CURRICULUM VITAE

Vicente Talanquer University Distinguished Professor

EDUCATION AND TRAINING

Doctorate of Philosophy in Chemistry (Physical Chemistry), 1992
08/89-10/92 Universidad Nacional Autónoma de México (UNAM).
Thesis: Bulk and interfacial properties of reacting and associating systems.
Advisor: Alberto Robledo

Masters of Science in Chemistry (Physical Chemistry), 1987
08/85-08/87 Universidad Nacional Autónoma de México (UNAM).
Thesis: Sublattice ordered phases of the Griffith's three component model.
Advisor: Carmen Varea

Bachelors of Science in Chemistry, 1985
08/81-06/85 Universidad Nacional Autónoma de México (UNAM).
Thesis: Simple model for an electrolyte.
Advisor: Carmen Varea

PROFESSIONAL EXPERIENCE

Professor
Department of Chemistry and Biochemistry, University of Arizona
07/15-Present University Distinguished Professor
08/13-06/15 Professor
08/06-06/13 Associate Professor (Tenured)
02/00-05/06 Associate Professor (Tenure Track).

School of Chemistry, Universidad Nacional Autónoma de México.
01/98-01/00 Associate Professor B (Tenured).
01/92-01/98 Associate Professor A (Tenured).
08/88-01/92 Assistant Professor (Tenure Track).

Visiting Scholar
June-July 96-03 James Frank Institute, University of Chicago.

Post-Doctorate
10/92-09/95 James Frank Institute, University of Chicago. Advisor: David Oxtoby

Research Assistant
01/87-08/88 School of Chemistry, Universidad Nacional Autónoma de México.

AWARDS AND HONORS

2021 **ACS Award for Achievement in Research for the Teaching & Learning of Chemistry**. American Chemical Society
2019 **CSSP Educational Research Award**. Council of Scientific Society Presidents

2015 **Arizona Professor of the Year**. Carnegie Foundation.
2015 **University Distinguished Professor**. University of Arizona
2013 **Distinguished Achievement in Science Education Award**. College of Science, University of Arizona.
2012 **James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry**. Northeastern Section of the American Chemical Society.
2012 **Henry and Phyllis Koffler Prize in Teaching.** University of Arizona
2007 **Leicester & Kathryn Sherrill Creative Teaching Award.** University of Arizona.
2006 **Five-Star Teaching Award**. University of Arizona.
2004 **Early-Career Teaching Award.** College of Science, University of Arizona.
1998 **Outstanding Young Professor in Physical Sciences Education**. *UNAM*
1997 **First place in the national contest "Science History for Secondary School Students."** *The Mexican Academy of Sciences, May 1997*.
1996 **Best Doctoral Student in Chemistry** (First in the class of 1987-1989). *UNAM.*
1990 **Member of the National Research System of Mexico**. National Researcher. *Candidate: 1990-1993. Level I: 1993-1999. Level II: 1999 to 2001.*
1989 **Best Masters Student in Chemistry** (First in the class of 1985-1987). *UNAM.*
1986 **Best Undergraduate Student in Chemistry** (First in the class of 1981-1985). *UNAM.*

SOCIETY MEMBERSHIPS

- American Association for the Advancement of Science (AAAS)
- American Chemical Society (ACS)
- National Association for Research in Science Teaching (NARST)

CURRENT RESEARCH INTERESTS

My research focuses on the characterization of the intuitive reasoning used by chemistry students to answer questions and solve problems that require qualitative reasoning (e.g., classification, prediction, inference, ranking, comparison). We explore how students' ideas and reasoning strategies evolve as they develop more expertise in the discipline. My research group also investigates science teachers' thinking, paying particular attention to the nature of the different factors that influence their assessment decisions and actions.

RESEARCH SUPPORT

Active

1. National Science Foundation (NSF-IUSE). Collaborative Research: Investigating Classroom Discourse in Active Learning Environments for Large Enrollment Chemistry Courses. 10/01/19-09/30/23. Awarded: **$366,205**, PI: Vicente Talanquer (8% Effort). In collaboration with Renee Cole (University of Iowa) and Greg Rushton (Middle Tennessee State University).
2. National Science Foundation (NSF-IUSE*). Developing Instructional Teams for Evidence-Based Instruction in Large Collaborative Learning Environments.* 09/01/16-08/31/22. Awarded **$2,750,794**. PI: Vicente Talanquer (8% Effort), Co-PIs: Paul Blowers, Lisa Elfring.
3. National Science Foundation (NSF-DRK-12). *Supporting Chemical Teachers to Assess and Foster Chemical Thinking*. 09/01/16-08/31/22. Awarded **$123,495**. PI: Vicente Talanquer. (8% Effort). Sub-award associated with a collaborative research project with Hannah Sevian from the UMass-Boston.

PUBLICATIONS

*indicates published as graduate student;
[+]indicates advisee (i.e., student, postdoc) co-author.
Underlined author is the main contributor in papers published in collaboration with peers.

Area: Science and Chemistry Education
Peer-Reviewed and Invited Journal Articles

1. [+]S. Hester, J. M. Elliott, L. K. Navis, T. Hidalgo, [+]Y. A. Kim, P. Blowers, L. Elfring, K. L. Lattimore, and V. Talanquer. Using an instructional team during pandemic remote teaching enhanced student outcomes in a large STEM course. *Journal of College Science Teaching* (Accepted November 2021).
2. [+]S. Petritis, C. Kelley, and V. Talanquer. Analysis of factors that affect the nature and quality of student laboratory argumentation *Chemistry Education Research and Practice* (Published online December 2021).
3. J. W. Reid, Z. D. Kirbulut-Gunes, S. Fateh, A. Fatima, [+]M. Macrie-Shuck, H. T. Nennig, F. Quintanilla, N. E. States, A. Syed, R. Cole, G. T. Rushton, L. Shah, and V. Talanquer. Investigating patterns of student engagement during collaborative activities in undergraduate chemistry courses. *Chemistry Education Research and Practice* (Published online November 2021).
4. [+]S. D. Hester, [+]K. M. Southard, [+]Y. A. Kim, [+]J. Cox, L. K. Elfring, P. Lowers, and V. Talanquer. Benefits and challenges in the implementation of an Instructional-Teams Model for supporting evidence-based instructional practices in large-enrollment STEM courses. *College Teaching* (Published online November 2021).
5. [+]M. Macrie-Shuck and V. Talanquer. How students use whiteboards and its effects on group work. *Journal of Chemical Education* 98, 12, 3723-3730 (2021).
6. [+]K. Caushi, H. Sevian, and V. Talanquer. Exploring variation in ways of thinking about and acting to control a chemical reaction. *Journal of Chemical Education* 98, 12, 3714-3722 (2021).
7. [+]J. Tashiro and V. Talanquer. Exploring inequities in a traditional and a reformed general chemistry course. *Journal of Chemical Education* 98, 12, 3680-3692 (2021).
8. V. Talanquer. Multifaceted chemical thinking: A core competence. *Journal of Chemical Education* 98, 3450-3456 (2021).
9. P. Mahaffy, S. Matlin, M. Potgieter, B. Saha, A. Visa, S. Cornell, F. Ho, V. Talanquer, J. Wissinger, and V. Zunia. Systems Thinking and sustainability: Converging on chemistry's role in the 21st Century. Chemistry International, 43(4), 6-10 (2021).
10. [+]M. Herridge and V. Talanquer. Variation in chemistry instructors' evaluations of student written responses and its impact on grading. *Chemistry Education Research and Practice*, 22, 948-972 (2021).
11. [+]K. M. Southard, [+]S. Hester, [+]J. Jurkiewicz, J. E. Curry, [+]Y. A. Kim, [+]J. Cox, L. Elfring, P. Blowers, and V. Talanquer. A Close Look at Change: The role of an instructional-team community on an instructor's evolution during instructional reform. *Disciplinary and Interdisciplinary Science Education Research,* 3:8 (2021).
12. [+]J. Tashiro, D. Parga, J. Pollard, and V. Talanquer. Characterizing change in students' self-assessment of understanding when engaged in instructional activities. *Chemistry Education Research and Practice,* 22, 662-682 (2021).
13. [+]Y. A. Kim, L. Rezende, E. Eadie, J. Maximillian, [+]K. Southard, L. Elfring, P. Blowers, and V. Talanquer. Responsive teaching in online learning environments: Using an instructional team to promote formative assessment and sense of community. *Journal of College Science Teaching* 50(4), 17-24 (2021).
14. [+]M. Herridge and V. Talanquer. Dimensions of variation in chemistry instructors' approaches to the evaluation and grading of student responses. *Journal of Chemical Education*, 98, 2, 270-280 (2021).
15. V. Talanquer. Reacciones redox: De la transferencia de carga eléctrica en pilas a las reacciones de oxidación [Redox reactions: From electric charge transfer in batteries to oxidation reactions]. *Alambique*, 103, 38-44 (2021).
16. [+]S. Petritis, C. Kelley, and V. Talanquer. Exploring the impact of the framing of a laboratory experiment on the nature of student argumentation. *Chemistry Education Research and Practice*, 22, 105-121 (2021).

