Navy students as a faculty who made a lasting impression on their professional growth and development.

Mara H. Wasburn Early Engineering Educator Award (2014)

Women in Engineering Division, American Society for Engineering Education

Awarded to females at the entry/launch point of their engineering education career who have the potential to contribute to the engineering education community, specifically in the recruitment and retention of women.

Thank-A-Teacher Award (2012)

Center for the Enhancement of Teaching and Learning, The Georgia Institute of Technology

Anonymously recognized by an undergraduate student for the use of innovative teaching and learning practices in Civil Engineering Systems course.

Patricia K. Cross Future Leaders Award Nominee (2012)

Association of American Colleges and Universities

Nominated for award based on demonstrated commitment to leadership, service, and teaching excellence at Georgia Tech.

Teaching Assistant Fellow (2012)

Center for the Enhancement of Teaching and Learning, The Georgia Institute of Technology

Selected as an experienced teaching assistant to design and implement workshops for campus-wide teaching assistant orientations and graduate student professional development programming at Georgia Tech.

Graduate Engineering Education Consortium for Students Fellow (2012)

National Science Foundation (NSF)

Selected as an emerging engineering education researcher from a pool of national applicants to attend the NSF Engineering Education Awardees Conference.

Research Awards

New Faculty Research Award (2019)

American Society for Engineering Education Southeastern Section

Awarded for outstanding scholarly contributions in the area of engineering education research.

Outstanding Paper Contribution (2018)

9th Conference on Engineering Education for Sustainable Development

Awarded for paper entitled “Identifying Imbalances in Sustainable Design Curricula: A Spotlight on Economic Sustainability.”

Multidisciplinary Division Best Paper Award (2017)

American Society for Engineering Education

Awarded for paper entitled “A Systematic Review of Sustainability Assessments in ASEE Proceedings”

Gerald R. Seeley Award (2017)

American Society for Engineering Education, Civil Engineering Division

Awarded to a faculty with five or fewer years of experience, based on the quality of the submitted proceeding.

Thomas C. Evans Best Instructional Paper Award (2017)

American Society for Engineering Education, Southeastern Section

Paper entitled “Assessing Conceptual Knowledge using Three Concept Map Scoring Methods” published in the Journal of Engineering Education.

Best Paper Award (2015)

New Engineering Educators Division, The American Society for Engineering Education

Awarded to the best paper in the New Engineering Educators division: What Makes an Undergraduate Course Impactful? An examination of students’ perceptions of instructional environments.

Stephen J. Ressler Best Paper Award (2014)

Civil Engineering Division, American Society for Engineering Education

Awarded for the best paper presented in the Civil Engineering Division: Development and Application of a Sustainable Design Rubric to Evaluate Student Abilities to Incorporate Sustainability into Capstone Design Projects.

Thomas C. Evans Best Instructional Paper Award (2012)

American Society for Engineering Education, Southeastern Section

Paper detailing the development of a learning-cycle-based sustainability module was recognized as the most outstanding engineering education paper.

Biological Engineering Colloquium Best Graduate Presentation Award (2008)

Agricultural and Biological Engineering Department, Clemson University

Awarded for exemplary presentation of graduate research at a colloquium held to showcase biosystems engineering research.

Natural Resources Symposium Best Undergraduate Presentation Award (2007)

Natural Resources Graduate Student Association, Clemson University

Awarded for exemplary presentation of research at a symposium held to showcase research within the College of Agriculture, Forestry, and Life Sciences.

Biological Engineering Colloquium Best Undergrad Presentation Award (2007)

Agricultural and Biological Engineering Department, Clemson University

Awarded for exemplary presentation of undergraduate research at a colloquium held to showcase biosystems engineering research.

B.C. Inabinet Medallion (2007)

Calhoun Honors College, Clemson University

Given to students at Clemson University in the Calhoun Honors College who complete honors coursework and an undergraduate research project with accompanying thesis.

Service and Leadership Awards

Young Civil Engineer of the Year (2016)

South Carolina Chapter, The American Society of Civil Engineers

Awarded to a civil engineer in South Carolina under the age of 35 who has demonstrated service and commitment to the profession.

Clark Lindsay McCaslan Award (2007)

Agricultural and Biological Engineering Department, Clemson University

Presented to a senior biosystems engineering student at Clemson University for outstanding scholarship, professional and extracurricular activities, as well as character and leadership.

Blue Key Academic and Leadership Award (2007)

College of Agriculture, Forestry and Life Sciences, Clemson University

Awarded to one student in each of the five colleges at Clemson University who distinguishes himself or herself in terms of academic scholarship and campus leadership.

Fellowships and Scholarships

Graduate Research Fellowship Recipient (2009)

National Science Foundation (NSF)

Supports outstanding graduate students in selected fields who are pursuing research-based master's and doctoral degrees.

