

Marcos (Danny) Caballero

1 Contact Information

Marcos (Danny) Caballero, PhD
Department of Physics & Astronomy
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2 Education

- Georgia Institute of Technology (Atlanta, GA) Doctor of Philosophy in Physics, 2011
Thesis: **Evaluating and Extending a Novel Course Reform of Introductory Mechanics**
Advisor: Prof. Michael F. Schatz [Online]
- Georgia Institute of Technology (Atlanta, GA) Master of Science in Physics, 2007
- University of Texas at Austin (Austin, TX) Bachelor of Science in Physics, 2004

3 Academic Experience

Positions




- 2023 – Present, Professor, Department of Computational Mathematics, Science, and Engineering
- 2023 – Present, Lappan-Phillips Professor of Physics Education, Department of Physics and Astronomy, Michigan State University
- 2020 – 2023, Associate Professor, Department of Computational Mathematics, Science, and Engineering
- 2018 – 2023, Lappan-Phillips Associate Professor of Physics Education, Department of Physics and Astronomy, Michigan State University
- 2017 – Present, Adjunct Associate Professor, Department of Physics, University of Oslo
- 2013 – Present, Affiliated Faculty, CREATE for STEM Institute, Michigan State University
- 2013 – 2018, Assistant Professor, Department of Physics and Astronomy, Michigan State University
- 2011 – 2013, Postdoctoral Researcher, Department of Physics, University of Colorado Boulder
- 2011 – 2013, Research Affiliate, School of Physics, Georgia Institute of Technology
- 2005 – 2011, Graduate Teaching and Research Assistant, School of Physics, Georgia Institute of Technology

Awards and Honors

- 2023 – Fellow of the American Physical Society, Group on Physics Education Research [Press]
“For foundational research and development on the roles of computation in physics education and contributions to research on undergraduate and graduate education in physics.”
- 2023 – APS Education Prize, Partnership for the Integration of Computing in Undergraduate Physics, Team Member [Press]
“For developing an active, inclusive, and supportive community of physics educators dedicated to integrating computation into their instruction; creating, reviewing, and disseminating instructional materials; and generating knowledge of computation in physics curricula and of effective practices.”
- 2022 – Physical Review PER Editor’s Suggestion (Topic: Computational Physics Education): *Student’ perspectives on computational challenges in physics class* [Paper]

- 2022 – Department Award for Improving Undergraduate Physics Education, Team Member, American Physical Society [Press]
- 2021 – Physical Review PER Editor’s Suggestion (Topic: Quantitative Methods for Education Research): *Framework for evaluating statistical models in physics education research* [Paper]
- 2021 – Physical Review PER Editor’s Suggestion (Topic: Graduate Physics Education): *Physics Graduate Record Exam does not help applicants “stand out”* [Paper]
- 2019 – Physical Review PER Editor’s Suggestion (Topic: Computational Physics Education): *Physics computational literacy: An exploratory case study using computational essays* [Paper]
- 2019 – Physics Education Research Conference Notable Paper [Press]
- 2019 – Featured in MSU Today for Teaching Innovation [Press]
- 2018 – President’s Distinguished Teaching Award, MSU [Press]
- 2018 – Teacher-Scholar Award, MSU [Press]
- 2017 – Featured in MSU Today for NSF grant [Press]
- 2016 – Physics Education Research Conference Notable Paper [Press]
- 2016 – College of Natural Science Teaching Prize, MSU
- 2015 – Thomas H. Osgood Memorial Awards for Faculty Excellence in Teaching, MSU
- 2014 – STEM Gateway Fellow, College of Natural Science, MSU
- 2011 – Tower Award, Georgia Institute of Technology
- 2010 – CETL/BP Outstanding Graduate TA Award Finalist, Georgia Institute of Technology
- 2009 – CETL/BP Outstanding Graduate TA Award, Georgia Institute of Technology
- 2007 - 2008 – Teaching Assistant of the Year, American Association of Physics Teachers
- 2007 - 2011 – Gozuieta Fellow, Georgia Institute of Technology
- 2007 – Travel Grant, Technical University of Denmark
- 2006 Tower Award, Georgia Institute of Technology