17. V. Talanquer. La progresión de los aprendizajes sobre la composición, estructura y transformación química de la materia. Educacio Quimica, 27, 4-11 (2020).
18. [+]Y. A. Kim, [+]E. Monroe, [+]H. Nielsen, [+]J. Cox, [+]K. M. Southard, L. Elfring, P. Blowers, and V. Talanquer. Exploring undergraduate students' abilities to collect and interpret formative assessment data. *Journal of Chemical Education*, 97, 4245-4254 (2020).
19. [+]M. Macrie-Shuck and V. Talanquer. Exploring students' explanations of energy transfer and transformation. *Journal of Chemical Educatio*n, 97, 4225-4234 (2020).
20. [+]S. A. Murray, R. Huie, R. Lewis, S. Balicki, M. Clinchot, G. Banks, V. Talanquer, and H. Sevian. Teachers' noticing, interpreting, and acting on students' chemical ideas in written work. *Journal of Chemical Education*, 97, 10, 3478–3489 (2020).
21. V. Talanquer, R. Bucat, R. Tasker, and P. Mahaffy. Lessons from a pandemic: Educating for complexity, change, uncertainty, vulnerability and resilience. *Journal of Chemical Education*, 97, 9, 2696–2700 (2020).
22. J. Sjöström, I. Eilks, and V. Talanquer. Didaktik models in chemistry education. *Journal of Chemical Education*, 97, 4, 910–915 (2020).
23. V. Talanquer. Some insights into assessing chemical systems thinking. *Journal of Chemical Education*, 96, 2918-2925 (2019).
24. V. Talanquer. Crosscutting concepts as productive ways of thinking. *The Science Teacher*. September, 20-22 (2019).
25. [+]P. Moreira, A. Marzabal, and V. Talanquer. Investigating the effect of teacher mediation on students' expressed reasoning. *Chemistry Education Research and Practice*. 20, 606-617 (2019).
26. [+]Y. A. Kim, [+]J. Cox, [+]K. Southard, L. Elfring, P. Blowers, and V. Talanquer. Learning Researchers: Promoting formative assessment in STEM courses. *Journal of College Science Teaching*, 45, 22-27 (2019).
27. [+]M. Freire, V. Talanquer, and E. Amaral. Conceptual Profile of Chemistry: A Framework for Enriching Thinking and Action in Chemistry Education. *International Journal of Science Education*, 41, 674–692 (2019).
28. [+]P. Moreira, A. Marzabal, and V. Talanquer. Using a mechanistic framework to characterise chemistry students' reasoning in written explanations. *Chemistry Education Research and Practice*. 20, 120-131 (2019).
29. V. Talanquer. The importance of understanding fundamental chemical mechanisms. *Journal of Chemical Educatio*n. 95(11), 1905-1911 (2018).
30. V. Talanquer. Chemical rationales: Another triplet for chemical thinking. *International Journal of Science Education*. 15, 1874-1890 (2018).
31. V. Talanquer. Progressions in reasoning about structure-property relationships. *Chemistry Education Research and Practice*. 19, 998-1009 (2018).
32. V. Talanquer. Construcción y aplicación de un modelo atómico simple a partir de datos experimentales [Construction and application of a simple atomic model from experimental data]. *Alambique*, 93, 34-40 (2018).
33. J. Sjöström and V. Talanquer. Eco-reflexive chemical thinking and action. *Current Opinion in Green and Sustainable Chemistry*, 13, 16-20 (2018).
34. [+]K. Scalco, V. Talanquer, K. Kill, and M. Cordeiro. Making sense of phenomena from sequential images versus illustrated text. *Journal of Chemical Education*, 95, 347-354 (2018)
35. V. Talanquer and J. Pollard. Reforming a large foundational course: Successes and challenges. *Journal of Chemical Education*. 94, 1844-1851 (2017).
36. V. Talanquer. Concept Inventories: Predicting the wrong answer may boost performance. *Journal of Chemical Education*. 94, 1805-1810 (2017).
37. V. Talanquer. Coloreando cáscaras de huevo: Una exploración de la extensión y velocidad de las reacciones químicas [Coloring eggs shells: An exploration of reaction extent and rate] *Alambique,* 90, 37-43 (2017).
38. V. Talanquer. Tres elementos fundamentales en la formación de docentes de ciencias [Three Core elements in science teacher preparation]. *TED: Tecne, Epsiteme y Didaxis*. 41, 183-196 (2017).