President's Fellowship Recipient (2009)

Georgia Institute of Technology

Awarded to students that bring exemplary levels of scholarship and innovation to their academic departments.

Graduate Research Fellowship Honorable Mention (2008)

National Science Foundation (NSF)

Honors outstanding graduate students in selected fields who are pursuing research-based master's and doctoral degrees.

Wade Stackhouse Fellowship Recipient (2007)

Clemson University College of Agriculture, Forestry and Life Sciences

Awarded to select graduate students for academic and research excellence.

Palmetto Fellowship Recipient (2003-2007)

State of South Carolina

Provided to high school students earning at least a 3.5 high school GPA and 1200 SAT score.

TEACHING EXPERIENCE

The Citadel, The Military College of South Carolina; Charleston, SC (2013 - present)

Associate/Assistant Professor, Department of Civil and Environmental Engineering

- Courses developed and disseminated: Introduction to Civil Engineering, Fluid Mechanics, Introduction to Environmental Engineering, Water and Wastewater Systems, and Environmental Lab.
- Promoted student learning by incorporating active teaching and learning strategies into all courses, including demonstrations, laboratory exercises, role playing, collaborative learning and/or project-based learning.
- Encouraged student-regulated learning using minute paper exercises, post-exam reflection activities, and concept maps.

The Georgia Institute of Technology; Atlanta, GA (2012)

Graduate Assistant, Center for the Enhancement of Teaching and Learning

- Developed and led professional development workshops for graduate students.
- Prepared and distributed an online newsletter (CETL Education Newsletter) to update graduate students about upcoming professional development workshops, job opportunities, and other campus activities.
- Assisted with other operations of a teaching and learning center, including aiding in preparation of faculty development seminars, organizing materials for campus-wide teaching and learning courses, and conducting graduate student teaching evaluations.

The Georgia Institute of Technology; Atlanta, GA (2011-2012)

Teaching Assistant, Civil & Environmental Engineering

- Courses assisted with: Civil Engineering Systems and Capstone Design
- Designed and implemented active learning activities with large classes of 60 – 100 students.
- Developed activities to help students apply sustainability during the design process.
- Evaluated Statement of Qualifications and final design reports submitted by student groups.

Clemson University; Clemson, SC (2007-2009)

Teaching Assistant, Biosystems Engineering

- Courses assisted with: Fundamentals of Biosystems Engineering, Biological Kinetics and Reactor Modeling, and Heat and Mass Transport
- Prepared and facilitated selected laboratory sessions.
- Led selected classroom lectures.
- Graded homework and lab reports.

SERVICE ACTIVITIES

Professional Service

Senior Associate Editor (2020 - present)

Journal of Civil Engineering Education

Solicit reviewers and compile reviews for manuscripts submitted to the journal.

Editorial Board Member (2020 - present)

Sustainability

Serve as a preferred reviewer with annual invitation to edit a special edition.

Inaugural Member of the College of Reviewers (2018 – present)

Directorate of Undergraduate Education (DUE), National Science Foundation (NSF)

Conduct ad-hoc reviews for STEM education proposals submitted to the NSF.

Grant Review Panelist (2016 - present)

Directorate of Undergraduate Education (DUE), National Science Foundation (NSF)

Served on seven panels (to date) to review proposals submitted for funding.

Effective Teaching Standing Committee Chair (2015 - present)

Civil Engineering Division of the American Society for Engineering Education (ASEE)

Work with committee to create program for 2016 ASEE conference.

Campus Representative (2014 – present)

American Society for Engineering Education (ASEE)

Disseminate information about ASEE conferences and events to faculty, as well as compose and submit an annual report.

Editor (2017- 2020)

Civil Engineering Division of the American Society for Engineering Education (ASEE)

Composed and distributed a newsletter documenting chapter activities to members.

Engineering Excellence Awards Judge (2013 – 2017)

American Council of Engineering Companies South Carolina Chapter (ACEC-SC)

Reviewed and scored engineering projects completed by consulting firms in South Carolina and made recommendations for distinguished awards.

Peer-Reviewed Articles for:

- Journal of Cleaner Production
- Journal of Civil Engineering Education
- Canadian Journal of Engineering Education
- Frontiers in Education Conference
- American Society for Engineering Education National Conference
- First Year Engineering Education Conference
- Engineering Education for Sustainable Development Conference

Service to Students

Faculty Director of the Excellence in Civil Engineering Leadership (ExCEL) Scholarship Program (2019 – present)

Civil and Environmental Engineering Department, The Citadel; Charleston, SC
Lead development and administration of curricular innovations and support services (academic, professional, personal) for high-performing students with financial need.