4 Writing in review

5. Melanie M Cooper, Marcos D. Caballero, Justin H. Carmel, Erin M. Duffy, Diane Ebert-May, Cori L. Fata-Hartley, Deborah G. Herrington, James T. Laverty, Paul C. Nelson, Lynmarie A. Posey, Jon R. Stoltzfus, Ryan L. Stowe, Ryan D. Sweeder, Stuart Tessmer, and Sonia M. Underwood. “Beyond Active Learning: Using 3-Dimensional Learning to Create Scientifically Authentic, Student-Centered Classrooms”. In: *bioRxiv* (2023). doi: 10.1101/2023.12.05.570209. url: <https://www.biorxiv.org/content/early/2023/12/07/2023.12.05.570209>
4. Michael Vignal, Gayle Geschwind, Marcos D. Caballero, and H. J. Lewandowski. *Couplet scoring for research based assessment instruments*. 2023
3. Hannah C. Sabo, Tor Ole B. Odden, and Marcos D. Caballero. *How do we assess computation in physics?* 2023
2. “Preparing 21st Century Physicists: Integrating Computation into the Undergraduate Physics Curriculum”. 2025 
1. D. Stroupe, D. Reinholz, S. Byun, J. Christensen, J. Willison, and M.D. Caballero. “Supporting teachers to integrate computational practices and design opportunities for equitable participation in science classrooms”. 2022  

5 Invited papers and book chapters

7. Marcos D. Caballero and Tor Ole B. Odden. “Computing in physics education”. In: *Nature Physics* 20.3 (Mar. 2024), pp. 339–341. issn: 1745-2481. doi: 10.1038/s41567-023-02371-2. url: <https://doi.org/10.1038/s41567-023-02371-2>
6. Tor Ole B. Odden and Marcos D. Caballero. “Physics Computational Literacy: What, Why, and How?” In: *The International Handbook of Physics Education Research: Learning Physics*. AIP Publishing LLC. isbn: 978-0-7354-2544-6. doi: 10.1063/9780735425477_019. url: https://doi.org/10.1063/9780735425477%5C_019

5. Alexis V. Knaub, John M. Aiken, and Marcos D. Caballero. “Editorial: Focused Collection: Quantitative Methods in PER: A Critical Examination”. In: *Physical Review Physics Education Research* 15 (2019), p. 020001. doi: 10.1103/PhysRevPhysEducRes.15.020001
4. Marcos D. Caballero and Morten Hjorth-Jensen. “Integrating a Computational Perspective in Physics Courses”. In: *New Trends in Physics Education Research*. Ed. by Salvatore Magazù. Nova Science Publishers, 2018, pp. 47–76. isbn: 978-1-53613-894-8
3. Marcos D. Caballero. “Taking A Scientific Approach To Physics Education”. In: *Student Journal of Physics* 6.1 (2017). Ed. by L. Sapathy. url: https://www.iopb.res.in/~sjp/sjp_past_issues/V6N1/1.pdf
2. Marcos D. Caballero, Matthew A. Kohlmyer, and Michael F. “Fostering Computational Thinking”. In: *2011 Physics Education Research Conference Proceedings*. Ed. by N. Sanjay Rebello, Paula V. Engelhardt, and Chandralekha Singh. 2011, pp. 15–18. doi: 10.1063/1.3679982
1. Keith R. Bujak, Marcos D. Caballero, Michael F. Schatz, M. Jackson Marr, and Richard Catrambone. “Comparing the Matter and Interactions Curriculum with a Traditional Physics Curriculum: A Think Aloud Study”. In: *2011 AERA Conference Proceedings*. 2011

6 Popular Press and Conference Reports

4. Nicholas T. Young, Kirsten Tollefson, and Marcos D. Caballero. “Making graduate admissions in physics more equitable”. In: *Physics Today* 76.7 (July 2023), pp. 40–45. issn: 0031-9228. doi: 10.1063/PT.3.5271. url: <https://doi.org/10.1063/PT.3.5271>
3. Marcos D. Caballero, Larry Engelhardt, Alexis V. Knaub, Michelle Kuchera, Marié Lopez del Puerto, Brandon Lunk, Kelly Roos, and Todd Zimmerman. *2021 PICUP Virtual Capstone Conference Report*. Tech. rep. 2022. url: https://www.compadre.org/picup//events/pdfs/2021_PICUP_Capstone_Report_Final_Final_220502.pdf
2. Marcos D. Caballero, Larry Engelhardt, Robert Hilborn, Marié Lopez del Puerto, and Kelly Roos. “PICUP: The Partnership for the Integration of Computation into Undergraduate Physics”. In: *APS News* 28.3 (2019). url: <https://www.aps.org/publications/apsnews/201903/backpage.cfm>
1. Marcos D. Caballero, Dimitri R. Dounas-Frazer, Heather J. Lewandowski, and MacKenzie R. Stetzer. “Labs are Necessary, and We Need to Invest in Them”. In: *APS News* 27.5 (2018). url: <https://www.aps.org/publications/apsnews/201805/backpage.cfm>

