

Timothy David Zimmerman

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Graduate School of Education

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Curriculum Vita, December, 2008

Education

Ph.D. **University of California, Berkeley, CA**
Science Education, 2005

"Promoting Knowledge Integration of Scientific Principles and Environmental Stewardship: Assessing an Issue-based Approach to Teaching Evolution and Marine Conservation"
Marcia C. Linn (co-Chair), James D. Slotta (co-Chair), Barbara Y. White, Ian S. Carmichael

M.S. **University of Charleston, Charleston, SC**
Marine Biology, 1992

"Latitudinal Reproductive Variation in the Salt Marsh Turtle, the Diamondback Terrapin, *Malaclemys terrapin*"
Julian R. Harrison (Major Advisor), J. Whitfield Gibbons, Carl Whitney, Zhexi Luo

B.S. **University of Massachusetts, North Dartmouth, MA**
Biology and Marine Biology, 1989

Research Interests

Ocean Science Education

Little is known about student understanding of Earth's largest ecosystem: the ocean. What is the starting point of students' knowledge of ocean science? What is the character and nature of those ideas? What would an ocean science learning progression look like?

Use of Scientific Data in Science Learning

Environmental scientists rely more and more on new technologies, especially real-time data, to make sense of the complexities of their research domain. How can we bring these technologies and the real-time data they collect into classrooms in a meaningful and effective manner? What technological tools can be utilized or designed that promote evidence-based decision-making by students?

Science and Environmental Decision-making

Individual decisions about environmental sustainability have collective and long-term effects, yet the connection between knowledge construction and decision-making processes is not well understood. Does coherence or integration of cognitive scientific constructs have lasting decision-making impacts? To what extent does decision-making map onto other scientific process abilities such as argument construction or use of scientific evidence? Are there epistemological constraints associated with such decision-making abilities?

Integrating Formal (Classroom) and Informal (e.g., aquarium) Learning

Research in science education indicates that out-of-school experiences (e.g., visits to research sites, museums, aquariums, etc.) contribute significantly to learners' interests in and understanding of science. How can we best leverage technology to mediate science learning across formal and informal learning contexts? How can mobile technologies, such as handheld devices and wireless networks, improve learning "in the moment?" How can we design holistic curricula, incorporating curricular design with exhibit or field trip design, which promote knowledge integration?

Employment History

Rutgers University

Assistant Professor of Science Education

2008-Present

Joint Appointment in the Graduate School of Education and the School of Environmental and Biological Sciences. Teach courses on learning theory and pedagogical practice as they relate to science education, technology in education, and learning in informal learning contexts. Conduct research on student learning of science, particularly ocean science concepts, and on the design of Internet connected computer technologies including classroom-based and mobile technologies.

University of California, Berkeley, Lawrence Hall of Science

Program Manager, CA Center for Ocean Science Education Excellence

2006-2008

NSF Center – Center for Ocean Science Education Excellence (COSEE). Managing COSIA (Communicating Ocean Sciences to Informal Audiences), a large, \$1.8 million program funded by Informal Science Education at NSF, consisting of a consortium of 6 university/aquarium partnerships collaborating on training future marine scientists. Developed a university-level science majors' course on learning theory and pedagogy. Designed ocean science instructional materials and informal learning activities for communicating ocean science topics in informal learning contexts. Researched the development of K-12 ocean science learning progressions. Developed science instruction materials for K-2 students that extend informal learning experiences to the home. Investigated shifts in pedagogical epistemologies of science students exposed to learning theory.

University of California, Berkeley, Graduate School of Education

Graduate Student Researcher

2000-2005

NSF Center – Technology Enhanced Learning in Science (TELS). Designed, implemented, and evaluated science curricula and assessments that enacted a theoretical framework of learning and instruction. Developed and evaluated curricula in partnership with science disciplinary partners (e.g., the National Geographic Society, Monterey Bay Aquarium, National Oceanic and Atmospheric Administration). Researched curriculum materials that engaged students in developing their scientific understanding through knowledge building activities where they apply their knowledge to relevant ecological problems such as marine habitat destruction, invasive species or climate change. Designed and implemented new pedagogical methodologies and technology tools for integrating school and museum learning environments. Performed quantitative and qualitative analyses on student assessment data.