American Society of Civil Engineers Concrete Canoe Team Advisor (2013 – 2017)

Civil and Environmental Engineering Department, The Citadel; Charleston, SC
Worked with civil engineering students to construct a concrete canoe for the annual Carolinas Conference, as well as develop visual display and oral presentation for competition. Award-winning teams in 2014 (2nd place), 2015 (1st place), 2016 (1st place), and 2017 (1st place) regional competitions.

American Society of Civil Engineers Mead Paper Co-Advisor (2014 – 2016)

Civil and Environmental Engineering Department, The Citadel; Charleston, SC
Guided a senior each year in composing an essay on a relevant ethics topic in civil engineering. Award-winning students in 2015 (1st place) and 2017 (1st place) regional competitions.

Society of Women Engineers Student Chapter Advisor (2013 – 2014)

School of Engineering, The Citadel; Charleston, SC
Aided students in all chapter activities, including regular meetings, travel to national and regional conferences, and community outreach events.

University/College Service

Financial Affairs Committee (2020 – present)

The Citadel; Charleston, SC
Served on a committee to review financial productivity of departments and programs.

Faculty Awards Committee (2019 – present)

The Citadel; Charleston, SC
Served on a committee to solicit and review and nomination packages for several faculty excellence awards.

Institutional Review Board (2018 – present)

The Citadel; Charleston, SC
Served on a committee to review and comment on the research ethics of projects that involve human subjects.

Cadet Life Committee (2016 - 2019)

The Citadel; Charleston, SC
Served on a committee composed of faculty, staff, and military personnel to devise strategies to improve the cadet experience.

Interdisciplinary STEM Education Master's Degree Committee (2016 - 2017)

The Citadel; Charleston, SC
Served on a committee composed of faculty from education, engineering, math, and sciences to improve a Master's degree in Interdisciplinary STEM Education.

Environmental Studies Minor Committee (2016 - 2017)

The Citadel; Charleston, SC

Served on a committee to develop a new cross-disciplinary minor in sustainability and environmental studies.

Indefinite Delivery Engineering Contract Committee (2015)

Facilities and Engineering, The Citadel; Charleston, SC

Evaluated statements of qualifications and conducted on-campus interviews for companies applying for a civil, roofing, and structural indefinite delivery contract.

Safety Director Search Committee (2014)

Facilities and Engineering, The Citadel; Charleston, SC

Evaluated applicant's resumes and conducted virtual interviews.

Departmental Service

Chair of the Advising Committee (2020 – present)

The Citadel; Charleston, SC

Lead departmental efforts to improve and manage advising procedures and administration.

Chair of the Undergraduate Recruitment Committee (2020 – present)

The Citadel; Charleston, SC

Facilitate development of materials and organization of events to recruit cadets and evening students to the civil engineering program.

Chair of the Advancement, Scholarship, and Awards Committee (2017 – present)

The Citadel; Charleston, SC

Aided in selection of scholarship and award recipients among Civil and Environmental Engineering student candidates.

Faculty Search Committees (2015, 2016, 2018, 2019, 2020)

Civil and Environmental Engineering Department, The Citadel; Charleston, SC

Served on committees to evaluate applications, conduct phone interviews, and participate in on-campus interviews to hire several new civil engineering faculty.

Pre-Knob Recruitment Facilitator (2013 – 2015)

Civil and Environmental Engineering Department, The Citadel; Charleston, SC

Co-hosted tours of the Civil and Environmental Engineering (CEE) department to encourage prospective students to consider a major in engineering.

Community Service

Co-Organizer of “Introduce a Girl to Engineering Day” (2013 – 2018)

The Citadel; Charleston, SC

Interfaced with student and professional chapters of the Society of Women Engineers (SWE), as well as the Girl Scouts of Eastern South Carolina, to develop interactive projects to excite 100 middle-school-aged girls about engineering.

Organizer for the STEM Festival College of Engineering Booth (2014)

The Citadel; Charleston, SC

Led a group of undergraduate civil engineering students in developing an interactive project using K’NEX to introduce children of all ages to civil engineering.

Service as an Undergraduate/Graduate Student

Graduate Career Symposium Co-Organizer (2013)

Center for the Enhancement of Teaching and Learning Center, The Georgia Institute of Technology; Atlanta, GA

Invited and coordinated academic and industry professionals to deliver talks and workshops to aid graduate students in selecting a career path.

STEM Expo Co-Organizer (2013)

Graduate Student Chapter of the American Society for Engineering Education, The Georgia Institute of Technology; Atlanta, GA

Coordinated a poster expo showcasing engineering education research projects being conducted across different academic departments at Georgia Tech.

President of the Georgia Tech Chapter of the American Society for Engineering Education (GT-ASEE) (2011-2012)

The Georgia Institute of Technology; Atlanta, GA

Co-founded and organized GT-ASEE to guide graduate students in the development of teaching and engineering education research skills.