7 Articles appearing in peer-reviewed journals







46. Michael Vignal, Gayle Geschwind, Benjamin Pollard, Rachel Henderson, Marcos D. Caballero, and H. J. Lewandowski. “Survey of physics reasoning on uncertainty concepts in experiments: An assessment of measurement uncertainty for introductory physics labs”. In: *Phys. Rev. Phys. Educ. Res.* 19 (2 Oct. 2023), p. 020139. doi: 10.1103/PhysRevPhysEducRes.19.020139. url: <https://link.aps.org/doi/10.1103/PhysRevPhysEducRes.19.020139>
45. Nicholas T. Young, N. Verboncoeur, Dao Chi Lam, and Marcos D. Caballero. “Rubric-based holistic review represents a change from traditional graduate admissions approaches in physics”. In: *Phys. Rev. Phys. Educ. Res.* 19 (1 May 2023), p. 010134. doi: 10.1103/PhysRevPhysEducRes.19.010134. url: <https://link.aps.org/doi/10.1103/PhysRevPhysEducRes.19.010134>
44. Nicholas T. Young, K. Tollefson, Remco G. T. Zegers, and Marcos D. Caballero. “Rubric-based holistic review: A promising route to equitable graduate admissions in physics”. In: *Phys. Rev. Phys. Educ. Res.* 18 (2 Nov. 2022), p. 020140. doi: 10.1103/PhysRevPhysEducRes.18.020140. url: <https://link.aps.org/doi/10.1103/PhysRevPhysEducRes.18.020140>
43. P. C. Hamerski, Daryl McPadden, Marcos D. Caballero, and Paul W. Irving. “Students’ perspectives on computational challenges in physics class”. In: *Phys. Rev. Phys. Educ. Res.* 18 (2 Aug. 2022), p. 020109. doi: 10.1103/PhysRevPhysEducRes.18.020109. url: <https://link.aps.org/doi/10.1103/PhysRevPhysEducRes.18.020109>
42. Daniel P. Weller, Theodore E. Bott, Marcos D. Caballero, and Paul W. Irving. “Development and illus-