39. V. Talanquer. Enlace químico y estructura: construcción de modelos y explicaciones a partir de datos experimentales [Chemical bonding and structure: Building models and explanations from experimental data] *Educacio Quimica*, 21, 26-32 (2017).
40. M. Clinchot, [+]C. Ngai, R. Huie, V. Talanquer, J. Lambertz, G. Banks, [+]M. Weinrich, R. Lewis, P. Pelletier, and H. Sevian. Better formative assessment. *The Science Teacher*. March, 69-74 (2017).
41. V. Talanquer. A short journey through the core ideas of physical chemistry. *Science & Education*. 25, 927-928 (2016).
42. [+]M. Weinrich and V. Talanquer. Mapping students' modes of reasoning when thinking about chemical reactions used to make a desired product. *Chemistry Education Research and Practice*. 17, 394- 406 (2016).
43. V. Talanquer. Central ideas in chemistry: An alternative perspective. *Journal of Chemical Education.* 93, 3-8 (2016).
44. [+]F. Yan and V. Talanquer. Students' Ideas about how and why chemical reactions happen: Mapping the conceptual landscape. *International Journal of Science Education.* 37, 3066-3092 (2015).
45. [+]K. Heisterkamp and V. Talanquer. Interpreting data: The hybrid minds. *Journal of Chemical Education*. 92, 1988-1995 (2015).
46. V. Talanquer. Extracción, separación e identficación de sustancias [Extraction, separation, and identification of substances]. *Alambique*, 82, 17-23 (2015).
47. G. Banks, M. Clinchot, [+]S. Cullipher, R. Huie, J. Lambertz, R. Lewis, [+]C. Ngai, H. Sevian, G. Szteinberg, V. Talanquer, and [+]M. Weinrich. Uncovering chemical thinking in students' decision making: A fuel-choice scenario. *Journal of Chemical Education*. 92, 1610-1618 (2015).
48. V. Talanquer. La importancia de la evaluación formativa [The importance of formative assessment]. *Educación Química*, 26, 177-179 (2015).
49. [+]M. Weinrich and V. Talanquer. Mapping students' conceptual modes when thinking about chemical reactions used to make a desired product. *Chemistry Education Research and Practice*. 16, 561-577 (2015).
50. [+]S. Cullipher, H.Sevian, and V. Talanquer. Reasoning about benefits, costs, and risks of chemical substances: Mapping different levels of sophistication. *Chemistry Education Research and Practice.* 16, 377-392 (2015).
51. V. Talanquer, M. Bolger, and D. Tomanek. Exploring Prospective Teachers' Assessment Practices: Noticing and Interpreting Student Understanding in the Assessment of Written Work. *Journal of Research in Science Teaching.* 52(5), 585-609 (2015).
52. V. Talanquer. Threshold concepts in chemistry: The critical role of implicit schemas. *Journal of Chemical Education*. 92, 3-9 (2015).
53. [+]G. Szteinberg, S.Balicki, G. Banks, M. Clinchot, [+]S. Cullipher, R. Huie, J. Lambertz, L. Lewis, [+]C. Ngai, [+]M. Weinrich, V. Talanquer, & H. Sevian. Collaborative professional development in chemistry education research: Bridging the gap between research and practice. *Journal of Chemical Education*. 91, 1401-1408 (2014).
54. [+]C. Ngai, H. Sevian, and V. Talanquer. What is this substance? What makes it different? Mapping progression in students' assumptions about chemical identity. *International Journal of Science Education.* 36(14), 2438-2461 (2014).
55. J. Sjöström and V. Talanquer. Humanizing chemistry education: From simple contextualization to multifaceted problematization. *Journal of Chemical Education.* 91, 1125-1131 (2014).
56. V. Talanquer. Chemistry education: Ten heuristics to tame. *Journal of Chemical Education.* 91, 1091-1097 (2014).
57. V. Talanquer. DBER and STEM education reform: Are we up to the challenge? *Journal of Research in Science Teaching.* 51(6), 809-819 (2014).
58. V. Talanquer. Razonamiento pedagógico específico sobre el contenido [Specific pedagogical content reasoning]. *Educación Química*. 25(3), 391-397 (2014).
59. V. Talanquer. Desarrollando pensamiento químico en contextos sociales y ambientales [Developing chemical thinking in social and environmental contexts]. *Educacio Quimica*, 17, 4-11 (2014).
60. V. Talanquer. Simulaciones computacionales para construuir y explorer modelos [Computer simulations for building and exploring models]. *Alambique*. 76, 8-16 (2014).

61. V. Talanquer and H. Sevian. Chemistry in past and new science frameworks and standards: Gains, losses, and missed opportunities. *Journal of Chemical Education*. 91(1), 24-29 (2014).
62. H. Sevian and V. Talanquer. Rethinking chemistry: A learning progression on chemical thinking. *Chemistry Education Research and Practic*e. 15(1), 10-23 (2014).
63. V. Talanquer. When atoms want. *Journal of Chemical Education*. 90(11), 1419-1424 (2013).
64. [+]K. Young and V. Talanquer. Effect of different types of small-group activities on students' conversations. *Journal of Chemical Education*, 90(9), 1123-1129 (2013).
65. [+]J. Maeyer and V. Talanquer. Making predictions about chemical reactivity: Assumptions and heuristics. *Journal of Research in Science Teaching*, 50(6), 748-767 (2013).
66. V. Talanquer. Chemistry education: Ten facets to shape us. *Journal of Chemical Education*, 90, 832-838 (2013).
67. V. Talanquer. School chemistry: The need for transgression. *Science & Education*. 22, 1757-1773 (2013).
68. V. Talanquer, D. Tomanek, and I. Novodvorsky. Assessing students' understanding of inquiry: What do prospective science teachers notice? *Journal of Research in Science Teaching*. 50(2) 189-208 (2013).
69. [+]H. Xu and V. Talanquer. Effect of the Level of Inquiry of Lab Experiments on General Chemistry Students' Written Reflections. *Journal of Chemical Education*. 90, 21-28 (2013).
70. [+]H. Xu and V. Talanquer. Effect of the Level of Inquiry on Student Interactions in Chemistry Laboratories. *Journal of Chemical Education*. 90, 29-36 (2013).
71. [+]S. Cullipher, H. Sevian, and V. Talanquer, A learning progression approach to studying benefits, costs and risks in chemical design. *La Chimica Nella Scuola*. 34(3), 344-51 (2012).
72. V. Talanquer. Chemistry Education: Ten dichotomies we live by. *Journal of Chemical Education*. 89, 1340-1344 (2012).
73. [+]K. Christian and V. Talanquer. Content-Related Interactions in Self-Initiated Study Groups. *International Journal of Science Education*. 34(14) 2231-2255 (2012).
74. [+]K. Christian and V. Talanquer. Modes of reasoning in self-initiated student groups in chemistry. *Chemistry Education Research and Practice*. 13(3) 286-295 (2012).
75. Martínez, J. Valdés, V. Talanquer, and J. A, Chamizo. Estructura de la materia: De saberes y pensares [Structure of matter: Knowing and thinking]. *Educación Química.* **23**, 361-369 (2012).
76. V. Talanquer. El papel de las ideas previas en el aprendizaje de la química [The role of prior knowledge in chemistry learning]. *Alambique*. **69**, 35-41 (2011).
77. [+]L. McClary and V. Talanquer. Heuristic reasoning in chemistry: Making decisions about acid strength. *International Journal of Science Education.* **3**(10) 1433-1454 (2011).
78. [+]L. McClary and V. Talanquer. College students' mental models of acids and acid strength. *Journal of Research in Science Teaching.* **48**(4) 396-413 (2011).
79. V. Talanquer. Macro, Submicro, and Symbolic? The Many Faces of the Chemistry Triplet. *International Journal of Science Education.* **33**(2), 179-195 (2011).
80. V. Talanquer. Exploring dominant types of explanations built by general chemistry students. *International Journal of Science Education*. **32**(18) 2393-2412 (2010).
81. [+]J. Maeyer and V. Talanquer. The role of heuristics in students thinking: Ranking of chemical substances. *Science Education.* **94**(6), 963-984 (2010).
82. V. Talanquer, I. Novodvorsky, and D. Tomanek. Factors influencing entering teacher candidates' preferences for instructional activities: A glimpse into their orientations towards teaching. *International Journal of Science Education.* **32**(10) 1389-1406 (2010).
83. V. Talanquer. Construyendo puentes conceptuales entre las varias escalas y dimensiones de los modelos químicos [Building conceptual bridges between the different scales and dimensions of chemical models]. *Educació Química EduQ*, **5**, 11-18 (2010).
84. V. Talanquer. Pensamiento intuitivo en quimica: Suposiciones implicitas y reglas heuristicas [Intuitive thinking in chemistry: Implicit assumptions and heuristics]. *Ensenanza de las Ciencias.* **28**(2) 165-174 (2010).
85. V. Talanquer and J. Pollard. Let's teach how we think instead of what we know. *Chemistry Education Research and Practice*. **11**(2) 74-83 (2010).