Engineering Education Workshop Co-Organizer (2012)

Graduate Student Chapter of the American Society for Engineering Education, The Georgia Institute of Technology; Atlanta, GA

Organized a workshop entitled “Teaching, Scholarship, and Research: Building an Engineering Education Community at Georgia Tech” in Atlanta, GA, which was attended by 75 administrators, faculty, staff, and graduate students.

Women in Engineering (WIE) Graduate Student Panelist (2012)

The Georgia Institute of Technology; Atlanta, GA

Served as an invited panelist to answer undergraduate engineering students’ questions on the topic “How to Apply for Graduate School.”

President’s Undergraduate Research Awards Reviewer (2011-2012)

The Georgia Institute of Technology; Atlanta, GA

Reviewed abstracts and letters of recommendations for undergraduate students at Georgia Tech applying for research funding.

Women in Engineering (WIE) Ambassador (2011-2012)

The Georgia Institute of Technology; Atlanta, GA

Supported efforts to increase female participation in engineering by introducing different engineering disciplines to middle- and high-school girls.

Clemson College of Engineering and Science Advisory Board Member (2008)

Clemson University; Clemson, SC

Selected to discuss status and future directions of college with key faculty and administrators from the perspective of a graduate student.

Clemson College of Engineering and Science Ambassador (2004 – 2007)

Clemson University; Clemson SC

Introduced Clemson University and presented the field of biosystems engineering to prospective freshmen.

President of Clemson Engineers without Borders (CU-EWB) (2005-2007)

Clemson University; Clemson, SC

Founded and organized CU-EWB to help students apply their engineering knowledge to improve the quality of life in developing and recovering areas.

Service Trip Coordinator (2006-2007)

Clemson University; Clemson, SC

Organized and led 10-35 undergraduates and graduates on three service trips to New Orleans, LA to aid in Hurricane Katrina relief.

PUBLICATIONS

Journal Articles

Watson, M.K., Barrella, E., Wall, T., Noyes, C., & Rodgers, M. Comparing Measures of Student Sustainable Design Skills Using a Project-Level Rubric and Surveys. *Sustainability*. 2020, 12(18), 7308.

Watson, M.K., Pelkey, J., Noyes, C., & Rodgers, M.O. Using Kolb's Learning Cycle to Improve Student Sustainability Knowledge. *Sustainability*. 2019, 11(19), 4602.

Watson, M.K., Barrella, E.M., & Pelkey, J. Assessment of Conceptual Knowledge using a Component-Based Concept Map Scoring Program. *International Journal of Engineering Education*. 2018, 34(3), 1025-1037.

Watson, M.K., Barrella, E.M., Wall, T.A., Noyes, C., & Rodgers, M.O. A Rubric to Analyze Student Abilities to Engage in Sustainable Design. *Advances in Engineering Education*. 2017, 6(1), 1-25.

Watson, M.K. & Drapcho, C.M. Kinetics of Inorganic Carbon-Limited Freshwater Algal Growth at High pH. *Transactions of the American Society of Agricultural and Biological Engineers*. 2016, 59(6), 1633-1643.

Watson, M.K. & Barrella, E. Using Concept Maps to Explore the Impacts of a Learning-Cycle-Based Sustainability Module Implemented in Two Institutional Contexts. *Journal of Professional Issues in Engineering Education and Practice*. 2016, D4016001.

Watson, M.K., Pelkey, J.G., Noyes, C., & Rodgers, M.O. Assessing Impacts of a Learning-Cycle-Based Module on Students' Conceptual Sustainability Knowledge using Concept Maps and Surveys. *Journal of Cleaner Production*. 2016, 133, 544-556.

Watson, M.K., Pelkey, J.G., Noyes, C., & Rodgers, M.O. Assessing Conceptual Knowledge using Three Concept Map Scoring Methods. *Journal of Engineering Education*. 2016, 105(1), 118-146.

Watson, M.K., Lozano, R.L., Noyes, C., & Rodgers, M.O. Assessing Curricula Contribution to Sustainability More Holistically: Experiences from the Integration of Curricula Assessment and Students' Perceptions at the Georgia Institute of Technology. *Journal of Cleaner Production*. 2013, *61*,106-116.

Watson, M.K., Pelkey, J.G., Noyes, C., & Rodgers, M.O. Student Perceptions of Sustainability Education in Civil and Environmental Engineering at the Georgia Institute of Technology. *Journal of Professional Issues Engineering Education and Practice*. 2013, *139*(3), 235-243.

Watson, M.K., & Lozano, R. Sustainability and Chemistry Education: Assessment of Chemistry Curricula at Cardiff University using the STAUNCH® System. *Educación Química*. 2013, *24*(2), 184-192.