- tration of a framework for computational thinking practices in introductory physics”. In: *Phys. Rev. Phys. Educ. Res.* 18 (2 July 2022), p. 020106. doi: 10.1103/PhysRevPhysEducRes.18.020106. url: <https://link.aps.org/doi/10.1103/PhysRevPhysEducRes.18.020106>
41. Joseph Wilson, Benjamin Pollard, John M. Aiken, Marcos D. Caballero, and H. J. Lewandowski. “Classification of open-ended responses to a research-based assessment using natural language processing”. In: *Physical Review Physics Education Research* (2022). doi: 10.1103/PhysRevPhysEducRes.18.010141
 40. Odd Petter Sand, Marcos D. Caballero, Knut Martin Mørken, and Elise Lockwood. “Three Cases That Demonstrate How Students Connect the Domains of Mathematics and Computing”. In: *Journal of Mathematical Behavior* (2022). doi: 10.1016/j.jmathb.2022.100955
 39. Odd Petter Sand, Elise Lockwood, Marcos D. Caballero, and Knut Martin Mørken. “Students’ Development of a Logarithm Function in Python Using Taylor Expansions: A Teaching Design Case Study”. In: *Digital Experiences in Mathematics Education* (2022). doi: 10.1007/s40751-022-00104-3
 38. Benjamin Pollard, Robert Hobbs, Rachel Henderson, Marcos D. Caballero, and H. J. Lewandowski. “Introductory physics lab instructors’ perspectives on measurement uncertainty”. In: *Physical Review Physics Education Research* 17 (1 2021), p. 010133. doi: 10.1103/PhysRevPhysEducRes.17.010133
 37. Nicholas T Young and Marcos D Caballero. “Predictive and Explanatory Models Might Miss Informative Features in Educational Data”. In: *Journal of Educational Data Mining* 13.4 (2021), pp. 31–86. doi: 10.5281/zenodo.5806830
 36. Nicholas T. Young and Marcos D. Caballero. “Physics Graduate Record Exam does not help applicants “stand out””. In: *Physical Review Physics Education Research* 17 (1 2021), p. 010144. doi: 10.1103/PhysRevPhysEducRes.17.010144
 35. John M. Aiken, Riccardo De Bin, H. J. Lewandowski, and Marcos D. Caballero. “Framework for evaluating statistical models in physics education research”. In: *Physical Review Physics Education Research* 17 (2 2021), p. 020104. doi: 10.1103/PhysRevPhysEducRes.17.020104
 34. Nils J. Mikkelsen, Nicholas T. Young, and Marcos D. Caballero. “Investigating institutional influence on graduate program admissions by modeling physics Graduate Record Examination cutoff scores”. In: *Physical Review Physics Education Research* 17 (1 2021), p. 010109. doi: 10.1103/PhysRevPhysEducRes.17.010109
 33. John M. Aiken, Riccardo De Bin, Morten Hjorth-Jensen, and Marcos D. Caballero. “Predicting time to graduation at a large enrollment American university”. In: *PLOS ONE* 15.11 (2020). doi: 10.1371/journal.pone.0242334
 32. Paul W. Irving, Daryl McPadden, and Marcos D. Caballero. “Communities of practice as a curriculum design theory in an introductory physics class for engineers”. In: *Physical Review Physics Education Research* 16 (2 2020), p. 020143. doi: 10.1103/PhysRevPhysEducRes.16.020143
 31. Tor Ole B. Odden, Alessandro Marin, and Marcos D. Caballero. “Thematic analysis of 18 years of physics education research conference proceedings using natural language processing”. In: *Physical Review Physics Education Research* 16 (1 2020), p. 010142. doi: 10.1103/PhysRevPhysEducRes.16.010142
 30. Alanna Pawlak, Paul W. Irving, and Marcos D. Caballero. “Learning assistant approaches to teaching computational physics problems in a problem-based learning course”. In: *Physical Review Physics Education Research* 16 (1 2020), p. 010139. doi: 10.1103/PhysRevPhysEducRes.16.010139
 29. Kinsey Bain, Rebecca L. Matz, Cori L. Fata-Hartley, Marcos D. Caballero, Diane Ebert-May, Sonia M. Underwood, Justin H. Carmel, Deborah G. Herrington, James T. Laverty, Erin M. Duffy, Jon R. Stoltzfus, Lydia Bender, Lynmarie A. Posey, Mark Urban-Lurain, Ryan L. Stowe, Ryan D. Sweeder, Stuart H. Tessmer, and Melanie M. Cooper. “Characterizing College Science Instruction: The Three-Dimensional Learning Observation Protocol”. In: *PLOS ONE* 15.6 (2020), e0234640. doi: 10.1371/journal.pone.0234640
 28. Tor Ole B. Odden, Elise Lockwood, and Marcos D. Caballero. “Physics computational literacy: An exploratory case study using computational essays”. In: *Physical Review Physics Education Research* 15 (2 2019), p. 020152. doi: 10.1103/PhysRevPhysEducRes.15.020152
 27. Kelsey Funkhouser, William Martinez, Rachel Henderson, and Marcos D. Caballero. “Design, Analysis, Tools, and Apprenticeship (DATA) Lab”. In: *European Journal of Physics* 40.6 (2019), p. 065701. doi: 10.1088/1361-6404/ab2f0d
 26. Marcos D. Caballero, Norman Chonacky, Larry Engelhardt, Robert C. Hilborn, Marie Lopez del Puerto,