Coral Reef Alliance

Contractor

2002

Conducted a qualitative review of coral reef educational materials in an online library. Designed a tool for evaluating 500+ marine science education and outreach products in the library. Recommended guidelines for the development of coral reef conservation-focused materials

United States Environmental Protection Agency, Headquarters Office

National Program Manager

1997-2000

Managed national Clean Water Act Section 404 enforcement program. Coordinated Section 404 enforcement actions in 10 regional EPA offices. Wrote national environmental policy for EPA. Made policy decisions on the direction of EPA's national CWA 404 program. Prioritized and allocated resources, created long-term strategic plans, developed cost-benefit analyses, recommended program changes to increase efficiency. Analyzed scientific studies, reports and proposals. Reviewed enforcement cases, filings, etc. to ensure scientific validity.

United States Army Corps of Engineers, Headquarters Office

National Program Manager

1996-1997

Wrote and promulgated national environmental policy. Negotiated interagency (EPA, COE, USFWS, NMFS, USDA) agreements. Prepared and presented briefings and recommendations to and for White House officials, members of Congress, the Chief of Engineers, the Assistant Secretary of the Army, and Pentagon Officials. Supervised 11 NWP Task Force members during collation, analysis and response to over 4000 comments on the NWP Federal Register proposal. Wrote policy guidance to COE field personnel, other agencies and the public. Coordinated EPA, COE, USDA, DOJ staff and management during the creation of national policy.

United States Army Corps of Engineers, Charleston SC District Office

Project Manager

1992-1996

Evaluated environmental impacts to aquatic resources associated with permits and alleged violations. Designed and evaluated restoration and mitigation plans. Delineated wetlands. Managed several hundred enforcement cases annually. Directed/mediated interagency meetings between the public and federal, state and local agencies. Resolved conflicts among stakeholders. Interpreted environmental laws for the public.

South Carolina Department of Natural Resources, Marine Resources Research Institute

Research Assistant

1992

Captured, tagged, and released sea turtles to determine their frequency and abundance in Charleston harbor. Conducted underwater live bottom shoal research using videography and side-scan sonar techniques.

College of Charleston, Biology Department

1989-1992

Taught general biology and human anatomy and physiology laboratory sections to undergraduates.

University of Georgia, Savanna River Ecology Laboratory

1990-1992

Initiated and implemented original field research on diamondback terrapin nesting habits. Conducted nesting surveys, developed methodologies for collection of nesting parameters and performed statistical analysis of data. Captured, marked, released, and recaptured terrapins to obtain population dynamics data.

Massachusetts Audubon Society, Wellfleet Bay Wildlife Sanctuary

1989

Taught outdoor environmental education classes to students in grades K-10. Conducted 3-hour informational cruises: captured and identified organisms and explained their life histories to MA Audubon Society members.

Publications

Books and Monographs

Payne, D.L. & Zimmerman, T.D. (in review). Beyond terra firma: Bringing Ocean and Aquatic Sciences to Science Teacher Education. *ASTE Monograph: The Inclusion of Environmental Education in Science Teacher Education*.

Darling-Hammond, L., Barron, B., Pearson, P.D., Shoenfeld, A.H., Stage, E.K., Zimmerman, T.D., Cervetti, G.N., & Tilson, J.L. (2008). *Powerful learning: What we know about teaching for understanding*. San Francisco, CA: Jossey-Bass.

Zimmerman, T.D. (2005). *Promoting knowledge integration of scientific principles and environmental stewardship: Assessing an issue-based approach to teaching evolution and marine conservation*. Unpublished doctoral dissertation, University of California, Berkeley.

Zimmerman, T.D. 1992. Latitudinal Reproductive Variation in the Salt Marsh Turtle, the Diamondback Terrapin, *Malaclemys terrapin*. Unpublished master of science thesis, University of Charleston, Charleston, SC.

Book Chapters

Zimmerman, T.D. & Stage, E.K. (2008). Teaching science for understanding. In L. Darling-Hammond (Ed.) *Powerful learning: Teaching for understanding in the classroom*. (pp. 151-191) San Francisco, CA: Jossey-Bass.

