

CESAR DELGADO, ASSOCIATE PROFESSOR

<https://scholar.google.com/citations?user=-SiTMfMAAAAJ&hl=en&oi=ao>

Department of STEM Education
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EDUCATION

PhD, Educational Studies (Science Education), *University of Michigan*, Ann Arbor, MI 2009
Dissertation: *Development of a research-based learning progression for middle school through undergraduate students' conceptual understanding of size and scale*
27 Cites - Google Scholar 9/20/19

MS, Chemistry, *University of Michigan*, Ann Arbor, MI 2008

MA, Educational Studies (Learning Technologies), *University of Michigan*, Ann Arbor, MI 2008

MA, Secondary Education, *University of Alabama*, Tuscaloosa, AL 2003

BS, Chemical Engineering, *University of California at Los Angeles*, Los Angeles, CA

PROFESSIONAL APPOINTMENTS

Associate Professor with Tenure 2018-present
Assistant Professor 2015-2018
STEM Education
North Carolina State University

Assistant Professor 2009-2015
Department of Curriculum and Instruction, Science and Mathematics Education
University of Texas at Austin

Research Assistant 2008
Instructional Development & Education Assessment Institute, *University of Michigan*

Research Assistant 2006-2009
National Center for Learning and Teaching in Nanoscale Science and Engineering, *University of Michigan*

Research Assistant 2004-2005
BioKIDS. *University of Michigan*

Science Teacher, American School Foundation, Mexico City, Mexico 2001-2004
Science Teacher, Westwood Institute, Mexico City, Mexico 1998-2001
Science Teacher, Colegio Peterson, Mexico City, Mexico 1997-1998

HONORS, AWARDS, AND COMPETITIVE FELLOWSHIPS

Publons Top Peer Reviewer (top 1% social sciences, #7 in world and #2 in US) 2019

for science education) Outstanding Teacher Award (University Level), NCSU	2019
Advisee won the MA-ASTE Dr. Patricia A. Obenauf Graduate Student Research Presentation Award. This award includes \$800 to travel to the national ASTE Meeting in Baltimore in January 2018.	2017
Advisee won Honorable Mention, NSF Graduate Research Fellowship Program (GRFP)	2016
Dean's Fellowship, College of Education, The University of Texas at Austin. Two-course release and \$3000 research stipend.	2013
Early Career Workshop, International Conference of the Learning Sciences (ICLS). Sydney, Australia. Included \$1750 travel stipend through NSF.	2012
School of Education Scholar's Award Fellowship, University of Michigan.	2004-2009
Doctoral Consortium, International Conference of the Learning Sciences (ICLS). Utrecht, Holland. Included \$1500 travel stipend through NSF.	2008
Equity Scholar Award, National Association for Research in Science Teaching (NARST), Baltimore, MD. \$500 travel stipend through NARST.	2008
Social Science Summer Training Award, Institute for Social Research. Ann Arbor, MI. Tuition waiver.	2007
Middle School Teacher of the Year; High School Co-Teacher of the Year. Westhill Institute, Mexico City, Mexico.	2000

RESEARCH METRICS

h-index: 12 (12 publications cited at least 12 times)

i10-index: 13 (13 publications cited at least 10 times)

g-index: 26 (top 26 cited publications cited 26 times on average)

681 citations (Google Scholar 9/20/19)

PUBLICATIONS IN PEER-REVIEWED JOURNALS (17)

* Co-author was a graduate student working with me at the time of submission

- J1.** Hui, J., **Delgado, C.**, Bauer, M., Wylie, C., & Llord, K. (accepted). A hypothetical learning progression for quantifying phenomena in science. *Science & Education*.
- J2.** Lucero, M., **Delgado, C.**, & Green, K.* (early view). An exploration of high school biology teachers' knowledge of students' conceptions regarding natural selection. *International Journal of Science and Mathematics Education*. Accepted July 2019

- J3.** You, H. S., **Delgado, C.**, & Marshall, J. (early view). Toward interdisciplinary learning: Development and validation of an assessment for interdisciplinary understanding of global carbon cycling. *Research in Science Education*.
- J4.** Green, K.*, Langerhans, B., Dempsey, M., & **Delgado, C.** (April/May 2018). The evolution of a partnership: How a scientist, a teacher, and a researcher brought real-world science to students. *Science Scope*.
 “Science Scope is an award-winning, peer-reviewed, practitioners' journal for grade 6–8 teachers, university faculty responsible for teacher preparation, and state and district science supervisors and leaders.”
- J5.** You, H. S., Marshall, J., & **Delgado, C.** (2018). Assessing students’ disciplinary and interdisciplinary understanding of global carbon cycling. *Journal of Research in Science Teaching*, 55(3), 377-398. <https://doi.org/10.1002/tea.21423>.
 (JRST is the top-ranked science education research journal. 2015 ISI impact factor = 3.052. Rank 6/231 education and education research journals. Acceptance rate: 12.5%)
9 Cites - Google Scholar 9/20/19
- J6.** **Delgado, C.**, Jones, M. G., You, H. S., Robertson, L., Chesnutt, K.*, & Halberda, J. (2017). Scale and the evolutionarily-based Approximate Number System: An exploratory study. *International Journal of Science Education* 39(8), 1008-1024.
 (IJSE is a top-tier science education research journal. 2016 ISI Journal Citation Reports impact factor = 1.240, ranked 103 out of 235 education and education research journals.)
5 Cites - Google Scholar 9/20/19
- J7.** Lucero, M., Petrosino, A., & **Delgado, C.** (2017). Exploring the relationship between secondary science teachers’ subject matter knowledge and knowledge of student conceptions while teaching evolution by natural selection. *Journal of Research in Science Teaching* 54(2), 219-246. <https://doi.org/10.1002/tea.21344>.
 (JRST is the top-ranked science education research journal. 2016 ISI impact factor = 3.179. Rank 9/235 education and education research journals. Acceptance rate: 12.5%)
7 Cites - Google Scholar 9/20/19
- J8.** **Delgado, C.**, & Lucero, M.* (2015). Scale construction for graphing: An investigation of students’ resources. *Journal of Research in Science Teaching*, 52(5), 633-658. <https://doi.org/10.1002/tea.21205>.
 (JRST is the top-ranked science education research journal. 2015 ISI impact factor = 3.052. Rank 6/231 education and education research journals. Acceptance rate: 12.5%)
8 Cites - Google Scholar 9/20/19
- J9.** **Delgado, C.** (2015). Navigating tensions between conceptual and metaconceptual goals in the use of models. *Journal of Science Education and Technology* 24(2-3), 132-147. <https://doi.org/10.1007/s10956-014-9495-7>.
 (JOST is a top journal for technology in science education research. 2015 ISI impact factor = 1.12. Rank 23/40 “education, scientific disciplines” journals. Acceptance rate: 21%)
8 Cites - Google Scholar 9/20/19
- J10.** **Delgado, C.**, Stevens, S. Y., Shin, N., & Krajcik, J. S. (2015). A middle school instructional unit for size and scale contextualized in nanotechnology. *Nanotechnology Reviews* 4(1), 51-69. <https://doi.org/10.1515/ntrev-2014-0023>.