- and Kelly R. Roos. “PICUP: A Community of Teachers Integrating Computation into Undergraduate Physics Courses”. In: *The Physics Teacher* 57.6 (2019), pp. 397–399. doi: 10.1119/1.5124281
25. John M. Aiken, Rachel Henderson, and Marcos D. Caballero. “Modeling student pathways in a physics bachelor’s degree program”. In: *Physical Review Physics Education Research* 15 (1 2019), p. 010128. doi: 10.1103/PhysRevPhysEducRes.15.010128
 24. Nicholas T. Young, Grant Allen, John M. Aiken, Rachel Henderson, and Marcos D. Caballero. “Identifying features predictive of faculty integrating computation into physics courses”. In: *Physical Review Physics Education Research* 15 (1 2019), p. 010114. doi: 10.1103/PhysRevPhysEducRes.15.010114
 23. Marcos D. Caballero and Laura Merner. “Prevalence and nature of computational instruction in undergraduate physics programs across the United States”. In: *Physical Review Physics Education Research* 14 (2 2018), p. 020129. doi: 10.1103/PhysRevPhysEducRes.14.020129
 22. Rebecca L. Matz, Cori L. Fata-Hartley, Lynmarie A. Posey, James T. Laverty, Sonia M. Underwood, Justin H. Carmel, Deborah G. Herrington, Ryan L. Stowe, Marcos D. Caballero, Diane Ebert-May, and Melanie M. Cooper. “Evaluating the extent of a large-scale transformation in gateway science courses”. In: *Science Advances* 4.10 (2018). doi: 10.1126/sciadv.aau0554
 21. David Stroupe, Marcos D. Caballero, and Peter White. “Fostering students’ epistemic agency through the co-configuration of moth research”. In: *Science Education* (2018), pp. 1–25. doi: 10.1002/sce.21469
 20. James T. Laverty and Marcos D. Caballero. “Analysis of the most common concept inventories in physics: What are we assessing?” In: *Physical Review Physics Education Research* 14 (1 2018), p. 010123. doi: 10.1103/PhysRevPhysEducRes.14.010123
 19. Alanna Pawlak, Paul W. Irving, and Marcos D. Caballero. “Development of the Modes of Collaboration framework”. In: *Physical Review Physics Education Research* 14 (1 2018), p. 010101. doi: 10.1103/PhysRevPhysEducRes.14.010101
 18. Paul W. Irving, Michael J. Obsniuk, and Marcos D. Caballero. “P³: a practice focused learning environment”. In: *European Journal of Physics* 38.5 (2017), p. 055701. doi: 10.1088/1361-6404/aa7529
 17. Marcos D. Caballero, Leanne Doughty, Anna M. Turnbull, Rachel E. Pepper, and Steven J. Pollock. “Assessing learning outcomes in middle-division classical mechanics: The Colorado Classical Mechanics and Math Methods Instrument”. In: *Physical Review Physics Education Research* 13 (2017), p. 010118. doi: 10.1103/PhysRevPhysEducRes.13.010118
 16. James T. Laverty, Sonia M. Underwood, Rebecca L. Matz, Lynmarie A. Posey, Justin H. Carmel, Marcos D. Caballero, Cori L. Fata-Hartley, Diane Ebert-May, Sarah E. Jardeleza, and Melanie M. Cooper. “Characterizing College Science Assessments: The Three-Dimensional Learning Assessment Protocol”. In: *PLOS ONE* 11.9 (2016), e0162333. doi: 10.1371/journal.pone.0162333
 15. Melanie M. Cooper, Marcos D. Caballero, Diane Ebert-May, Cori L. Fata-Hartley, Sarah E. Jardeleza, Joseph S. Krajcik, James T. Laverty, Rebecca L. Matz, Lynmarie A. Posey, and Sonia M. Underwood. “Challenge faculty to transform STEM learning”. In: *Science* 350.6258 (2015), pp. 281–282. issn: 0036-8075. doi: 10.1126/science.aab0933
 14. Stephanie V. Chasteen, Bethany Wilcox, Marcos D. Caballero, Katherine K. Perkins, Steven J. Pollock, and Carl E. Wieman. “Educational transformation in upper-division physics: The Science Education Initiative model, outcomes, and lessons learned”. In: *Physical Review Special Topics – Physics Education Research* 11 (2 2015), p. 020110. doi: 10.1103/PhysRevSTPER.11.020110
 13. Bethany R. Wilcox, Marcos D. Caballero, Charles Baily, Homeyra Sadaghiani, Stephanie V. Chasteen, Qing X. Ryan, and Steven J. Pollock. “Development and uses of upper-division conceptual assessments”. In: *Physical Review Special Topics – Physics Education Research* 11 (2 2015), p. 020115. doi: 10.1103/PhysRevSTPER.11.020115
 12. Marcos D. Caballero, Bethany R. Wilcox, Leanne Doughty, and Steven J. Pollock. “Unpacking students’ use of mathematics in upper-division physics: where do we go from here?” In: *European Journal of Physics* 36.6 (2015), p. 065004. doi: 10.1088/0143-0807/36/6/065004
 11. Lin Ding and Marcos D. Caballero. “Uncovering the hidden meaning of cross-curriculum comparison results on the Force Concept Inventory”. In: *Physical Review Special Topics – Physics Education Research* 10 (2 2014), p. 020125. doi: 10.1103/PhysRevSTPER.10.020125
 10. Anne-Marie Hoskinson, Brian A. Couch, Benjamin M. Zwickl, Kathleen A. Hinko, and Marcos D. Caballero. “Bridging physics and biology teaching through modeling”. In: *American Journal of Physics*