Watson, M.K., Tezel, U., & Pavlostathis, S.G. Biotransformation of Alkanoylcholines Under Methanogenic Conditions. *Water Research*. 2012, *46*(9), 2947-2956

Book Chapters

Barrella, E. and M.K. Watson, *Comparing the Outcomes of Horizontal and Vertical Integration of Sustainability Content into Engineering Curricula using Concept Maps*, in *New Developments in Engineering Education for Sustainable Development*, W.L. Filho & S. Nesbit, Editors. 2016, Springer: Switzerland. p. 1-14.

Lozano, R.L. and M.K. Watson, *Assessing Sustainability in University Curricula: Case Studies from the University of Leeds and the Georgia Institute of Technology*, in *Sustainability Assessment Tools in Higher Education Institutions*, S. Caeiro, et al., Editors. 2013, Springer: New York NY. p. 359-373.

Conference Proceedings

Watson, M.K. & Ghanat, S.T. (2020) Exploring Math Self-Efficacy Among First-Year Civil Engineering Majors. First Year Engineering Experience Conference, East Lansing, MI.

Watson, M.K., Ghanat, S.T., Wood, T.A., Davis, W.J., Hornor, T., & Bower, K.C. (2020) GIFTS: Reimagining the Early Calculus Experience. First Year Engineering Experience Conference, East Lansing, MI.

Barrella, E., Watson, M.K., Girdner, J.D., & Anderson, R.D. (2020) Scaffolding and Assessing Sustainable Design Skills in a Civil Engineering Capstone Design Course. American Society for Engineering Education Annual Conference, Virtual/Online.

Watson, M.K., Ghanat, S.T., Wood, T.A., Davis, W.J., Hornor, T., & Bower, K.C. (2020) A Summer Calculus Experience to Encourage Development of Community and Self-Efficacy Building of Civil Engineering Students. American Society for Engineering Education Annual Conference, Virtual/Online.

Watson, M.K., Ghanat, S.T., Wood, T.A., Davis, W.J., & Bower, K.C. (2019) A Systematic Review of Models for Calculus Course Innovations. American Society for Engineering Education Annual Conference, Tampa, FL.

Barrella, E.M., Watson, M.K., Anderson, R., Cowan, C.M., & Girdner, J.D. (2019) Measuring Change: Research Updates Helping Engineering Students Tackle Complex Sustainability Problems. American Society for Engineering Education Annual Conference, Tampa, FL.

Watson, M.K., Davis, W.J., Mays, T.W., Welch, R.W., & Ryan, J.C. (2019) Measuring Undergraduate Student Design Self-Efficacy within an Undergraduate Civil Engineering Curriculum. American Society for Engineering Education Annual Conference, Tampa, FL.

Barrella, E.M., Cowan, C.M., Girdner, J.D., Watson, M.K., & Anderson, R. (2019) Student Experience and Learning with a Formative Sustainable Design Rubric. American Society for Engineering Education Annual Conference, Tampa, FL.

Barrella, E.M., Cowan, C., Girdner, J., Anderson, R., & Watson, M.K. (2018) Using Neuroeducation Methods to Compare Engineering Student Performance on Linear and Systems Tasks. IEEE Frontiers in Education Conference, San Jose, CA.

Watson, M.K., Barrella, E.B., Cowan, C., & Anderson, R. (2018) Validating a Sustainable Design Rubric by Surveying Engineering Educators. American Society for Engineering Education Annual Conference, Salt Lake City, UT.

Watson, M.K., Martin, A.K., Welch, R., & Bower, K.C. (2018) Examining the Impacts of Academic and Community Enrichment Resources on First-Year Civil Engineering Students. American Society for Engineering Education Annual Conference, Salt Lake City, UT.

Barrella, E.M. & Watson, M.K. (2018) Identifying Imbalances in Sustainable Design Curricula: A Spotlight on Economic Sustainability. 9th Conference on Engineering Education for Sustainable Development, Glassboro, N.J.

Cowan, C., Girdner, J., Majdic, B., Barrella, E.M., Anderson, R., & Watson, M.K. (2018) Validating the Use of B-Alert Live in Measuring Cognitive Load in Engineering Problem-Solving. American Society for Engineering Education Southeastern Conference, Daytona Beach, FL.

Cowan, C., Barrella, E.M., Watson, M.K., & Anderson, R. (2017) Validating Content of a Sustainable Design Rubric Using Established Frameworks. American Society for Engineering Education Annual Conference, Columbus, OH.

Watson, M.K., Bower, K.C., & Davis, W.J. (2017) Advancing Diversity Initiatives in the Civil Engineering Profession. American Society for Engineering Education Annual Conference, Columbus, OH.

Watson, M.K. & Barrella, E.M. (2017) A Systematic Review of Sustainability Assessments in ASEE Proceedings. American Society for Engineering Education Annual Conference, Columbus, OH.