(Nanotechnology Reviews is ranked 44th out of 83 nanoscience & nanotechnology, 70th of 163 chemistry, and 104th out of 271 materials science journals. 2015 ISI impact factor = 2.044.)
16 Cites - Google Scholar 9/20/19

- J11. Delgado, C. (2014).** Collective landmarks for deep time: A new tool for evolution education. *Journal of Biological Education* 48(3), 133-141. DOI: 10.5408/12-300.1. (“Journal of Biological Education is firmly established as the authoritative voice in the world of biological education.” 2015 ISI Impact factor = 0.507. Rank 33/40 “education, scientific disciplines” journals.)
12 Cites - Google Scholar 9/20/19
- J12. Tang, K., Delgado, C., & Moje, E. (2014).** An integrative framework for the analysis of multiple and multimodal representations for science meaning-making in science education. *Science Education* 98(2), 305-326. <https://doi.org/10.1002/sce.21099> (Science Education is a top-tier science education research journal. 2013 ISI Impact factor = 2.921. Rank 8/219 education and education research journals.)
64 Cites - Google Scholar 9/20/19
- J13. You, H. S.*, & Delgado, C. (2014).** Toward an interdisciplinary science curriculum: Analysis of the connections across science learning progressions. *International Journal for Cross-Disciplinary Subjects in Education* 4(1), 1854-1862. (IJCDSE is a peer-reviewed, open access journal, published quarterly. Indexing Citation Board Impact factor = 5.214 calculated.)
3 Cites - Google Scholar 9/20/19
- J14. Delgado, C. (2013).** Cross-cultural study of understanding of scale and measurement: Does the everyday use of US customary units disadvantage US students? *International Journal of Science Education* 35 (8), 1277-1298. (IJSE is a top-tier science education research journal. 2013 ISI Journal Citation Reports impact factor = 1.516, rank 31/ 219 education and education research journals.)
8 Cites - Google Scholar 9/20/19
- J15. Delgado, C. (2013).** Navigating deep time: Landmarks for time from the Big Bang to the present. *Journal of Geoscience Education* 61(1), 103-112. (“The Journal of Geoscience Education is the premier peer-reviewed publication for geoscience education research at the undergraduate and pre-college levels. JGE is the publication of record for NAGT, and serves as the only international forum for the publication of research concerning the pedagogy, assessment, and philosophy of teaching and learning about the geosciences.” 2013 Scimago Impact factor 0.486)
13 Cites - Google Scholar 9/20/19
- J16. Stevens, S., Delgado, C., & Krajcik, J. (2010).** Developing a hypothetical multi-dimensional learning progression for the nature of matter. *Journal of Research in Science Teaching* 47(6), 687-715. <https://doi.org/10.1002/tea.20324>. (JRST is the top-ranked science education research journal. 2010 ISI impact factor = 2.728. Rank 4/184 education and education research journals. Acceptance rate: 12.5%)
259 Cites - Google Scholar 9/20/19
- J17. Beyer, C., Delgado, C., Davis, E., & Krajcik, J. (2009).** Investigating teacher learning supports in high school biology curricular programs to inform the design of educative curriculum materials. *Journal of Research in Science Teaching* 46(9), 977-998. <https://doi.org/10.1002/tea.20293>.

(JRST is the top-ranked science education research journal. 2009 ISI impact factor = 1.910. Rank 13/139 education and education research journals. Acceptance rate: 12.5%)
105 Cites - Google Scholar 9/20/19

BOOK CHAPTERS, ENCYCLOPEDIA ENTRIES, AND REPORTS (5)

- Ch1.** Delgado, C., Jones, M. G., & Parker, D. (forthcoming). Crosscutting concept: Scale, proportion, and quantity. In J. Nordine & O. Lee (Eds.), *Crosscutting Concepts*. Arlington, VA: NSTA Press.
- Ch2.** Delgado, C. (2012). Spatial thinking and dimensionality. In K. Kastens & C. Manduca (Eds.), *Earth and mind 2: A synthesis of research on thinking and learning in the geosciences*. Special Paper 486. Boulder, CO: Geological Society of America.
2 Cites - Google Scholar 9/20/19
- Ch3.** Delgado, C. & Krajcik, J. (2010). Technology supports for science learning. In E. Baker, P. Peterson, & B. McGraw (Eds.), *The International Encyclopedia of Education* (3rd Edition). Oxford: Elsevier. DOI: 10.1016/B978-0-08-044894-7.00729-6.
12 Cites - Google Scholar 9/20/19
- Ch4.** Cahill, C., Delgado, C., & Song, M. (2010). Engaging students in content learning and scientific critique through a nanoscience context. In R. E. Yager (Ed.), *Exemplary science for resolving societal challenges*. Arlington, VA: NSTA Press.
- Ch5.** Beyer, C., Delgado, C., Davis, E. A., & Krajcik, J. S. (2006). Investigating high school biology texts as educative curriculum materials: Curriculum review process (Report).
10 Cites - Google Scholar 9/20/19