- 82.5 (2014), pp. 434–441. doi: 10.1119/1.4870502
9. Marcos D. Caballero and Steven J. Pollock. “A model for incorporating computation without changing the course: An example from middle-division classical mechanics”. In: *American Journal of Physics* 82.3 (2014), pp. 231–237. doi: 10.1119/1.4837437
 8. Marcos D. Caballero, John B. Burk, John M. Aiken, Brian D. Thoms, Scott S. Douglas, Erin M. Scanlon, and Michael F. Schatz. “Integrating Numerical Computation into the Modeling Instruction Curriculum”. In: *The Physics Teacher* 52.1 (2014), pp. 38–42. doi: 10.1119/1.4849153
 7. Bethany R. Wilcox, Marcos D. Caballero, Daniel A. Rehn, and Steven J. Pollock. “Analytic framework for students’ use of mathematics in upper-division physics”. In: *Physical Review Special Topics – Physics Education Research* 9 (2 2013), p. 020119. doi: 10.1103/PhysRevSTPER.9.020119
 6. Anne-Marie Hoskinson, Marcos D. Caballero, and Jennifer K. Knight. “How can we improve problem solving in undergraduate biology?: Applying lessons from 30 years of physics education research”. In: *Cell Biology Education - Life Science Education* 12.2 (2013), pp. 153–161. issn: 1931-7913. doi: 10.1187/cbe.12-09-0149
 5. Stephanie V. Chasteen, Rachel E. Pepper, Marcos D. Caballero, Steven J. Pollock, and Katherine K. Perkins. “Colorado Upper-Division Electrostatics diagnostic: A conceptual assessment for the junior level”. In: *Physical Review Special Topics – Physics Education Research* 8 (2 2012), p. 020108. doi: 10.1103/PhysRevSTPER.8.020108
 4. Marcos D. Caballero, Matthew A. Kohlmyer, and Michael F. Schatz. “Implementing and assessing computational modeling in introductory mechanics”. In: *Physical Review Special Topics – Physics Education Research* 8 (2 2012), p. 020106. doi: 10.1103/PhysRevSTPER.8.020106
 3. Marcos D. Caballero, Edwin F. Greco, Eric R. Murray, Keith R. Bujak, M. Jackson Marr, Richard Catrambone, Matthew A. Kohlmyer, and Michael F. Schatz. “Comparing large lecture mechanics curricula using the Force Concept Inventory: A five thousand student study”. In: *American Journal of Physics* 80.7 (2012), pp. 638–644. doi: 10.1119/1.3703517
 2. Matthew A. Kohlmyer, Marcos D. Caballero, Richard Catrambone, Ruth W. Chabay, Lin Ding, Mark P. Haugan, M. Jackson Marr, Bruce A. Sherwood, and Michael F. Schatz. “Tale of two curricula: The performance of 2000 students in introductory electromagnetism”. In: *Physical Review Special Topics – Physics Education Research* 5 (2 2009), p. 020105. doi: 10.1103/PhysRevSTPER.5.020105
 1. Anita L. Cochran, Edwin S. Barker, Marcos D. Caballero, and Judit György-Ries. “Placing the Deep Impact Mission into context: Two decades of observations of 9P/Tempel 1 from McDonald Observatory”. In: *Icarus* 199.1 (2009), pp. 119–128. doi: 10.1016/j.icarus.2008.08.015

8 Articles appearing in peer-reviewed conference proceedings

36. P. C. Hamerski, Devin Silvia, and Marcos D. Caballero. “Exploring Self-Efficacy in Data Science”. In: *Proceedings of the 27th ACM Conference on on Innovation and Technology in Computer Science Education Vol. 2. ITiCSE ’22*. Dublin, Ireland: Association for Computing Machinery, 2022, pp. 633–634. isbn: 9781450392006. doi: 10.1145/3502717.3532131  
35. David Stroupe, Sunghwan Byun, Julia Willson, Julie Christensen, Marcos D. Caballero, and Daniel L. Reinholz. “Teachers’ use of resources for equitable integration of computation in science classrooms”. In: *Proceedings of the 16th International Conference of the Learning Sciences-ICLS2022*. Ed. by C. Chinn, E. Tan, C. Chan, and Y. Kali. International Society of the Learning Sciences, 2022, pp. 905–909  
34. Grace Mackessy, Paul W. Irving, Marcos D. Caballero, and Leanne Doughty. “Comparing student conceptions and construction of while loops in modeling motion”. In: *2021 Physics Education Research Conference Proceedings*. Ed. by Michael B. Bennett, Brian W. Frank, and Rebecca E. Vieyra. 2021, pp. 245–250. doi: 10.1119/perc.2021.pr.Mackessy 
33. Alyssa C. Waterson, Rachel Henderson, and Marcos D. Caballero. “Analyzing time-to-degree for transfer students at a Large Midwestern University”. In: *2021 Physics Education Research Conference Proceedings*. Ed. by Michael B. Bennett, Brian W. Frank, and Rebecca E. Vieyra. 2021, pp. 438–443. doi: 10.1119/perc.2021.pr.Waterson 
32. Rachel Henderson, Kelsey Funkhouser, and Marcos D. Caballero. “A Longitudinal Exploration of Students’ Beliefs about Experimental Physics”. In: *2019 Physics Education Research Conference Pro-*

- ceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 214–219. doi: 10.1119/perc.2019.pr.Henderson   
31. Nicholas T. Young and Marcos D. Caballero. “Using Machine Learning to Understand Physics Graduate School Admissions”. In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 669–674. doi: 10.1119/perc.2019.pr.Young [PERC Notable Paper]   
 30. Tor Ole B. Odden and Marcos D. Caballero. “Computational Essays and Computational Literacy at the University of Oslo”. In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 429–434. doi: 10.1119/perc.2019.pr.Odden  
 29. Daniel Weller, Marcos D. Caballero, and Paul W. Irving. “Investigating Teacher Learning Goals Involving Computation in High School Physics”. In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 627–632. doi: 10.1119/perc.2019.pr.Weller   
 28. Theodore Bott, Daniel Weller, Marcos D. Caballero, and Paul W. Irving. “Preliminary Analysis of Student-Identified Themes around Computation in High School Physics”. In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 57–62. doi: 10.1119/perc.2019.pr.Bott   
 27. Jacqueline Bumler, P. C. Hamerski, Marcos D. Caballero, and Paul W. Irving. “How do previous coding experiences influence undergraduate physics students?” In: *2019 Physics Education Research Conference Proceedings*. Ed. by Ying Cao, Steven Wolf, and Michael B. Bennett. 2019, pp. 69–74. doi: 10.1119/perc.2019.pr.Bumler   
 26. Daryl McPadden, P. C. Hamerski, Marcos D. Caballero, and Paul W. Irving. “Feedback as a mechanism for improving students scientific communication skills”. In: *2018 Physics Education Research Conference Proceedings*. Ed. by Adrienne Traxler, Ying Cao, and Steven Wolf. 2018. doi: 10.1119/perc.2018.pr.McPadden   
 25. Odd Petter Sand, Tor O.B. Odden, Christine Lindstrøm, and Marcos D. Caballero. “How computation can facilitate sensemaking about physics: A case study”. In: *2018 Physics Education Research Conference Proceedings*. Ed. by Adrienne Traxler, Ying Cao, and Steven Wolf. 2018. doi: 10.1119/perc.2018.pr.Sand   
 24. Kelsey Funkhouser, Marcos D. Caballero, Paul W. Irving, and Vashti Sawtelle. “What counts in laboratories: toward a practice-based identity survey”. In: *2018 Physics Education Research Conference Proceedings*. Ed. by Adrienne Traxler, Ying Cao, and Steven Wolf. 2018. doi: 10.1119/perc.2018.pr.Funkhouser  
 23. Ashleigh Leary, Paul W. Irving, and Marcos D. Caballero. “The difficulties associated with integrating computation into undergraduate physics”. In: *2018 Physics Education Research Conference Proceedings*. Ed. by Adrienne Traxler, Ying Cao, and Steven Wolf. 2018. doi: 10.1119/perc.2018.pr.Leary  
 22. Kristina Griswold, Daryl McPadden, Marcos D. Caballero, and Paul W. Irving. “Denoting and Comparing Leadership Attributes and Behaviors in Group Work”. In: *2018 Physics Education Research Conference Proceedings*. Ed. by Adrienne Traxler, Ying Cao, and Steven Wolf. 2018. doi: 10.1119/perc.2018.pr.Griswold  
 21. Robert Solli, John M. Aiken, Rachel Henderson, and Marcos D. Caballero. “Examining the relationship between student performance and video interactions”. In: *2018 Physics Education Research Conference Proceedings*. Ed. by Adrienne Traxler, Ying Cao, and Steven Wolf. 2018. doi: 10.1119/perc.2018.pr.Solli  
 20. Paul W. Irving and Marcos D. Caballero. “Expanding the PICUP community of practice”. In: *2017 Physics Education Research Conference Proceedings*. Ed. by Lin Ding, Adrienne Traxler, and Ying Cao. 2017, pp. 188–191. doi: 10.1119/perc.2017.pr.042  
 19. Nathaniel Hawkins, Michael J. Obsniuk, Paul W. Irving, and Marcos D. Caballero. “Examining Thematic Variation in a Phenomenographical Study on Computational Physics”. In: *2017 Physics Education Research Conference Proceedings*. Ed. by Lin Ding, Adrienne Traxler, and Ying Cao. 2017, pp. 168–171. doi: 10.1119/perc.2017.pr.037   
 18. John M. Aiken and Marcos D. Caballero. “Methods for Analyzing Pathways through a Physics Ma-