Peer Reviewed Publications

Lovich, J.E., A.D. Tucker, D.E. Kling, J.W. Gibbons, and T.D. Zimmerman. 1991. Behavior of hatchling diamondback terrapins (*Malaclemys terrapin*) released in a South Carolina salt marsh. *Herpetological Review* 22(3):81-83.

Works in Progress

Zimmerman, T.D. (in prep). Science and environmental decision-making: Implications from a high school ocean science curriculum.
Zimmerman, T.D. & Slotta (in prep). A knowledge integration approach to learning about evolution.

Fellowships, Grants, and Awards

Research Grants

2008 Principle Investigator: "Learning Across Contexts: Evidence of Science Learning Through Field Trip Conversations." 1-yr, \$24,524 award to conduct research in science education. Funded by the Rutgers University's School of Environmental and Biological Sciences Pre-tenure competitive grant program.
2006 Co-Principle Investigator: A Learning Progression for Ocean Sciences Grades K-5. A 4-year, \$3.3 million preliminary proposal to NSF's Discovery Research K-12 Program. This pre-proposal received high marks during peer review, however a full proposal was not submitted due to uncontrollable circumstances.
2001 - 2002 Co-Principal Investigator: Palm Educational Partnership Research Hub Award. The WISE- Palm Research Partnership. [\$149,500 in technology for a one year research plan].
1991 - 1992 Principle Investigator: Slocum-Lunz Foundation Graduate Research Grant – Awarded to purchase equipment for field research on diamondback terrapins in South Carolina.

Fellowships

UC Berkeley University Fellowship – Awarded to conduct research on the use of technology in marine science education. Academic year 2003-2004.
UC Berkeley University Fellowship – Awarded to continue development of a research program that integrates formal and informal science learning. Academic year 2002-2003.
Spencer Research Center Graduate Training Fellowship – Awarded to develop and assess curricula integrating formal and informal science learning environments and that focus on marine conservation concepts. Academic year 2001-2002.
NSF Science and Design Fellowship – Awarded to develop and assess a technology based curriculum in marine science. Academic year 2000-2001.

Awards

Certificate of Recognition, U.S. Department of Justice – May, 2000
Certificate of Recognition, U.S. Department of Justice – May, 1999
Outstanding Performance Commendation, U.S. Department of the Army – February, 1996
Letter of Appreciation, U.S. Department of the Army, Headquarters Office – February, 1995