PUBLISHED PEER REVIEWED CONFERENCE PROCEEDINGS/ABSTRACTS (14)

- CP1.** Yoon, S., Delgado, C., McKenna, T. J., Krajcik, J. S., Levites, L. & Sussman, A. (2019). The integration of cross-cutting concepts in three-dimensional learning. In S. J. Fick, J. Nordine, J., & K. W. McElhaney, *Proceedings of the summit for examining the potential for crosscutting concepts to support three-dimensional learning*. Charlottesville, VA: University of Virginia. Retrieved from <http://curry.virginia.edu/CCC-Summit>.
- CP2.** Delgado, C., & Peterson, M. (2018). An enhanced framework for scale cognition leveraging visual metaphor theory and analogical reasoning theory. In J. Kay & R. Luckin (Eds.), *Rethinking learning in the digital age: Making the learning sciences count*. 13th International Conference of the Learning Sciences (ICLS), volume 3 (pp. 1607-8). London, UK: International Society of the Learning Sciences.
- CP3.** You, H.-S.* & Delgado, C. (2014). Weaving an interdisciplinary science curriculum: Analysis of the connections across learning progressions. In C. A. Shoniregun & G. A. Akmayeva (Eds.), *Canada International Conference on Education Conference Proceedings* (pp. 68-71). Basildon, UK: CICE.
- CP4.** Delgado, C., & Lucero, M.* (2014). Students' resources for the construction of scales for graphing. In J. L. Polman, E. A. Kyza, D. K. O'Neill, I. Tabak, W. R. Penuel, A. S. Jurow, K. O'Connor, T. Lee, & L. D'Amico (Eds.), *Learning and becoming in practice:*

Proceedings of the International Conference of the Learning Sciences (ICLS), volume 1 (pp. 262-269). Boulder, CO: International Society of the Learning Sciences.
(Acceptance rate for full papers: 30%)

- CP5. Delgado, C., & Morton, K.*** (2012). Learning progressions, learning trajectories, and equity. In van Aalst, J., Thompson, K., Jacobson, M. J., & Reimann, P. (Eds.) (2012). *The future of learning: Proceedings of the 10th International Conference of the Learning Sciences (ICLS 2012) – Volume 1, Full papers*, pp. 204-211. International Society of the Learning Sciences: Sydney, NSW, Australia.
(Acceptance rate for full papers: 30%)
2 Cites - Google Scholar 9/20/19
- CP6. Delgado, C.** (2010). Units of length: A notational system for conceptual understanding of size and scale. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *Learning in the disciplines: Proceedings of the 9th International Conference of the Learning Sciences (ICLS)*. Vol. 2. pp. 362-363. Chicago: International Society of the Learning Sciences.
7 Cites - Google Scholar 9/20/19
- CP7. Pellegrino, J., Krajcik, J., Stevens, S., Swarat, S., Shin, N., Delgado, C., et al.** (2008). Using Construct-Centered Design to align curriculum, instruction, and assessment development in emerging science. In G. Kanselaar, V. Jonker, P.A. Kirschner, & F. Prins, (Eds.). *Proceedings from ICLS '08: International perspectives in the Learning Sciences: Creating a learning world* (vol. 3, pp. 314-21). Utrecht, the Netherlands: International Society of the Learning Sciences.
14 Cites - Google Scholar 9/20/19
- CP8. Cahill, C., Stevens, S., Shin, N., Delgado, C., Krajcik, J., & Yunker, M.,** (2007). Using small-group discussions to assess student learning of nanoscale concepts. *Abstracts of Papers of the American Chemical Society 233*, 639-639.
- CP9. Shin, N., Quintana, C., Delgado, C., Stevens, S., & Krajcik, J.** (2007). The nanoworld: Research-driven design process. *Abstracts of Papers of the American Chemical Society 233*, 657-657.
- CP10. Stevens, S., Krajcik, J., Delgado, C., Elgammal, R., Quintana, C., Rosenquist, A., ... & Yunker, M.** (2007). Identification of the big ideas in nanoscience. *Abstracts of Papers of the American Chemical Society 233*, 678
- CP11. Delgado, C., Stevens, S., & Krajcik, J.** (2007). Size and scale curricular activities for middle school. *Abstracts of Papers of the American Chemical Society 233*, 674-674
- CP12. Delgado, C., Stevens, S., & Krajcik, J.** (2007). Students' conceptions of size. *Abstracts of Papers of the American Chemical Society 233*, 666-666.
- CP13. Hutchinson, K., Stevens, S., Shin, N., Delgado, C., Yunker, M., Bodner, G., Giordano, N., & Krajcik, J.** (2007). Secondary students' interests in nanoscience concepts and phenomena. *Abstracts of Papers of the American Chemical Society 233*, 761-731.

- CP14.** Stevens, S., **Delgado, C.**, Shin, N., & Krajcik, J. (2007). Developing and validating a learning progression for the nature of matter. *Abstracts of Papers of the American Chemical Society* 233, 661-661.
1 Cite - Google Scholar 9/20/19

PUBLICATIONS IN MEXICAN JOURNALS (4)

- MX1.** **Delgado, C.** (2002). Dinámica de grupos e identificación proyectiva en el contexto escolar (Group dynamics and projective identification in the school context). *Revista Mexicana de Pedagogía* 13(66), 3-9, 13(67), 19-23.
Revista Mexicana de Pedagogía publishes theoretical papers, position papers, and analyses. It is aimed at education policy makers.
- MX2.** Castro, M., **Delgado, C.**, & Signoret, A. (2000-2001). Los cuentos de hadas en la pedagogía nacional (Fairy tales in Mexican pedagogy). *Revista Mexicana de Pedagogía* 11(55), 26-31, 12(56), 20-24, 12(57), 15-21.
Revista Mexicana de Pedagogía publishes theoretical papers, position papers, and analyses. It is aimed at education policy makers.
- MX3.** **Delgado, C.** (1999). Un ejercicio constructivista en química (A constructivist exercise in chemistry). *Correo del Maestro* 4(40), 5-9.
Correo del Maestro is a practitioner journal for all school subjects.
- MX4.** Delgado, C. (1999). Cómo fomentar el pensamiento abstracto en clase de matemáticas (Encouraging abstract thought in mathematics class). *Correo del Maestro* 3(34), 5-7.
Correo del Maestro is a practitioner journal for all school subjects.