Barrella, E.M., Watson, M.K., & Pierrakos, O. (2017) Methods and Preliminary Findings for Developing and Assessing Engineering Students' Cognitive Flexibility in the Domain of Sustainable Design. American Society for Engineering Education Annual Conference, Columbus, OH.

Watson, M.K., Russo, L., & Michalaka, D. (2017) Introduce a Girl to Engineering Day: Assessment and Future Directions. American Society for Engineering Education Zone 2 Conference, San Juan, Puerto Rico.

Watson, M.K. & Barrella, E.M. (2017) Innovative Tools for Assessing Student Sustainability Knowledge. American Society for Engineering Education Zone 2 Conference, San Juan, Puerto Rico.

Barrella, E.M., Watson, M.K., & Cowan, C. (2017) Expert Evaluation of a Sustainable Design Rubric. American Society for Engineering Education Zone 2 Conference, San Juan, Puerto Rico.

Barrella, E. & Watson, M.K. (2016) Developing a Cross-Disciplinary Sustainable Design Rubric for Engineering Projects. 8th International Conference on Engineering Education for Sustainable Development, Bruges, Belgium.

Watson, M.K., Barrella, E., & Pelkey, J.G. (2016) Concept Maps as Teaching, Learning, and Research Tools. 8th First Year Engineering Experience Conference, Columbus, OH.

Watson, M.K., Mills, A.R., Bower, K.C., Brannan, K., Woo, M.H., & Welch, R.W. (2015) Refinement of a Concept Inventory to Assess Conceptual Understanding in Civil Engineering Fluid Mechanics. American Society for Engineering Education Annual Conference, Seattle, WA.

Coso, A.E., Watson, M.K., & Llewellyn, D.C. (2015) What Makes an Undergraduate Course Impactful? An Examination of Students' Perceptions of Instructional Environments. American Society for Engineering Education Annual Conference, Seattle, WA.

Watson, M.K., Ghanat, S.T., Michalaka, D., Bower, K., Welch, R.W. (2015) Why Do Students Choose Engineering? Implications for First-Year Engineering Education. 7th First Year Engineering Education Conference, Blacksburg, VA.

Barrella, E. & Watson, M.K. (2015) Comparing the Outcomes of Horizontal and Vertical Integration of Sustainability Content into Engineering Curricula using Concept Maps (2015). 7th International Conference on Engineering Education for Sustainable Development. Vancouver, Canada.

Watson, M.K., Marley, K., Ghanat, S., & Michalaka, D. Using Student Attitudes to Inform the Design of a First-Year Civil Engineering Course (2015). American Society for Engineering Education Southeastern Conference, Gainesville, FL.

Watson, M.K., Pelkey, J.G., Noyes, C., & Rodgers, M.O. (2014). Using the SOLO Taxonomy to Analyze Student Sustainability Knowledge. American Society for Engineering Education Annual Conference, Indianapolis, IN.

Watson, M.K., Pelkey, J.G., Noyes, C., & Rodgers, M.O. (2014). Using Concept Maps to Analyze the Structure and Content of Student Sustainability Knowledge. American Society for Engineering Education Annual Conference, Indianapolis, IN.

Watson, M.K., Barella, E., Wall, T., Noyes, C., & Rodgers, M.O. (2013). Development of a sustainable design rubric to assess student abilities to apply sustainability principles in engineering design. American Society for Engineering Education Annual Conference, Atlanta, GA.

Watson, M.K., & Coso, A. (2013). Deconstructing graduate students' philosophies of education. American Society for Engineering Education Annual Conference, Atlanta, GA.

Watson, M.K., Noyes, C., & Rodgers, M.O. (2012). *Development of a Guided-Inquiry Module for Teaching Sustainability 'Through the Cycle'*. Paper presented at the American Society for Engineering Education Southeastern Section Annual Conference, Starkville, MS.

PRESENTATIONS

Engineering Education

Barrella, E., Watson, M.K., Girdner, J.D., & Anderson, R.D. (2020) Scaffolding and Assessing Sustainable Design Skills in a Civil Engineering Capstone Design Course. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Watson, M.K., Ghanat, S.T., Wood, T.A., Davis, W.J., Hornor, T., & Bower, K.C. (2020) A Summer Calculus Experience to Encourage Development of Community and Self-Efficacy Building of Civil Engineering Students. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Watson, M.K., Ghanat, S.T., Wood, T.A., Davis, W.J., & Bower, K.C. (2019) A Systematic Review of Models for Calculus Course Innovations. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Barrella, E.M., Watson, M.K., & Pierrakos, O. (Jun. 2017) Methods and Preliminary Findings for Developing and Assessing Engineering Students' Cognitive Flexibility in the Domain of Sustainable Design. Presented at the American Society for Engineering Education Annual Conference. Poster Presentation.