86. [+]K. Dávila and V. Talanquer. Classification of end-of-chapter questions and problems in general chemistry textbooks in the US. *Journal of Chemical Education.* **87**(1) 97-101 (2010).
87. V. Talanquer. On cognitive constraints and learning progressions: The case of structure of matter. *International Journal of Science Education.* **31**(15) 2123-2136 (2009).
88. V. Talanquer. De escuelas, docentes y TICs [Of schools, teachers, and ICTs]. *Educación Química*, **20**(3), 346-351 (2009).
89. V. Talanquer. Química; ¿Quién eres, a dónde vas y cómo te alcanzamos? [Chemistry: Who are you? Where are you going? How do we catch up with you?] *Educación Química*, **20**(E), 220-226 (2009).
90. D. Tomanek, V. Talanquer, and I. Novodvorsky. What do science teachers consider when selecting formative assessment tasks? *Journal of Research in Science Teaching.* **45**(10), 1113-1130 (2008).
91. [+]M. Stains and V. Talanquer. Classification of chemical reactions Stages of expertise. *Journal of Research in Science Teaching.* **45**(7), 771-793 (2008).
92. V. Talanquer. Students' predictions about the sensory properties of chemical compounds: Additive versus emergent frameworks. *Science Education.* **92**(1), 96-114 (2008).
93. V. Talanquer, D. Morgan, [+]J. Maeyer, and [+]K. Young. Linking general education and science teacher preparation. *Journal of College Science Teaching.* **37** (Nov/Dec), 18-22 (2007).
94. V. Talanquer. Explanations and teleology in chemistry education. *International Journal of Science Education.* **29**(7), 853-870 (2007).
95. V. Talanquer, D. Tomanek, and I. Novodvorsky. Revealing student teachers' thinking through dilemma analysis. *Journal of Science Teacher Education.* **18**(3), 399-421 (2007)
96. [+]M. Stains and V. Talanquer. A_2: Element or Compound? *Journal of Chemical Education.* **84**(5), 880-884 (2007).
97. [+]M. Stains and V. Talanquer. Classification of chemical substances using particulate representations of matter: An analysis of student thinking. *International Journal of Science Education.* **29**(5), 643-661 (2007); *Erratum* **29**(7), 935-938 (2007).
98. V. Talanquer. Propiedades Emergentes: Un Reto para el Químico Intuitivo [Emergent Properties: A Challenge for the Intuitive Chemist] *Educación Química.* **17,** 315-320 (2006).
99. V. Talanquer. Common sense chemistry: A model for understanding students' alternative conceptions. *Journal of Chemical Education.* **83**(5), 811-816 (2006).
100. V. Talanquer. Reclaiming the central role of equations of state in thermodynamics. *Journal of Chemical Education.* **83**, 127-131 (2006).
101. V. Talanquer. El Químico Intuitivo. [The Intuitive Chemist] *Educación Química.* **16**(4) 114-122 (2005).
102. V. Talanquer. Recreating a Periodic Table: A Tool for Developing Pedagogical Content Knowledge. *The Chemical Educator.* **10**, 95-99 (2005).
103. J. Pollard and V. Talanquer. Interactive Digital Overheads: Dynamic teaching tools for the chemistry classroom. *The Chemical Educator.* **10**, 36-40 (2005).
104. V. Talanquer and D. Morgan. Learning to teach: The role of evidence. *Journal of College Science Teaching.* **34** (March/April), 28-32 (2005).
105. V. Talanquer. Formación Docente. ¿Qué conocimiento distingue a los buenos maestros de química? [Teacher Preparation: What do good chemistry teachers know?] *Educación Química*. **15** (1) 52-57 (2004).
106. V. Talanquer, I. Novodvorsky, T. F. Slater, and D. Tomanek. A stronger role for science departments in the preparation of future chemistry teachers. *Journal of Chemical Education*. **80**, 1168-1171 (2003).
107. D. Tomanek, V. Talanquer, I. Novodvorsky, T. F. and Slater. Responding to the call for change: The new college of science teacher preparation program at the University of Arizona**.** *Cell Biology Education.* **2**(1), 29-34 (2003).
108. Novodvorsky, D. Tomanek, V. Talanquer, and T. F. Slater, A new model of physics teacher preparation. *Journal of Physics Teacher Education Online* (JPTEO). **1** (2) 10-32 (2002).
109. V. Talanquer. Minimizing Misconceptions: Tools for identifying patterns of reasoning. *The Science Teacher*. **69** (8) 46-49 (2002).
110. V. Talanquer. Nucleation in gas-liquid transitions. *Journal of Chemical Education.* **79**, 877-883 (2002).

111. V. Talanquer and G. Sarmiento. One foot=one cenxocpalli: Measuring in the pre-hispanic world. *Science Scope*. **25** (7) 12-17 (2002).
112. V. Talanquer. Science survivors. *Science and Children*. **39** (4) 36-41 (2002).
113. V. Talanquer. El movimiento CTS en México: ¿vencedor vencido? [The STS movement in Mexico: A defeated winner?] *Educación Química*. **11** (4) 381-386 (2000).
114. V. Talanquer. De la intuición a la ciencia. [From intuition to science] *Como ves?* No.**15**, 22-24 (2000).
115. V. Talanquer. La quimica en el siglo XXI: Angel o Demonio? [Chemistry in the 21st century: Angel or Demon?] *Como ves?* No.**12**, 30-32, (1999).
116. V. Talanquer. En pos de una Quimera [In search of a Chimera] (Editorial). *Educacion Quimica*. **9**(6), 324 (1998).
117. V. Talanquer. Lo mismo y no lo mismo (Roald Hoffmann, Book Presentation) [The Same and not the Same]. *Educacion Quimica*. **9**(3), 179-180 (1998).
118. [+]F. Barrios, [+]S. Granados and V. Talanquer. ¿Cómo se forman los cristales? [How do crystals form?]. *Educación Química.* **9** (3) 129-135 (1998).
119. [+]I. Tubert and V. Talanquer. Sobre adsorción [Adsorption]. *Educación Química.* **8** (4) 186-190 (1997).
120. [+]F. Cortes, V. Talanquer y G. Irazoque. La química y el tiempo: Reacciones reloj. *Educación Química.* **5**(2) 74-80 (1994).
121. V. Talanquer. A Microcomputer simulation of the Liesegang phenomena. *Journal of Chemical Education.* **71**, 58-62 (1994).
122. V. Talanquer and G. Irazoque. Fractals: to know, to do, to simulate. *The Physics Teacher*. **31** (2) 72-78 (1993).
123. [+]Y. Hueda, G. Irazoque and V. Talanquer. Los anillos del tiempo [Liesegang rings]. *Educación Química.* **4** (4) 202-207 (1993).
124. V. Talanquer. Química en la educación secundaria [Chemistry in secondary education]. *Educación Química*. **4** (3) 156-161 (1993).
125. [+]K. Padilla, V. Talanquer and G. Irazoque. Del incoloro al rojo a través del equilibrio [Chemical equilibrium]. *Educación Química.* **4** (2) 74-78 (1993).
126. [+]J. Córdoba, V. Talanquer and G. Irazoque. Interfases caprichosas [Capricious interphases]. *Educación Química*. **4** (1) 32-38 (1993).
127. [+]F. Cortés, [+]A. Gamboa, V. Talanquer and G. Irazoque. Caoticidades [Chaos]. *Educación Química*. **3** (4) 258-265 (1992).
128. [+]P. Roquero, V. Talanquer and G. Irazoque. ¿Cuándo moja? ¿Cuándo no? [When is it wet? When isn't it?]. *Educación Química.* **3** (3) 214-220 (1992).
129. V. Talanquer and G. Irazoque. Auto-organización III. Ondas químicas [Chemical waves]. *Educación Química.* **3** (2) 89-95 (1992).
130. V. Talanquer and G. Irazoque. Auto-organización II. Reacciones oscilantes [Oscillating reactions]. *Educación Química.* **3** (1) 36-41 (1992).
131. V. Talanquer and G. Irazoque. Auto-organización I. El Problema de la convección [The problem of convection]. *Educación Química.* **2** (4) 166-173 (1991).
132. V. Talanquer and G. Irazoque. Fractales [Fractals]. *Educación Química.* **2** (3) 114-121 (1991).
133. V. Talanquer and G. Irazoque. Transiciones de fase y universalidad [Phase transitions and universality]. *Educación Química*. **2** (2) 59-67 (1991).
134. V. Talanquer. ¿Qué pasa en nuestra Secundaria**?** [What is happening in our secondary schools?]. *Educación Química.* **1** (2) 92-95 (1990).
135. V. Talanquer. Física para Químicos [Physics for chemists]. *Educación Química.* **1** (3) 134-138 (1990).