MANUSCRIPTS UNDER REVIEW (3)

- UR1** Chesnutt, K., Jones, M. G., & **Delgado, C.** (under review). The Approximate Number System, a basis for thinking about quantity: Evidence, measurement, and implications for education. *Educational Research Review*. Submitted July 2017.
- UR2** You, H. S., **Delgado, C.**, & Park, S. (revised and resubmitted). What school-level factors influence scientific literacy? A multi-level analysis using PISA 2015. *Journal of Research in Science Teaching*. Resubmitted September 2019.
- UR3** You, H. S., **Delgado, C.**, & Park, S. (revised and resubmitted). Interdisciplinary Science Assessment of Carbon Cycling: Construct validity evidence based on internal structure. *Research in Science Education*. Resubmitted May 2019.

MANUSCRIPTS IN PREPARATION (6)

- IP1.** **Delgado, C.**, Aksit, O.*, You, H. S., Breecker, D. O., & Barnes, J. D. (in preparation). Teaching about age of events and duration of processes in an undergraduate geoscience course. Target: *Journal of Geoscience Education*
- IP2.** You, Delgado. Interdisciplinary approach in carbon cycling: Experts' conceptions and the US standards. Target: *International Journal of Science Education*

- IP3.** **Delgado, C.**, Green, K.*, Domenico, P., & Pierrie, T. (in preparation). Professional development model for project based learning and community engagement. Target: *Journal of Science Teacher Education*
- IP4.** **Delgado, C.**, & Alexander, A.* (in preparation). Conventions for line graph construction: Synthesizing 100 years of standards. Target: *Science & Education*
- IP5.** **Delgado, C.** (in preparation). Graphing practices in introductory astronomy textbooks: Conventions in tension with aesthetics and pedagogical aims. Target: *Physical Review Physics Education Research*
- IP6.** **Delgado, C.**, Norville, K., Han, K., Lobatón, E., & Wu, T-F. (in preparation). Assessing the effectiveness of individual learning in a realistic engineering design class. Target: *Advances in Engineering Education*

PRESENTATIONS AT PROFESSIONAL MEETINGS WITHOUT PROCEEDINGS OR ABSTRACTS (52)

* Co-author was a graduate student working under my supervision at the time of submission

^ Co-author was an undergraduate student of mine at the time of submission

- C1.** **Delgado, C.** (2019, August). *Students' views on the "categorical imperative" of avoiding contradiction*. Paper presented at the European Science Education Research Association Conference (ESERA). Bologna, Italy.
- C2.** Green, K.*, & **Delgado, C.** (2019, August). *Navigating cultural borders: An evolution intervention in an undergraduate biology class*. Paper presented at ESERA. Bologna, Italy.
- C3.** You, H. S., Park, S., & **Delgado, C.** (2019, April). *What school-level factors influence scientific literacy? A multi-level analysis using PISA 2015*. Paper presented at the American Educational Research Association (AERA) Annual Conference. Toronto, Canada.
(AERA is the leading educational research conference in the US.)
- C4.** Green, K.*, & **Delgado, C.** (2019, April). *Synthesizing frameworks of evolution learners: A promising new direction*. Paper presented at AERA. Toronto, Canada.
- C5.** **Delgado, C.**, Peterson, M., Norville, K.*, & Bordas, C.* (2019, April). *Interpretational functions of imagery in instructional media for science education*. Paper presented at NARST. Baltimore, MD.
(NARST formerly stood for National Association for Research in Science Teaching and is the premier science education research conference in the world. NARST is now an international organization.)
- C6.** Jin, H., **Delgado, C.**, Bauer, M., Wylie, E. C., Llord, K. F., & Cisterna, D. (2019, April). *Bases for developing a hypothetical learning progression for quantification in science*. Paper presented at NARST. Baltimore, MD.
- C7.** Smith, C. R.*, & **Delgado, C.** (2019, April). *Applying a K-12 consensus model to science teaching assistant professional development*. Paper presented at NARST. Baltimore, MD.

- C8. Delgado, C.,** Norville, K.* , Han, K., Lobaton, E., & Wu, T. (2019, March). *Assessing the effectiveness of individual learning in a realistic engineering design class*. Paper presented at the American Society for Engineering Education (ASEE), Southeast Conference. Raleigh, NC.
 (“The purpose of ASEE is the advancement of education in all of its functions which pertain to engineering and allied branches of science and technology, including the processes of teaching and learning, counseling, research, extension services and public relations..”)
- C9. Delgado, C.** (2019, March). *Integrating science, mathematics, and technology through project-based learning (90-min workshop)*. Paper presented at the International Consortium for Research in Science and Mathematics. San José, Costa Rica.
 (ICRSME fosters the advancement of science and mathematics education in developing countries, focusing on “programs for collaborative research, curriculum development, instructional improvement, academic exchange, teacher education and professional development, innovation initiatives, and shared resource opportunities.”)
- C10. Delgado, C., & Peterson, M.** (2018, June). *An enhanced framework for scale cognition leveraging visual metaphor theory and analogical reasoning theory*. Paper presented at the International Conference of the Learning Science (ICLS), London, England.
 (“The International Conference of the Learning Sciences (ICLS), first held in 1992 and held bi-annually since 1996, hosts keynotes, symposia, workshops, panels, submitted paper sessions, poster sessions, and demos covering timely and important issues and reporting research findings across the entire field of the learning sciences.”)
- C11. Delgado, C., & You, H. S.** (2018, April). *Interdisciplinary connections in the NGSS: Realizing the vision*. Paper presented at AERA. New York, NY.
- C12. NARST. You, H.S., Delgado, C., & Marshall, J.** (2018, March). *Assessing students' disciplinary and interdisciplinary understanding of global carbon cycling*. Paper presented at NARST, Atlanta, GA.
- C13. Green, K.* , & Delgado, C.** (2018, March). *A novel model for professional development in project-based learning, evaluated*. Paper presented at NARST, Atlanta, GA.
- C14. Lucero, M., Green, K.* , & Delgado, C.** (2018, March). *An exploration of high school biology teachers' knowledge about students' natural selection ideas*. Paper presented at NARST, Atlanta, GA.
- C15. Green, K.* , & Delgado, C.** (2018, January). *Teleological alternative conceptions about evolution in pre-service and in-service science teachers*. Paper presented at Association for Science Teacher Education (ASTE), Baltimore, MD.
 (ASTE strives to be the leading voice in the areas of research and policy development related to the enhancement of science teaching.)
- C16. Aksit, O.* , Delgado, C., & Green, K.*** (2017, April). *Undergraduates' knowledge of age of events and duration of processes in geoscience*. Paper presented at AERA, San Antonio, TX.