Peer Reviewed Presentations

- Zimmerman, T.D., Halversen, C., Strang, C. (March, 2008). *Promoting and researching sustainable scientist-informal education partnerships: The COSEE-CA COSIA Model*. Paper presentation at the 2008 Ocean Sciences Meeting. Orlando, FL.
- Zimmerman, T.D. (Jan., 2008). *Ocean misconceptions, Ocean Literacy Principles and their role in advancing scientific literacy*. Paper presentation at the Association for Science Teacher Education 2008 International Conference. St. Louis, MO.
- Peach, C., Yasuda, M., Senise, M., Zimmerman, T.D. (Dec., 2007). *Earth and ocean sciences online: A strategic partnership to bring research science into middle and high school classrooms*. Paper presentation at the American Geophysical Union Annual Conference. San Francisco, CA.
- Zimmerman, T.D., Halversen, C., Strang, C. (Nov., 2007). *Preparing Future Generations of Scientists for Cross-discipline Communication and Collaboration: The Communicating Ocean Sciences Model*. Paper presentation at the Estuarine Research Federation Biennial Conference. Providence, RI.
- Strang, C., & Zimmerman, T.D. (July, 2007). *Ocean literacy: Concept flows for grades K-5*. Presentation at the National Association of Marine Educators Annual Meeting. Portland, ME.
- Zimmerman, T.D. & Slotta, J.D. (April, 2007). *Connecting science to real world issues: A knowledge integration approach*. Paper presentation at the Annual Meeting of the American Educational Research Association. Chicago, IL.
- Glenn, S., McDonnell, J., Halversen, C., & Zimmerman, T.D. (Dec., 2006). *Communicating Ocean Sciences to Informal Audiences (COSIA): Universities, oceanographic institutions, science centers, and aquariums working together to improve ocean education and public outreach*. Poster presentation at American Geophysical Union Annual Conference. San Francisco, CA.
- Zimmerman, T.D. & Brown, J. (Sept., 2006). *Ocean protection through effective communication: Ocean knowledge, misconceptions and public opinion*. Poster presentation at California and The World Ocean Conference. Long Beach, CA.
- Slotta, J.D., Aleahmad, T. & Zimmerman, T. (April, 2005). *Scaffolding interactive learning: The case for a rich interoperability framework*. Poster presentation at the Annual Meeting of the American Educational Research Association. Montreal, Quebec, Canada.
- Slotta, J.D. & Zimmerman, T. D. (April, 2004). *Integrating handheld activities into Web-based inquiry projects*. Paper presentation at the Annual Meeting of the American Educational Research Association. San Diego, CA.
- Zimmerman, T.D. & Slotta, J.D. (April, 2003). *Helping students understand complex biology concepts through knowledge integration activities in the classroom and at an aquarium*. Paper presentation at the Annual Meeting of the American Educational Research Association. Chicago, IL.
- Slotta, J.D. & Zimmerman, T. (Feb., 2002). *Designing marine science technology-mediated curricula that integrate formal and informal learning environments*. Poster presentation at CLT Ubiquitous Computing: Handhelds in Education conference. Hillsboro, OR.
- Sisk-Hilton, S. & Zimmerman, T. (March, 2002). *WISE science: Promoting technology rich inquiry-based science learning*. Symposium presented at the San Mateo Science Teachers Association Conference. San Mateo, CA.
- Zimmerman, T.D. 1992. *Latitudinal Reproductive Variation in the Salt Marsh Turtle, the Diamondback Terrapin, Malaclemys terrapin*. Presented at the Southeastern Estuarine Research Association Spring Meeting. North Topsail Beach, NC.

Invited Presentations

- Zimmerman, T.D. (Nov. 2007). *Ocean Education and Environmental Literacy Theme*. Invited panelist for the Sea Grant West Coast Regional Research and Information Needs Planning Workshop. Oakland, CA.
- Zimmerman, T.D. (Aug., 2007). *Communicating for Understanding*. Invited presentation on the implications of current learning theory for communicating difficult ocean science concepts. California Ocean Communicators Alliance Workshop. Santa Barbara, CA.

- Zimmerman, T.D. (March, 2006). *Technology, focused content, educational theory, principled pedagogy*. Invited talk to the Moss Landing Marine Laboratory Wireless Interactive Interpretive Program development team. Moss Landing, CA.
- Zimmerman, T.D. (June, 2002). *The data dilemma, the WISE solution: Using real data in real classrooms*. Invited talk at the Tagging of Pacific Pelagics (TOPP) Education and Outreach Development Workshop. Monterey, CA.
- Zimmerman, T.D. (March, 2002). *WISE: A science education technology platform*. Invited talk at the Monterey Bay Aquarium Research Institute's EARTH - Education And Research: Testing Hypotheses workshop entitled "Education and real-time data workshop: Where should the two meet?" Monterey, CA.
- Slotta, J., & Zimmerman, T. (Oct., 2001). *The Web-based Inquiry Science Environment (WISE): Integrating inquiry and technology into the science curriculum*. Invited talk at the EarthTeam Teacher Professional Development Meeting. Berkeley, CA.
- Zimmerman, T.D. (June, 2001). *Teaching marine science using WISE technology*. Invited workshop presentation at the Monterey Bay Aquarium Teacher's Workshop. Monterey, CA.
- Zimmerman, T.D. (June, 2000). *Technical aspects of wetland delineation for purposes of CWA Section 404 enforcement cases*. Invited presentation at the U.S. Department of Justice Environmental Defense Section Annual Meeting. Washington, DC.