Chapters in Books

1. V. Talanquer. Qualitative reasoning in problem-solving in chemistry. In G. Tsaparlis (Ed.) Problems and problem solving in chemistry education. *Advances in Chemistry Education Series* (pp. 15-37), London: Royal Society of Chemistry, 2021.
2. V. Talanquer. Three chapters contributed to a compilation. In A. Caamaño (Ed.) *Enseñar Química: De las Sustancias a la Reacción Química* [Teaching Chemistry: From Substances to Reactions]. Barcelona: Graó, 2020.

3. V. Talanquer. Assessing for Chemical Thinking. In M. Schultz, S. Schmid& G. A. Lawrie,. (Eds.) *Research and Practice in Chemistry Education: Advances from the 25th IUPAC International Conference on Chemistry Education* (pp. 123-133). Singapore: Springer, 2019.
4. V. Talanquer. Exploring mechanistic reasoning in chemistry. In J. Yeo, T. W. Teo, & K.S. Tang (Eds.) *Science Education Research and Practice in Asia-Pacific and Beyond* (pp. 389-52), The Netherlands: Springer, 2018.
5. G. D. Burd, D. Tomanek, P. Blowers, M. Bolger, J. Cox, L. Elfring, E. Grubbs, J. Hunter, K. Johns, L. Lazos, R. Lysecky, J. A. Milsom, I. Novodvorsky, J. Pollard, E. Prather, V. Talanquer, K. Thamvichai, H. Tharp, and C. Wallace. Developing faculty cultures for evidence-based teaching practices in STEM: A progress report. In G. C. Weaver, W. D. Burgess, A. L. Childress, and L. Slakey (Eds.) *Transforming Institutions: Undergraduate STEM Education for the 21st Century* (pp. 77-89) Purdue University Press, West Lafayette, Indiana, 2016.
6. O. de Jong and V. Talanquer. Why is it relevant to learn the big ideas in chemistry at school? In I. Eilks and A. Hofstein (Eds.) *Relevant chemistry education: From theory to practice*, Chapter 2 (pp. 11-31) Sense Publishers, The Netherlands, 2015.
7. V. Talanquer. Using qualitative analysis software to facilitate qualitative data analysis. In D. Bunce and R. Cole (Eds). *Tools of Chemistry Education Research*. ACS Symposium Series. Washington, DC: ACS, 2014.
8. V. Talanquer. Conocimiento didáctico del contenido y progresiones de aprendizaje [Pedagogical Content Knowledge and Learning Progressions]. En A. Garritz (Ed.), M. G. Lorenzo y S. F. Daza Rosales, *Conocimiento Didáctico del Contenido: Una Perspectiva Iberoamericana* [Pedagogical Content Knowledge: An Iberoamerican Perspective] Capítulo 8 (pp. 206-225). Editorial Académica Española, 2014
9. V. Talanquer. El rol de las supocisiones implícitas y las estrategias heurísticas en el razonamiento de los estudiantes de química [The role of implicit assumption and heuristic strategies in chemistry students' reasoning]. En C. Merino, M., Arellano, & A. Adúriz-Bravo, A (Eds.) *Avances en didáctica de la química: modelos y lenguaje* [Advances in chemistry education: models and language] . Capítulo 6 (pp. 93-105). Ediciones Universitarias de Valparaíso, Valparaíso, Chile, 2014.
10. H. Sevian, V. Talanquer, A. Bulte, and A. Stacy. Development of understanding in chemistry. In C. Bruguière, A. Tiberghien, and P. Clément (Eds.) *Topics and trends in current science education, 9th ESERA Conference Selected Contributions* (pp. 291-306). Springer: Dordrecht, 2014.
11. V. Talanquer. How do students reason about chemical substances and reactions? In G. Tsaparlis and H. Sevian (Eds.) *Concepts of matter in science education.* Series Innovations in Science and Technology Education. Vol. 19 (pp. 331-346). Springer: Dordrecht, 2013.
12. V. Talanquer. Educación química: Escuchando la voz de la historia y la filosofía [Chemistry education: Listening to the voices of history and philosophy]. En *Química, Historia, Filosofía y Educación* [Chemistry, History, Philosophy, and Education] (p. 55-65). Universidad Pedagógica Nacional: Bogotá, Colombia, 2011.
13. V. Talanquer. Química agazapada [Lurking Chemistry]. En J. A. Chamizo (Ed.) *Historia y Filosofía de la Química* [History and Philosophy of Chemistry] (p. 142-156). Facultad de Química, UNAM, Siglo XXI: México, 2011.
14. V. Talanquer, K. Scantlebury, and L. Dukerich. Prospective chemistry teachers subject matter knowledge. In A. Collins and N. Gillespie (Eds.) *The continuum of secondary science teacher preparation* (p. 91-102). Sense Publishers: Boston, 2009.
15. V. Talanquer y A. Cervantes, Ciencias Naturales [Natural Sciences], en *Monografias para todo el Año*, 6to. [Natural Sciences, in Readings and Homework for the Year, 6th grade]. Ed. Santillana: México, 2000.
16. V. Talanquer. El vapor sobre el espejo [Vapor on a mirror]. Chapter VI, *Estampas de la Ciencia II*. (p 208-245). FCE. Colección la Ciencia desde México, No. 174. México, 1999 (20,000 copies).
17. A. Garritz and V. Talanquer, Advances and Obstacles to the Reform of Science Education in Secondary Schools in Mexico**,** in *Science and Environment Education Views from Developing Countries***,** Ware, Sylvia A. (Ed.) (p. 75-92). Secondary Science Series, World Bank, 1999.