- C17.** **Delgado, C.** (organizer, presenter), Anderson, D., Green, K.*, Lucero, M., Nason, M., Sutherland, S. (discussant). (2017, April). *New directions and longstanding issues in assessment of evolutionary knowledge*. Symposium held at the NARST International Conference, San Antonio, TX.
- C18.** You, H. S., Marshall, J., & **Delgado, C.** (2017, April). *Toward interdisciplinary science learning: Development of an assessment for interdisciplinary understanding of carbon cycling*. Paper presented at NARST 2017.
- C19.** **Delgado, C.,** & Aksit, O.* (2016, October). *Building blocks for understanding conversion factors and stoichiometry*. 60-min workshop held at North Carolina Science Teachers Association Professional Development Institute, Greensboro, NC. (“Each year, NCSTA’s PDI provides sessions by science educators from North Carolina and the Southeast, demonstrating creative and proven methods to present content and pedagogy in science.”)
- C20.** **Delgado, C.,** & Lucero, M. (2016, April). *Following and breaking conventions for scales on graphs: From middle school students to university professors*. Paper presented at NARST, Baltimore, MD.
- C21.** Mann, M.*, **Delgado, C.,** Petrosino, A., Stroup, W. (2015, April). *Tensions between conceptual and metaconceptual learning with models*. Paper presented at NARST, April 2015, Chicago.
- C22.** You, H., S.*, & **Delgado, C.** (2015, April). *Revisiting the Coleman report: Exploring school effects on scientific literacy in PISA 2012 using hierarchical linear modeling*. Paper presented at NARST, April 2015, Chicago.
- C23.** Chiu, J., Cui, L., Czerniak, C. (discussant), **Delgado, C.,** Hazari, Z., Klotz, L., Liu, X., Nguyen, D.-H., Potvin, G., Rebello, S., Sadler, P., Scott, T., Shen, J. (chair), Smith, E., Sonnert, G., Sung, S., You*, H. S., Zhang, D. (2015, April). *Interdisciplinary and integrated STEM education: Research, practices, and perspectives*. Symposium held at AERA, Chicago, IL.
- C24.** Lucero, M., **Delgado, C.,** & Petrosino, A. (2014, April). *Measuring science teachers’ pedagogical content knowledge for student ideas about natural selection using a concept inventory*. Paper presented at AERA, Philadelphia, PA.
- C25.** **Delgado, C.,** & Ledbetter, N.^ (2014, April). *Cluster analysis as a tool for qualitative research: The case of scale construction*. Paper presented at AERA, Philadelphia, PA.
- C26.** Anderson, C., Bembenic, M., **Delgado, C.,** Flarend, A., Kastens, K., McDonald, S., Plummer, J., Pickard, M., Rivet, A., & Rubin, K. A. (2014, March). *Integrating crosscutting themes, practices, and core ideas: Learning progressions in Earth and space sciences*. Symposium held at NARST, Pittsburgh, PA.

- C27.** You, H. S.*, & **Delgado, C.** (2014, June). *Weaving an interdisciplinary science curriculum: Analysis of the connections across learning progressions*. Paper presented at Canada International Conference on Education, Nova Scotia, Canada.
 (“The CICE is an international refereed conference dedicated to the advancement of the theory and practices in education.”)
- C28.** **Delgado, C.**, & Lucero, M. (2014, June). Students’ resources for the construction of scales for graphing. Paper presented ICLS, Boulder, CO.
- C29.** **Delgado, C.** (2013, April). *Nature of science considerations in the design and use of simulations for chemistry*. Paper presented at AERA, San Francisco, CA.
- C30.** Ko, P.*, & **Delgado, C.** (2013, April). *A proposal for a hypothetical K-12 learning progression set for algorithmic thinking*. Paper presented at AERA, San Francisco, California.
- C31.** **Delgado, C.**, Jones, G., You, H. S.*, Robertson, L., & Halberda, J. (2013, April). *Size and scale tasks and their relation to evolutionarily-based and culturally-based knowledge*. Paper presented at NARST, Rio Grande, Puerto Rico.
- C32.** Craig, T.*, & **Delgado, C.** (2013, April). *Aligning science learning progressions and the Common Core State Standards for Mathematics*. Paper presented at NARST, Rio Grande, Puerto Rico.
- C33.** **Delgado, C.**, & Delgado, R. (2013, January). *Exploring the use of physics analogies in legal storytelling*. Paper presented at Association of American Law Schools meeting. New Orleans, LA.
 (The AALS meeting gathers “thousands of law faculty, deans, administrators and scholars... [to] discuss critical and emerging legal issues”)
- C34.** Lucero, M.*, & **Delgado, C.** (March, 2012). *Understanding the conventions undergraduate students follow or break when constructing scales for graphs*. Paper presented at NARST, Indianapolis, IN.
- C35.** **Delgado, C.**, & You, H. S.* (2012, March). *Learners’ strategies for size estimation*. Paper presented at NARST, Indianapolis, IN.
- C36.** **Delgado, C.**, & Morton, K.* (2012, July). *Learning progressions, learning trajectories, and equity*. Full paper presented at ICLS, Sydney, Australia. (Acceptance rate for full papers: 30%)
- C37.** **Delgado, C.** (2011, April). *Navigating deep time: Landmarks from the Big Bang to the present*. Paper presented at NARST, Orlando, FL.
- C38.** **Delgado, C.** (2011, April). *Cross-cultural comparison of SI-native and Imperial-native students’ understanding of size and scale*. Paper presented at NARST, Orlando, FL.