Teaching, Mentoring & Curriculum Design

University Courses and Lectures

Instructor/Co-Instructor

- * University of California, Berkeley, Graduate School of Education: "Environmental Education Reading Group" – Fall '07
- * University of California, Berkeley, Integrative Biology: "Communicating Ocean Sciences" - SP '06, '07
- * University of California, Berkeley, Environmental Science Policy and Management: "Knowing when 2+2 is more than 4: The art and science of systems dynamics." -
- * College of Charleston, Biology Department: "General Biology" labs – Fall '89, Fall '90, SP '91; "Human Anatomy and Physiology" lab –Fall '91

Guest Lecturer

- * George Washington University Law School, Washington, DC
- * Clemson University, Forestry Department

Informal Teaching Experience

- * California State Parks, Ano Nuevo State Wildlife Reserve – led interpretive walks amongst breeding population of elephant seals.
- * Charleston County Parks and Recreation Commission – taught outdoor, hands-on environmental education classes.
- * MA Audubon Society - taught week long, hands-on environmental education and marine science classes to diverse K-10 students
- * Earthwatch Terrapin Project - Initiated a Barrier Island Ecology course taught to high school teachers and undergraduates; 5, one-day-long classes each summer for 4 years
- * Charleston District, COE - Co-taught a 2 day seminar to the Savannah District, COE on procedures for enforcing laws and regulations under COE jurisdiction.

Curriculum Design

- * "Communicating Ocean Sciences to Informal Audiences" – Co-developed this course being taught to marine science graduate/undergraduate students at 6+ universities nationwide.
- * "WISE Birds of a Feather Evolve Together" – Co-developed this technology-mediated high school biology curriculum

- * "Knowing when 2+2 is more than 4: The art and science of systems dynamics." – Developed this freshman seminar course designed to engage freshman college students in systems thinking activities in an environmental science context
- * "WISE Adaptation to Habitat: Where have all the fish gone?" – Developed and assessed a web-enabled marine science curriculum, in collaboration with the Monterey Bay Aquarium. The curriculum challenges students to explore current marine conservation issues and promotes a rich and integrated understanding of environmental science concepts
- * "WISE Ocean Stewards" – Designed and evaluated this marine science curriculum, in conjunction with the National Geographic Society and the US National Oceanic and Atmospheric Administration, focused on the National Marine Sanctuaries and marine conservation
- * "Green Horizons" – Contributed content to this bound, but unpublished college level environmental curriculum designed to engage non-science majors in critical thinking exercises about everyday environmental issues such as recycling, water pollution and household toxic waste
- * Designed environmental science curricula for the Charleston County Parks and Recreation Commission

Master's Degree Students Mentored

- * Eric Teruel – Mentored/advised on curriculum design and master's research. M.Ed. received May 2006
- * Amy Holloway – Mentored/advised on curriculum design and master's research. M.Ed. received May 2005

Doctoral Degree Students Mentored

- * Edward Cohen – Advising Edward as he prepares for his doctoral program qualifying exams. Doctoral Committee Member.
- * Celeste Frazier Barthel – Oregon State University. Outside member of Celeste's Doctoral Committee. Ph.D. expected May 2009.
- * Janet Casperson – Mentored during first year of her doctoral program at UC Berkeley.

Professional Service

Advisory Committees

- * Education Committee Co-Chair, International Marine Conservation Congress – Spring '08-present
- * CA Ocean Communicator's Alliance – Steering Committee Advisor. February, 2006 – July, 2008
- * Moss Landing Marine Laboratory Wireless Interactive Interpretive Program: Lisa Uttal, PI. – Educational Technology and Learning Sciences Advisor. January, 2006-2007

Board Member

- * Marine Science Institute, Redwood City, CA – May, 2005 - April, 2006

Reviewer

- * Grant Proposal Reviewer – National Science Foundation
- * Conference Proposal Reviewer – American Educational Research Association
- * Journal Reviewer – Public Understanding of Science
- * Journal Review – Journal of Research in Science Teaching

Professional Affiliations/Service Activities

Association for Science Teacher Education (ASTE)
 American Educational Research Association (AERA)
 International Society of the Learning Sciences (ISLS)
 National Association for Research in Science Teaching (NARST)
 American Association for the Advancement of Science (AAAS)
 Estuarine Research Federation (ERF)