Textbooks

1. V. Talanquer and G. Irazoque. *Ciencia y Tecnología 3, Química* [Science & Tecnology 3, Chemistry]. 9th grade chemistry textbook. Ed. Castillo-McMillan, México, 2019.
2. V. Talanquer and J. Pollard. *Chemical Thinking I* and *II*. On-line textbook for General Chemistry I and II. Top Hat, 2019.
3. V. Talanquer and G. Irazoque. *Ciencias 3*, *Química* [Sciences 3, Chemistry]. 9th grade chemistry textbook. Ed. Castillo-McMillan, México, 2014.
4. V. Talanquer and G. Irazoque. Ciencias 3 [Sciences 3]. Ed. Castillo-McMillan, México, 2008.
5. V. Talanquer. *Ciencia o Ciencia Ficción* [Science or Science Fiction]. Ed. Santillana. México, 2003.
6. V. Talanquer and A. Cervantes. *Ciencias Naturales*, en Monografías para todo el Año, 6to. [Natural Sciences, in Readings and Homework for the Whole Year, 6th grade]. Ed. Santillana. México, 2000.
7. V. Talanquer and G. Sarmiento. *Física 2.* [8th grade, junior high school physics textbook]. Ed. Nuevo México. México, 1999.
8. V. Talanquer, A. M. Martínez and G. Irazoque. *Química 3*. [9th grade, junior high school chemistry textbook]. Ed. Santillana. Mexico, 1997. (60,000 copies)
9. V. Talanquer. *Fractus, Fracta, Fractal*. [Popular science book on fractals]. FCE. Colección la Ciencia desde México. No. 147. México, 1996. (7,000 copies)
10. H. García, G. Irazoque and V. Talanquer (authors listed in alphabetical order). *Introducción a la Física y a la Química.* [7th grade, junior high school physics and chemistry textbook]. Fondo de Cultura Económica. México, 1996. (30,000 copies)

[Books 9-12]: One of five authors selected to write the natural sciences textbooks used from 1996 through 2008 by *all* elementary schools in Mexico and distributed free of charge to the students. Published by the Secretary of Public Education. Responsible for the areas of *Physical Sciences* and *Science, Technology and Society* (Authors listed in alphabetical order).

11. A. Barahona, R. M. Catalá, J. A. Chamizo, B. Rico and V. Talanquer. *Ciencias Naturales. Sexto Grado.* [6th grade, elementary school]. SEP. México, 1999. (2,797,000 copies/year)
12. A. Barahona, R. M. Catalá, J. A. Chamizo, B. Rico and V. Talanquer. *Ciencias Naturales. Quinto Grado.* [5th grade, elementary school]. SEP. México, 1998. (2,903,750 copies/year)
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14. A. Barahona, R. M. Catalá, J. A. Chamizo, B. Rico and V. Talanquer. *Ciencias Naturales. Tercer Grado.* [3rd grade, elementary school]. SEP. México, 1996. (2,500,000 copies/year)

Other educational materials:

1. Chemical Thinking Interactives (https://sites.google.com/site/ctinteractives/). HTML5 Version, 2020.

Area: Physical Chemistry

Chapters in Books

1. V. Talanquer. Statistical Mechanics of Fluid Interfaces. In D. Petsev (Ed.) *Emulsions: Structure, Stability, and Interactions*. Chapter 1. Academic Press, 2004.

Peer-Reviewed Journal Articles:

1. [+]B. Husowitz and V. Talanquer. Filling and emptying transitions in cylindrical channels: A density functional approach. *J. Chem. Phys.* 126, 224703 (2007).
2. V. Talanquer. Nucleation of Self-Associating Fluids: Free versus Activated Association. *J. Phys. Chem. B* 111, 3438 (2007).
3. [+]B. Husowitz and V. Talanquer. Solvent density inhomogeneities and solvation free energies in supercritical diatomic fluids: A density functional approach. *J. Chem. Phys.* 126, 054508 (2007).
4. V. Talanquer. Phase transitions in DNA-linked nanoparticle assemblies: A decorated lattice model. *J. Chem. Phys.* 125, 194701 (2006).
5. [+]B. Husowitz and V. Talanquer. Nucleation on cylindrical plates: Sharp transitions and double barriers. *J. Chem. Phys.* 122, 194710 (2005).

6. V. Talanquer. Phase behavior of self-associating fluids with weaker dispersion interactions between bonded particles. *J. Chem. Phys.* 122, 154510 (2005).
7. V. Talanquer. Nucleation in a simple model for protein solutions with anisotropic interactions. *J. Chem. Phys.* 122, 084704 (2005).
8. [+]B. Husowitz and V. Talanquer. Nucleation in Cylindrical Capillaries. *J. Chem. Phys.* 121, 8021 (2004).
9. V. Talanquer and D. W. Oxtoby. Formation of Droplets on Non-Volatile Soluble Particles. *J. Chem. Phys*. 119, 921 (2003).
10. V. Talanquer and D. W. Oxtoby. Nucleation of pores in amphiphile bilayers. *J. Chem. Phys*. 118, 872 (2003).
11. V. Talanquer, [+]C. Cunningham, and D. W. Oxtoby. Bubble Nucleation in Binary Mixtures: A Semiempirical Approach. *J. Chem. Phys.* 114, 6759 (2001).
12. V. Talanquer and D. W. Oxtoby. Nucleation in a slit pore. *J. Chem. Phys*. 114, 2793 (2001).
13. [+]K. Padilla and V. Talanquer. Nucleation on aerosol particles. *J. Chem. Phys*. 114, 1319 (2001).
14. V. Talanquer and D. W. Oxtoby. A density functional approach to nucleation in micellar solutions. *J. Chem. Phys.* 113, 7013 (2000).
15. V. Talanquer and D. W. Oxtoby. Gas-liquid nucleation in associating fluids. *J. Chem. Phys.* 112, 851 (2000).
16. V. Talanquer and D. W. Oxtoby. A simple off-lattice model for microemulsions. *Faraday Transactions*. 112, 91 (1999).
17. [+]I. Napari, A. Laaksonen, V. Talanquer and D. W. Oxtoby. A density functional study of liquid-liquid interfaces in partially miscible systems. *J. Chem. Phys.* 110. 5906 (1999).
18. V. Talanquer and D. W. Oxtoby. Crystal nucleation in the presence of a metastable critical point. *J. Chem. Phys.* 109, 223 (1998).
19. V. Talanquer. A new phenomenological approach to gas-liquid nucleation based on the scaling properties of the critical nucleus. *J. Chem. Phys*. 106, 9957 (1997).
20. V. Talanquer and D. W. Oxtoby. Nucleation in the presence of an amphiphile: A density functional approach. *J. Chem. Phys.* 106, 3673 (1997).
21. [+]E. Carrillo, V. Talanquer, and M. Costas. Wetting transition at the liquid-air interface of methanol-alkane mixtures. *J. Phys. Chem.* 100, 5888 (1996).
22. V. Talanquer and D. W. Oxtoby. Critical clusters in binary mixtures: A density functional approach. *J. Chem. Phys.* 104, 1993 (1996).
23. V. Talanquer and D. W. Oxtoby. Nucleation on a solid substrate: A density functional approach. *J. Chem. Phys.* 104, 1483 (1996).
24. A. Laaksonen, V. Talanquer, and D. W. Oxtoby. Nucleation: Measurements, theory, and atmospheric applications. *Ann. Rev. Phys. Chem*. 46, 489 (1995).
25. V. Talanquer and D. W. Oxtoby. Heterogeneous nucleation of molecular and dipolar fluids. XIV Winter Meeting on Statistical Physics. *Physica A* 220*,* 74 (1995).
26. V. Talanquer and D. W. Oxtoby. Nucleation in molecular and dipolar fluids: interaction site model. *J. Chem. Phys.* 104, 3686 (1995).
27. [+]R. M. Nyquist, V. Talanquer, and D. W. Oxtoby. Density functional theory of nucleation: A semiempirical approach. *J. Chem. Phys.* 103, 1175 (1995).
28. V. Talanquer and D. W. Oxtoby. Density functional analysis of phenomenological theories of gas-liquid nucleation. *J. Phys. Chem.* 99, 2865 (1995).
29. V. Talanquer and D. W. Oxtoby. Nucleation of bubbles in binary fluids*. J. Chem. Phys.* 102, 2156 (1995).
30. [+]C. Pérez, [+]P. Roquero, and V. Talanquer. Wetting properties of simple binary mixtures and systems with one self-associating component*. J. Chem. Phys.* 100, 5913 (1994).
31. V. Talanquer and D. W. Oxtoby. Dynamical density functional theory of gas-liquid nucleation. *J. Chem. Phys*. 100, 5190 (1994).
32. V. Talanquer and D. W. Oxtoby. Nucleation in dipolar fluids: Stockmayer fluids*. J. Chem. Phys.* 99, 4670 (1993).
33. A. Robledo, C. Varea, and *V. Talanquer. Curvature interfacial transitions at amphiphile monolayers and their possible relation to the onset of micelle formation*. Phys. Rev. A.* 43, 5736 (1991).
34. *V. Talanquer. Global phase diagram for reacting systems. *J. Chem. Phys.* 96, 5408 (1992).
35. *V. Talanquer, C. Varea, and A. Robledo. Sublattice-ordered phases in a lattice model for a micellar solution*. Phys. Rev. B* 39, 7039 (1989).