- C39. Delgado, C., & Lucero, M.*** (2011, April). *Why do students construct unconventional scales for graphs?* Paper presented at AERA, New Orleans, LA.
- C40. Delgado, C.** (2010, April). *Theoretical and empirical investigation of students' strategies for size estimation.* Paper presented at National Council of Teachers of Mathematics Research Pre-session, San Diego, CA.
(The NCTM Research Pre-Session gathers "leading mathematics education researchers ...to examine and discuss current issues in mathematics education.")
- C41. Delgado, C.** (2010, March). *Knowledge of scale construction for graphing in undergraduate students.* Paper presented at NARST, Philadelphia, PA.
- C42. Delgado, C.** (2010). *Units of length: A notational system for conceptual understanding of size and scale.* Paper presented at ICLS, Chicago, IL.
- C43. Delgado, C.** (2009, April). *Learning progressions as a tool for equity.* Paper presented at NARST, Garden Grove, CA.
- C44. Delgado, C., Short, H., & Krajcik, J.** (2009, April). *Design, implementation, and evaluation of the effectiveness of a 12-hour middle school instructional unit for size and scale.* Paper presented at NARST, Garden Grove, CA.
2 Cites - Google Scholar 9/20/19
- C45. Adams, J., Cofford, G., Delgado, C., Kang, A., Ryoo, K., Preston, S., & Buck, G.** (discussant). (2009, April). *Exploring the grand challenges and great opportunities in realizing a more equitable science education.* Symposium held at NARST, Garden Grove, CA.
- C46. Delgado, C., Stevens, S., & Shin, N.** (2008, April). *Development of a learning progression for students' conceptions of size and scale.* Paper presented at NARST, Baltimore, MD.
5 Cites - Google Scholar 9/20/19
- C47. Hutchinson, K., Stevens, S., Shin, N., Yunker, M., Delgado, C..., Krajcik, J. S.** (2017, June). *Secondary students' beliefs about their interests in nanoscale science and engineering.* Paper presented at ASEE, Honolulu, HI.
2 Cites - Google Scholar 9/20/19
- C48. Delgado, C., Stevens, S., & Shin, N., Yunker, M., Krajcik, J.** (2007, April). *The development of students' conception of size.* Paper presented at NARST, New Orleans, LA.
28 Cites - Google Scholar 9/20/19
- C49. Stevens, S., Shin, N., Delgado, C., & Yunker, M.** (2007, April). *Fostering students' understanding of interdisciplinary science in a summer science camp.* Paper presented at NARST, New Orleans, LA.
8 Cites - Google Scholar 9/20/19

- C50.** Shin, N., Stevens, S., **Delgado, C.**, Krajcik, J., & Pellegrino, J. (2007, April). *Using learning progressions to inform curriculum, instruction, and assessment design*. Paper presented at NARST, New Orleans, LA.
28 Cites - Google Scholar 9/20/19
- C51.** Beyer, C., **Delgado, C.**, & Davis, E. (2007, April). *Investigating teacher learning supports in high school biology textbooks to inform the design of educative curriculum materials*. Paper presented at NARST, New Orleans, LA.
- C52.** Stevens, S., **Delgado, C.**, Krajcik, J. (2007, April). *Developing a learning progression for the nature of matter*. Paper presented at AERA, Chicago, IL.
16 Cites - Google Scholar 9/20/19

RESEARCH GRANT ACTIVITY

Co-Principal Investigator (with Kevin Han, PI, & Collin Lynch, Edgar Lobaton, Matt Tianfu).
106671 NSF IGE: *Learning the Entire Pipeline: Analyzing and Improving Graduate Engineering Education through Communities of Practice*. To be submitted Sept. 2019.

Principal Investigator (with co-PI Matthew Peterson).
95022 NSF. *SCALE-VR: Scale Cognition through Advanced Learning Environments in Virtual Reality*.
Submitted Jan. 2019. \$1,495,908. Not funded.

Co-PI (with Kevin Han, PI, and co-PIs Tamecia Jones and Jason Patrick)
94425 NSF IUSE: *Improving Undergraduate Education in Civil & Building Engineering through Student-centric Cyber-Physical Systems: Bringing Real-world Problems to Classrooms*.
Submitted Dec. 2018. \$445,114. Not funded.

92551 Co-Principal Investigator (with Kevin Han, PI, and co-PIs Collin Lynch, Edgar Lobaton, Matt Tianfu). NSF IGE: *Learning the Entire Pipeline: Analyzing and Improving Graduate Engineering Education through Communities of Practice*.
Submitted Sept. 2018. \$497,534. Not funded

Co-Principal Investigator (with Kevin Han, PI, and co-PIs Tamecia Jones, Youngjib Ham, and Hyungchul Yoon)
87448 NSF IUSE: *Improving Undergraduate Education in Civil & Building Engineering through Student-centric Cyber-Physical Systems: Bringing Real-world Problems to Classrooms*.
Submitted Feb. 2018. \$399,879. Not funded.

Co-Principal Investigator (with Matthew Peterson, PI).
76779 NSF EHR CORE: *Building Virtual Reality Experiences of Unobservable Scientific Phenomena at Myriad Scales: "There's a Giant in the Room!"*
Submitted Sept. 2017. \$1,497,622. Not funded.

Principal Investigator
85581 NSF CAREER: *English Learners and Project-Based Learning (EL-PBL)*

Submitted July 2017. \$717,363. Not funded.

83533 Principal Investigator (with Matthew Peterson, co-PI).
Spencer: *Development of a Theoretical Framework for Representation of Size and Scale* \$49,999
Submitted May, 2017. Not funded.