Watson, M.K. & Barrella, E.M. (Jun. 2017) A Systematic Review of Sustainability Assessments in ASEE Proceedings. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Watson, M.K., Bower, K.C., & Davis, W.J. (Jun. 2017) Advancing Diversity Initiatives in the Civil Engineering Profession. Presented at the American Society for Engineering Education Annual Conference. Poster Presentation.

Watson, M.K., Russo, L., & Michalaka, D. (Mar. 2017) Introduce a Girl to Engineering Day: Assessment and Future Directions. Presented at the American Society for Engineering Education Zone 2 Conference. Oral Presentation.

Barrella, E.M., Watson, M.K., & Cowan, C. (Mar. 2017) Expert Evaluation of a Sustainable Design Rubric. Presented at the American Society for Engineering Education Zone 2 Conference. Oral Presentation.

Barrella, E. & Watson, M.K. (Sept. 2016) Developing a Cross-Disciplinary Sustainable Design Rubric for Engineering Projects. Presented at the 8th International Conference on Engineering Education for Sustainable Development. Oral Presentation.

Watson, M.K., Ghanat, S.T., Michalaka, D., Bower, K., & Welch, R.W. (Aug. 2015) Why Do Students Choose Engineering? Implications for First-Year Engineering Education. Presented at the 7th First Year Engineering Education Conference. Oral Presentation.

Barrella, E. & Watson, M.K. (Jun. 2015) Comparing the Outcomes of Horizontal and Vertical Integration of Sustainability Content into Engineering Curricula using Concept Maps. Presented at the 7th International Conference on Engineering Education for Sustainable Development. Oral Presentation.

Watson, M.K., Marley, K., Ghanat, S., & Michalaka, D. (Apr. 2015) *Using Student Attitudes to Inform the Design of a First-Year Civil Engineering Course*. Presented at the American Society for Engineering Education Southeastern Conference. Oral Presentation.

Watson, M.K., Pelkey, J., Rodgers, M.O., & Noyes, C.R. (Jun. 2014) *Exploring Student Sustainability Knowledge using the Structure of Observed Learning Outcomes (SOLO) Taxonomy*. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Watson, M.K., Pelkey, J., Noyes, C.R., and Rodgers, M.O. (Jun 2014) *Use of Concept Maps to Assess Student Sustainability Knowledge*. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Watson, M.K. & Strong, A.C. (Jun. 2013). *Examining Graduate Students' Philosophies of Education: An Exploratory Study*. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Watson, M.K., Barrella, E.M., Wall, T.A., Noyes, C.R., & Rodgers, M.O. (Jun. 2013) *Development and Application of a Sustainable Design Rubric to Evaluate Student Abilities to Incorporate Sustainability into Capstone Design Projects*. Presented at the American Society for Engineering Education Annual Conference. Oral Presentation.

Watson, M.K., Noyes, C., & Rodgers, M.O. (Oct. 2013). *Use of Concept Maps to Assess Student Learning*. Presented to the Citadel Academy for the Scholarship of Teaching, Learning, and Evaluation. Oral Presentation.

Watson, M.K., Noyes, C., & Rodgers, M.O. (Mar. 2012). *Analyzing the Structure of Student Sustainability Knowledge Using Traditional and Holistic Concept Map Scoring Methods*. Presented at the Georgia Scholarship of STEM Teaching and Learning Conference, Statesboro, GA. Oral Presentation.

Watson, M.K., Noyes, C., & Rodgers, M.O. (Feb. 2012). *Analyzing Student Sustainability Knowledge Using Concept Maps*. Presented at the Georgia Tech Research and Innovation Conference, Atlanta, GA. Poster Presentation.

Biological and Environmental Engineering

Watson, M.K., Tezel, U., & Pavlostathis, S.G. (Apr. 2010). *Fate and Effect of Acetylcholine in Biological Treatment Systems*. Presented at the Association of Environmental Engineers and Scientists Symposium, Atlanta, GA. Poster Presentation.

Watson, M.K., & Drapcho, C.M. (Apr. 2008). *Growth and Modeling of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Institute for Biological Engineering National Meeting, Chapel Hill, NC. Poster Presentation.

Watson, M.K., & Drapcho, C.M. (Apr. 2008). *Growth and Modeling of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Natural Resources Symposium, Clemson, SC. Poster Presentation.

Watson, M.K., & Drapcho, C.M. (Apr. 2008). *Growth and Modeling of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Biological Engineering Colloquium, Clemson, SC. Oral and Poster Presentations; Received Best Graduate Presentation Award.

Watson, M.K., & Drapcho, C.M. (Apr. 2007). *Growth of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Institute for Biological Engineering National Meeting, St. Louis, MO. Oral Presentation.