36. *V. Talanquer, C. Varea, and A. Robledo. Global phase diagram for binary alloys with one magnetic component. *Phys. Rev. B* 39, 7030 (1989).
37. *V. Talanquer, C. Varea, and A. Robledo. Sublattice ordered phases of the Griffith's three-component model. *Phys. Rev. B* 39, 7016 (1989).

INVITED PRESENTATIONS (Last five years)

- *Developing and assessing student reasoning*. University of Colorado-Denver. December 3, 2021 (Online).
- *Misconceptions that students bring with them into the chemistry classroom*, Chem101. November 12, 2021 (Online).
- *¿Qué se investiga en educación química?* [What is Research in chemistry education?] Facultad de Química, Universidad Autónoma de México (UNAM), Mexico. November 5, 2021 (Online).
- *Desarrollando pensamiento sistémico en química* [Developing chemical systems thinking] XXXIV Semana de Ciencias Químicas, Facultad de Ciencias Química, Universidad Autónoma de San Luis Potosí, México. October 26, 2021 (Online).
- *Multifaceted chemical thinking*. ICOSETH 2021 - 3rd International Conference on Science Education and Technology. Universitas Sebelas Maret (UNS), Indonesia. October 16, 2021 (Online).
- *Reforming a general chemistry course: Benefits and struggles*. 2YC3 (Two-Year College Consortium) and C3 (College Chemistry Canada) virtual chemistry education conferences. September 24, 2021 (Online).
- *¿Qué debe cambiar en la educación en ciencias?* [What should change in science education?] Facultad de Ciencias Químicas, Universidad Benemérita de Puebla. Mexico, September 9, 2021 (Online).
- *Developing and assessing student reasoning*. 5th International Conference on Mathematics and Science Education (ICoMSE) 2021. Malang, East Java. Indonesia, August 3, 2021 (Online).
- *Developing and assessing chemical thinking*. Department of Chemistry, National Institute of Technology. Warangal, India, July 29, 2021 (Online).
- *Enriching and diversifying assessment of student learning*. University of Rhode Island. US, June 11, 2021 (Online).
- *Estrategias para uma enseñanza responsiva* [Strategies for responsive teaching] Diplomado Internacional Innovación en la Docencia Universitaria 2021, UNAM, Mexico; Universidad Tecnológica Metropolitana de Chile (UTEM). Santiago, Chile, May 21, 2021 (Online).
- *Assessing for Chemical Thinking*. Universitas Sebelas Maret (UNS). Surakarta, Indonesia, April 20, 2021 (Online).
- *Aprender ciencias con base en problemas del contexto* [Learning science usin contextualized problems] Sindicato de Maestros al Servicio del Estado de México. Mexico. March 12, 2021 (Online).
- *Cambios necesarios en la educación en ciencias* [Necessary changes in science education] Jornades telemàtiques sobre l'ensenyament de les Ciències: Nous reptes davant nous escenaris, Cataluña, Spain. March 20, 2021 (Online).
- *¿Cómo usar simulaciones para apoyar el trabajo experimental?* [How to use simulations to support experimental work?] Facultad de Química, UNAM. Mexico, February 22, 2021 (Online).
- *¿Qué deberíamos enseñar en química y cómo?* [What should we teach in chemistry and how?] (Plenary Talk) X semana de Química, Universidade Federal de Rondônia. Brazil, December 2, 2020 (Online).
- *Retos en la evaluación del aprendizaje* [Challenges Assessing Student Learning] Universidade Estadual de Santa Cruz. Brazil, November 27, 2020 (Online).
- *ED 2020: Aprendizajes y cambios necesarios* [ED 2020: Learning and necessary changes] (Discussion Panel) Colloquium: El Modelo Educativo del Colegio ante los nuevos desafíos. Colegio de Ciencias Y Humanidades, UNAM. Mexico, November 25, 2020 (Online).
- *¿Qué deberíamos enseñar en química?* [What should we teach in chemistry?) (Plenary Talk) 1er Congreso Internacional de Educación Química. Sociedad Química de México. Mexico, November 14, 2020 (Online).