79711 Principal Investigator (with Paul Domenico, Wake County Public School System and Jill Grifenhagen, NCSU, co-PIs).
NSF DRK-12: *Equitable Science Learning Through Project-Based Learning*.
Submitted December 2016. \$1,849,156. Not funded

Principal Investigator (with Soonhye Park and Gail Jones, co-PIs).
NCSU Foundation Grant: *Supporting Underserved Students in Science Education Through Graduate Studies for In-Service Teachers*.
Submitted May 2016. Total Award Amount: \$24,000.

Principal Investigator.
71967 NCSU Faculty Research and Professional Development (FRPD: *Professional Development to Increase Teachers' Ability to Support English Language Learners' STEM Achievement*.
Submitted Mar. 2016. Total Award Amount: \$6000

Principal Investigator.
UT Austin Special Research Grant: *Undergraduates' knowledge of scales of space and time*.
2014. Total Award Amount: \$650

Principal Investigator.
NSF CAREER: *The Crosscutting Concept of Scale in STEM Education* \$405,007
2012. Not funded; rated "competitive"

Co-Principal Investigator. (PI Michael Marder)
NSF REESE: *Evaluations of Science and Mathematics Teachers and Student Performance*.
\$1,549,028. 2012. Not funded

Principal Investigator.
UT Austin Faculty Summer Research Grant. *Cross-cultural Comparison of Metric-Native and English-Native Middle and High School Students' Conceptions of Size and Scale*.
2010. Total Award Amount: \$13,100.
UT Austin Special Research Grant.
2010 Total Award Amount: \$750.

OTHER SCHOLARLY ACTIVITIES

Curriculum development.

Size and scale of submacroscopic objects. An interdisciplinary, project-based
12-hour unit for middle school. 2007-2009

UTeach Institute Project-Based Instruction Replication Materials (with Denise Ekberg)
 Developed the instructional materials, syllabus, multimedia presentations, etc. for the course Project-Based Instruction. This course is taught in 45 universities in 21 states and the District of Columbia. Close to 7000 students are currently enrolled in UTeach programs leading to teacher licensure. 2005

Software development.

Size and Scale. An interactive simulation that allows students to visualize the relative scale of important scientific objects including cells and atoms, and to calculate their absolute size from relative scale and known absolute size of the reference object – a pinhead. With partners from UIC, UIUC. 2009

Ten powers of ten. Interactive computer visualization for the size of objects, covering ten orders of magnitude (from football field to virus), using *Stallion*, the world’s largest tiled-display system (at the ACES Visualization Laboratory, UT Austin) 2008

SCALE-VR. Virtual reality environment for CAVE, featuring objects from battleship to atom. 2018-

INTERNATIONAL SERVICE

Journal of Research in Science Teaching Editorial Review Board 2018-
 NARST Strand Coordinator, Strand 1 2017-2019
 Strand 11 2019-2021
 Faculty Mentor for Graduate Research Symposium 2019

NanoHUB Education Advisory Committee 2013-
 NanoHUB is a resource for nanoscience and nanotechnology, created by the NSF-funded Network for Computational Nanotechnology. NanoHUB has over 300,000 users annually, worldwide. (Funding renewed 2019)

Peer reviewer for journals 2008-

- Journal of Research in Science Teaching* (45 reviews)
- Science Education* (5 reviews)
- International Journal of Science Education* (13 reviews)
- The Elementary School Journal* (2 reviews)
- Journal of Cognition and Development* (1 review)
- Journal of Nano Education* (1 review)
- Journal of Engineering Education* (1 review)
- Physical Review Physics Education Research* (1 review)
- Cognitive Processing* (1 review)
- Developmental Psychology* (2 reviews)
- Eurasia Journal of Mathematics, Science and Technology Education* (1 review)
- Journal of Science Education and Technology* (1 review)

Peer reviewer for books	2011-
Alonzo, A.C., & Gotwals, A. W. (Eds.), <i>Learning progressions in Science: Current challenges and future directions</i> . (1 chapter)	
C. Manduca & K. Kastens (Eds.), <i>Earth and mind 2</i> . GSA Special Papers. (1 chapter)	
A. Rogat (Ed.), <i>Hypothetical Learning Progressions to Support New Science Standards: A Resource for Science Supervisors</i> . Consortium for Policy Research in Education. (Whole book)	
Peer reviewer for conferences	2007-
<i>National Association for Research in Science Teaching-NARST</i> (2007, 2008, 2011, 2012, 2013, 2016, 2019)	
<i>American Educational Research Association</i> (2010, 2011)	
<i>International Conference of the Learning Sciences</i> (2014, 2016)	
Presider of conference sessions. NARST (2013, 2015, 2017)	2013-
NATIONAL SERVICE	
Advisory Board Member	2016-
Promoting STEM Interests and Careers through FAME (Families and Museums Exploring), PI: Gail Jones	
Developer, Presenter	
<i>UTeach Institute Knowing and Learning Course Overview</i> Austin, TX; to approximately 30 instructors from universities across the country replicating UTeach	2014
<i>UTeach Institute Project-Based Instruction Workshop</i> Austin, TX; to approximately 25 instructors each time	2010, 2012
<i>UTeach Institute Project-Based Instruction Course Overview</i> Austin, TX; to approximately 25 instructors each time	2011, 2012
Invited Participant	2010
<i>Designing Technology-Enabled Diagnostic Assessments for K-12 Mathematics Conference</i> . Raleigh, NC.	
Invited Reviewer for National Science Foundation (NSF)	2009
UNIVERSITY SERVICE	
Distance Education Program Directors and Coordinators Committee	2019
CATALYST grant review committee	2019
North Carolina State University Judge, 3 rd Latin American Research Symposium	2016
Participant in candidate campus visit for Kevin Han Department of Civil, Construction, and Environmental Engineering,	2016