Watson, M.K., & Drapcho, C.M. (Apr. 2007). *Growth of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Natural Resources Symposium, Clemson, SC. Oral Presentation; Received Best Undergraduate Presentation Award.

Watson, M.K., & Drapcho, C.M. (Apr. 2007). *Growth of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Biological Engineering Colloquium, Clemson, SC. Oral Presentation; Received Best Undergraduate Presentation Award.

Watson, M.K., & Drapcho, C.M. (Apr. 2007). *Growth of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Focus on Creative Inquiry Symposium, Clemson, SC. Poster Presentation.

Watson, M.K., & Drapcho, C.M. (Apr. 2006). *Growth of Freshwater Algae as a Function of Media Inorganic Carbon Content*. Presented at the Focus on Creative Inquiry Symposium, Clemson, SC. Poster Presentation.

WORKSHOPS DISSEMINATED

Innovative Tools for Assessing Student Sustainability Knowledge (Mar. 2017)

American Society for Engineering Education Zone 2 Conference

Workshop devised to summarize available tools for assessing students' conceptual and applied knowledge related to sustainability.

Using Concept Maps to Assess Serve-Learn-Sustain Outcomes (Jan. 2017)

Center for Serve-Learn-Sustain, Georgia Institute of Technology

Workshop tailored to assess student outcomes for Quality Enhancement Plan related to sustainability and service learning.

Concept Maps as Teaching, Learning, and Research Tools (Aug. 2016)

8th First Year Engineering Experience Conference

Workshop designed to guide participants in developing and scoring concept-map-based assessment strategies for assessing conceptual understanding in engineering education.

Building Consensus on an Cross-Disciplinary Sustainable Design Rubric (Jun. 2016)

NSF-Sponsored Research in Engineering Education Grant

Interactive workshop designed to gather participants' perspectives on critical and cross-disciplinary aspects of sustainable design.

Using Active Learning in the Classroom (Feb. 2013)

Georgia Institute of Technology; Atlanta, GA

Workshop presented to graduate teaching assistants to aid them in selecting and applying active teaching and learning techniques in undergraduate psychology classes.

Dealing with Difficult Students (Oct. 2012)

Georgia Institute of Technology; Atlanta, GA

Workshop delivered to graduate teaching assistants to identify strategies for handling defiant, disruptive, and disengaged students.

Crafting Clear Explanations (Oct. 2012)

Georgia Institute of Technology; Atlanta, GA

Workshop disseminated to graduate teaching assistants to discuss strategies for overcoming the expert-novice dilemma.

Answering Student Questions (Sept. 2012)

Georgia Institute of Technology; Atlanta, GA

Workshop designed for graduate teaching assistants to identify barriers to and strategies for effectively answering student questions.

Overtaching: Illusions of Rigor (Aug. 2012)

Georgia Institute of Technology; Atlanta, GA Workshop developed for graduate teaching assistants to debunk the misconception that poor student performance is an indicator of a difficult or "rigorous" course.

CONSULTING SERVICES

External Evaluator (Jan. 2019 – May 2023)

University of South Carolina; Columbia, SC

Developed, administered, and analyzed assessment instruments to track development of critical thinking and inquiry among undergraduate researchers as part of an NSF CAREER grant entitled: Quantifying the Response of River Floodplains to Changes in Climate and Land Use," Principal Investigator: Enrica Viparelli.

Assessment Consultant (Jan. 2016 – Feb. 2018)

Center for Serve-Learn-Sustain, The Georgia Institute of Technology; Atlanta, GA

Guided administration and analysis of concept-map-based assessments to track student learning associated with outcomes specified in the Institution's Quality Enhancement Plan (QEP).

Environmental Consultant (2016 –2017)

SI Seawall & Fencing Services; Charleston, SC

Analyzed the environmental impacts of the Wave Dissipation System, a structural system designed to minimize beach erosion during weather emergencies.

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers, 2020-Present

American Society for Engineering Education, 2011-Present

Society of Women Engineers, 2013-2014

Institute for Biological Engineering, 2006-2009

REFERENCES

Dr. W. Jeff Davis

Institution: The Citadel; Charleston, SC

Relationship: Department Head

Title: Professor and Chair, Civil and Environmental Engineering

Email: jeff.davis@citadel.edu

Phone: 843-953-7687

Dr. Michael O. Rodgers

Institution: Georgia Institute of Technology; Atlanta, GA

Relationship: Dissertation Committee Chair

Title: Principal Research Scientist in Civil and Environmental Engineering

Email: michael.rodgers@ce.gatech.edu

Phone: 404-385-0569

Dr. Donna Llewellyn

Institution: Boise State University; Boise, ID

Relationship: Dissertation Committee Member

Title: Executive Director of the Institute for STEM and Diversity Initiatives

Email: donnallewellyn@boisestate.edu

Phone: 202-426-1903