- *Evaluación de los aprendizajes en química* [Assessing learning in chemistry] (Discussion Panel) 1er Congreso Internacional de Educación Química. Sociedad Química de México. Mexico, November 12, 2020 (Online).
- *Investigating and developing student reasoning in chemistry*. Tufts University, US, November 4, 2020 (Online).
- *¿Qué se esconde detrás de las concepciones alternativas en química*? [What lies behind students' alternative conceptions in Chemistry] (Plenary Talk) Encuentro de Didáctica de la Química Online. MInisterio de Educación de Panamá. Panama, October 31, 2020 (Online).
- *Challenges assessing student learning*. Florida International University, October 30, 2020 (Online).
- *Desarrollando pensamiento químico* [Developing chemical thinking]. Universidad Pedagógica Nacional, Colombia. Colombia, October 22, 2020 (Online).
- *Challenges assessing student learning*. Purdue University. US, September 23, 2020 (Online).
- *Transforming chemistry education* (Plenary Talk) LatinXChem Conference. US, September 15, 2020 (Online).
- *Enseñanza de las ciencias con base en problemas del contexto* [Science education based on contextual problems] (Plenary Talk) Congreso International de Evaluación Socioformativa Valora. Mexico, September 5, 2020 (Online).
- *Enriching formative and summative assessment in chemistry* (Plenary Talk) 15th European Conference on Research in Chemical Education (ECRICE 2020). Weizmann Institute of Science. Israel, July 6, 2020 (Online).
- *Confesiones de un docente en tiempos de pandemia* [An instructor's confessions during pandemic times]. National University of Mexico (UNAM). Mexico, June 26, 2020 (Online).
- *Future challenges of science education in the new STEM scenario* (Discussion Panel) V International Symposium of Science Education SIEC 2020. Universidad de Vigo. Spain, June 15, 2020 (Online).
- *Lecciones de pandemic: Aprendizajes, frustraciones e imperativos educacionales* [Lessons from the pandemic: Understandings, frustrations and educational imperatives]. Centro de Investigación y Apoyo a la Educación Científica, Universidad de Buenos Aires (CIEC UBA). Argentina, June 12, 2020 (Online).
- *Enseñar a pensar en química* [Teaching to think in chemistry]. Universidad Autónoma Metropolitana (UAM). Mexico, March 11, 2020.
- *Struggling to change: Research and development in a general chemistry course*. Duke University. US, March 3, 2020.
- *Nuevas Metáforas en la Educación en Ciencias* [New Metaphors in Science Education] (Plenary Talk) Congreso Sociedad Chilena de Educación. Chillán, Chile, November 7, 2019.
- *Struggling to change: Research and development in an introductory chemistry course*. Tufts University. US, September 23, 2019.
- *The Need for Unpacking* (Keynote) SABER Conference. University of Minneapolis. US, July 26, 2019.
- *Developing and Assessing Reasoning in Chemistry*. University of Iowa. US, March 29, 2019.
- *Reinventing the Foundations* (Plenary Talk). Tennessee STEM Education Research Conference. Middle Tennessee State University. US, February 15, 2019.
- *Reconceptualizing the Chemistry Curriculum to Foster Chemical Thinking*. Arizona State University. US, September 21, 2018.
- *Assessing for chemical thinking* (Plenary Talk). IUPAC International Conference of Chemistry Education. Sydney, Australia, July 13, 2018.
- *Understanding student reasoning to foster chemical thinking*. University of New South Wales. Sydney, Australia, July 10, 2018.
- *¿Qué formas de pensamiento químico demanda el mundo actual?* [What types of chemical thinking demands the modern world?] Facultad de Química, UNAM. Mexico, June 11, 2018.
- *What does it take to develop Chemical Thinking*? Ragsdale Colloquium. University of Utah. US, April 10, 2018.
- *What does it take to develop Chemical Thinking*? Brigham Young University. US, April 9, 2018.
- *Exploring and promoting chemical thinking*. Stony Brook University. US, December 7, 2017.
- *Educar con ambición* [Ambitious teaching] (Plenary Talk). IV Congresso Internacional de Educação Científica e Tecnológica. Universidade Regional Integrada do Alto Uriguai. Brazil, October 9, 2017.

- *Chemical Thinking: A fresh look at the General Chemistry curriculum*. University of Georgia. US, September 8, 2017.
- *Exploring reasoning to construct thinking*. La Mattina Lecture Series, University of New Hampshire. US, April 20, 2017.
- *Exploring student reasoning to support better teaching*. University of Michigan. US, March 21, 2017.
- *¿Cómo se piensa en Química?* [How do we think in Chemistry?] (Plenary Talk) XV Encuentro de Educación Química. Valparaíso, Chile, January 13, 2017.
- *Secuencias y progresiones de aprendizaje* [Sequence and learning progressions] Pontificia Universidad Católica de Valparaíso. Valparaíso, Chile, January 11, 2017.

SERVICE

Departmental Committees and Projects

2020-present Member, *Faculty Awards Committee*
2020-present Chair*, Standing Advisory Committee on Career Track Faculty Status*
2014-present Faculty Lead, *Chemistry Education Division*,
2010-present Member, *Undergraduate Program Committee***.**
2001-present Coordinator, *General Chemistry Group*
2001-2017 Major Advisor*,* Science Education option
2001-2010 Chair, Undergraduate Program Committee

College/University Committees

2020-present Member, *CoS Diversity, Equity, and Inclusion Committee*
2020-present Member of Steering Committee UA-CIRTL (Center for the Integration of Research, Teaching, nd Learning) Network
2019-present Co-initiative owner, *Renovation of Old Chemistry* building (Strategic Plan Initiative)
2018-present Member, *Advisory Board for the UA Center of University Education Scholarship* (CUES)
2018-present Member, *Honors Faculty Advisory Council*
2018 Member, *UA Physics Department APR Review Committee*
2017-present CBC Coordinator, *Council of Undergraduate Research Transformation Project* (CURTP),
2015-2018 Member, *CoS Promotion & Tenure Committee*
2000-2017 Member, *CoS Teacher Preparation Program*

National and International Service

2021-present Chair-elect (2021), Chair (2022), Past-Chair (2023), Chemical Education Division of the American Chemical Society
2021-present Monitoring Editor for the journal CBE-Life Sciences Education (CBE-LSE)
2021-present Working Group 2 Co-facilitator *IUPAC STCS (Systems Thinking in the Chemical Sciences) 2030+ project*
2021-present Advisory board member, *Canadian Journal of Chemistry*
2021-present Advisory board member, Enseñanza de las Ciencias [Spanish journal of science education]
2020-present Advisory board me*mber*, *Journal of the American Chemical Society Gold (JACS Au)*
2018-present Editorial board member, *Disciplinary and Interdisciplinary Science Education Research* (DISER)
2017-present Member*, Chemistry Education Research Committee* of the American Chemical Society
2016-present Advisory board member, *Journal of Chemical Education*
2014-present Series Editor, RSC Advances in Chemistry Education Series
2011-present Editorial board member, *International Journal of Science Teaching*
2017-2019 Chair*, 2019 Gordon Research Conference* (GRC) in Chemistry Education Research and Practice
2015-2020 Editorial board member, *Educación Química* [Mexican journal of chemical education]
2013-2020 Editorial board member*, Chemistry Education Research and Practice*

2015-2017 Co-Chair*, 2017 Gordon Research Conference* (GRC) in Chemistry Education Research and Practice
2013-2017 Member, *Planning Committee* for American Chemical Society NSTA-Days of Chemistry
2011-2015 Peer Reviewer, *Fulbright Specialist Program*
2010-2013 Editorial board member, *Journal of Research in Science Teaching*
2009-2013 Member of the *Science Academic Advisory Committee*, College Board

Ad Hoc Reviews

Journals:

2018-present	*Disciplinary and Interdisciplinary Science Education Research*
2017-present	*CBE-Life Sciences Education*
2017-present	*Learning and Instruction*
2016-present	*Cognition & Instruction*
2013- present	*Science & Education*
2013- present	*International Journal of Science and Mathematics Education*
2011- present	*Research in Science Education*
2009- present	*Chemistry Education Research and Practice*
2009- present	*International Journal of Science Education*
2007- present	*Science Education*
2006- present	*Journal of Research in Science Teaching*
2001- present	*Journal of Chemical Education*
1991- present	*Educación Química* [Chemical Education]. (Mexico)

Funding Agencies:

2003- present	*NSF* (Education Division)

National Meetings:

2013- present	*Encontro Nacional de Pesquisa em Educação em Ciências* (ENPEC) (Annual Meeting)
2001- 2016	*National Association for Research in Science Teaching* (NARST) (Annual meeting)

Outreach

2019-present Coordinator, *ACS CER Webinar Series*
2006-present Workshop facilitator, *College Academy for Parents* (2 hours every year)