University of Texas at Austin Academic Integrity and Information Technology Committee	2012-2014
Educational Policy Committee	2010-2014
Course and Instructor Survey Ad Hoc Sub-Committee, Education Policy Committee	2011-2012
UTeach Steering Committee	2010-2015
Research and Policy Ad Hoc Sub-Committee, UTeach Steering Committee	2010-2012
COLLEGE AND DEPARTMENT SERVICE	
Ad hoc liaison to NC Society of Hispanic Professionals 2019	
Ad hoc liaison to CIAE (Chile Education Research Center)	2019
Research Committee for the College of Education Co-chair	2018- 2019-
Search Committee, Associate Dean of Faculty and Academic Affairs	2018
North Carolina State University Guest lecture, EMS 732 Theoretical and Critical Perspectives of Sci. Education 2017, November	
Search Committee, Assistant Professor for Mathematics Education North Carolina State University	2017
Guest lecture, ECI 709 Learning Sciences Seminar	2017, April
Member, CED Committee for Excellence Awards	2017
Computer & Technology Committee	2016-2018
NSF Graduate Research Fellowship Program review panel	2015
Science Education Program Scheduling head	2015-
University of Texas at Austin Committee on graduate student awards and fellowships	2014-2015
Committee for Dean's Fellowship award	2014-2015
Second-year doctoral student review committee – STEM	2013
Standing Committee on Programs and Courses	2012-2014

Elementary Mathematics Education and Engineering Education Faculty Search Committees	2012, 2013
Recruitment Initiative for Hispanic Students, College of Education	2012
Ad Hoc Nominating Committee of the C&I GSC	2011-2012
Graduate Studies Committee - Curriculum and Instruction	2009-2015
Graduate Studies Committee – Science and Math Education, member Secretary	2009-2015 2012-2015

OUTREACH AND EXTENSION

Presenter

International Consortium for Research in Science and Mathematics Education XV
90- minute Workshop on Project-Based Learning accepted 2019
San Jose, Costa Rica

Invited Presenter

Crosscutting Concept Summit (Funded by NSF), Arlington VA 2018

Liaison

Ad hoc College of Education liaison to North Carolina Society of Hispanic Professionals 2018-

Presenter

Project-Based Learning: Does it work? Why? What does it look like? 60-minute talk for WCPSS's SummerSTEM Professional Development Workshop. July 16, 2018.

Exhibiter

Triangle High Five Math/Science Summit. 60-minute session: Quantification in Science: How Does Math Play Out in Science?

Exhibit Developer and Presenter

2017, 2018
Celebremos la Ciencia (Let's Celebrate Science), Museum of Life and Science, Durham NC. Engaged approximately 100 people of all ages in construction and understanding of electrical circuits (2017); approximately 100 people in learning about pH in foods (2018)

Panelist

2017
Brothers United in Leadership Development. NCSU. Outreach and recruitment event for 100 male high school students of color.

Exhibit Presenter

2016, 2017 (April)
NanoDays. NCSU. Engaged approximately 70 secondary public school students in exhibits demonstrating and explaining nanoscience and nanotechnology principles and applications.

- Evaluator 2016-
Wake Country Public School System's *SummerSTEM* summer workshop for project-based learning. Impact: 100 teachers
- Workshop Presenter (with Aksit, O.*) 2016
Building blocks for understanding conversion factors and stoichiometry.
60-min workshop and presentation at North Carolina Science Teachers Association Professional Development Institute, October 2016, Greensboro, NC. Led approximately 40 teachers through instructional activities to build conceptual understanding of conversion factors, indirectly impacting around 4000 North Carolina students.
- Designer and Implementer of Curriculum 2007-2009
Summer Nanoscience Academy. University of Michigan, Ann Arbor. Lead role in the design and implementation of a two-week, full day summer camp for approximately 35 underprivileged (>50% free or reduced lunch school district), racially diverse middle school students each year, using nanoscale science and technology as a context to teach important content and inquiry skills.

TEACHING AND MENTORING

= I developed the course

% = I substantively revised the course

Undergraduate courses

University of Texas at Austin:

EDC 365C% Knowing and Learning in Math and Science

EDC 365D Classroom Interactions

EDC 365E% Project Based Instruction

North Carolina State University

EMS 375 Methods of Teaching Science I

Graduate courses

Masters - North Carolina State University

EMS 505 Methods of Science Teaching 1

EMS 531% Introduction to Research in Science Education

EMS 594# Advanced Teaching in Physical Sciences

EMS 573% Technology Tools for Science Teachers

EMS 573# Technology Tools for STEM Teachers (with H.S. Lee and E. Krupa)

Doctoral - North Carolina State University

EMS 731 Fundamentals of Research in Science Education: Qual. and Quant. Inquiry

EMS 732% Theoretical and Critical Perspectives of Science Education

EMS 792# Learning Theories in STEM (developed with Jere Confrey)

ED 795% Learning Sciences: Theories, Concepts, and Environments (NCSU)

Doctoral – University of Texas at Austin

EDC 385G#: Advanced Topics - Learning Progressions and Learning Trajectories in
Science and Mathematics Education
EDC 390T%: Equity in Science and Mathematics Education

Doctoral Committees

Completed - University of Texas at Austin

Hye Sun You, Science Education (chair 2011-2014; member 2015)

Graduated 2016. Currently assistant professor Arkansas Tech U.

Margaret Lucero, Science Education (member)

Graduated 2014. Currently assistant professor at Santa Clara University

Tina Vega, Mathematics Education (chair)

Graduated 2015. Currently math teacher at Lee High School, San Antonio, TX

Soon Wook Han, Science Education (member)

Graduated 2013. Currently science teacher at MacArthur High School, Irving, TX

Completed – NCSU

Kathryn Green, Science Education (chair, 2015-19)

Graduated 2019. Currently a post-doc at U. Georgia Athens.

Cody Smith, Science Education (chair, 2016-19)

Graduated 2019. Currently a post-doc at U. Nebraska Lincoln.

Kayla Norville (member). 2019.

Osman Aksit (member). 2018.

Ana Patricia Maroto, Teacher Education and Learning Sciences (member)

Graduated 2017. Currently professor at University of Costa Rica, Occidental
Campus

In progress – North Carolina State University

Alonzo Alexander, Science Education (member)

Shana McAlexander, Science Education (member)

PROFESSIONAL DEVELOPMENT

Basics of Virtual Reality (4-hour workshop)

Dec. 2018