- lor". In: *2016 Physics Education Research Conference Proceedings*. Ed. by Dyan L. Jones, Lin Ding, and Adrienne Traxler. 2016, pp. 28–31. doi: 10.1119/perc.2016.pr.002 [PERC Notable Paper] 
17. Marcos D. Caballero. "Computation across the curriculum: What skills are needed?" In: *2015 Physics Education Research Conference Proceedings*. Ed. by Alice D. Churukian, Dyan L. Jones, and Lin Ding. 2015, pp. 79–82. doi: 10.1119/perc.2015.pr.015  
 16. Paul W. Irving, Vashti Sawtelle, and Marcos D. Caballero. "Troubleshooting Formative Feedback in P³ (A group-based learning environment)". In: *2015 Physics Education Research Conference Proceedings*. Ed. by Alice D. Churukian, Dyan L. Jones, and Lin Ding. 2015, pp. 155–158. doi: 10.1119/perc.2015.pr.034   
 15. James T. Laverty, Melanie M. Cooper, and Marcos D. Caballero. "Developing the Next Generation of Physics Assessments". In: *2015 Physics Education Research Conference Proceedings*. Ed. by Alice D. Churukian, Dyan L. Jones, and Lin Ding. 2015, pp. 187–190. doi: 10.1119/perc.2015.pr.042   
 14. Alanna Pawlak, Paul W. Irving, and Marcos D. Caballero. "Identification of a shared answer-making game in group context". In: *2015 Physics Education Research Conference Proceedings*. Ed. by Alice D. Churukian, Dyan L. Jones, and Lin Ding. 2015, pp. 255–258. doi: 10.1119/perc.2015.pr.059  
 13. Michael J. Obsniuk, Paul W. Irving, and Marcos D. Caballero. "A Case Study: Novel Group Interactions through Computational Physics". In: *2015 Physics Education Research Conference Proceedings*. Ed. by Alice D. Churukian, Dyan L. Jones, and Lin Ding. 2015, pp. 239–242. doi: 10.1119/perc.2015.pr.055   
 12. Anna Turnbull, Leanne Doughty, Vashti Sawtelle, and Marcos D. Caballero. "Student Ideas around Vector Decomposition in the Upper-Division". In: *2015 Physics Education Research Conference Proceedings*. Ed. by Alice D. Churukian, Dyan L. Jones, and Lin Ding. 2015, pp. 239–242. doi: 10.1119/perc.2015.pr.079 
 11. Leanne Doughty and Marcos D. Caballero. "Rubric Design for Separating the Roles of Open-Ended Assessments". In: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 71–74. doi: 10.1119/perc.2014.pr.014  
 10. James T. Laverty, Stuart H. Tessmer, Melanie M. Cooper, and Marcos D. Caballero. "Engaging Physics Faculty in Course Transformation". In: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 147–150. doi: 10.1119/perc.2014.pr.033  
 9. Wolf, Stephen F., Leanne Doughty, Paul W. Irving, Eleanor C. Sayre, and Marcos D. Caballero. "Just Math: A new epistemic frame". In: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 275–278. doi: 10.1119/perc.2014.pr.065   
 8. John M. Aiken, Shih-Yin Lin, Scott S. Douglas, Edwin F. Greco, Brian D. Thoms, Marcos D. Caballero, and Michael F. Schatz. "Student Use of a Single Lecture Video in a Flipped Introductory Mechanics Course". In: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 19–22. doi: 10.1119/perc.2014.pr.001  
 7. Scott S. Douglas, Shih-Yin Lin, John M. Aiken, Edwin F. Greco, Brian D. Thoms, Marcos D. Caballero, and Michael F. Schatz. "Peer Evaluation of Video Lab Reports in a Blended Introductory Physics Course". In: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 75–78. doi: 10.1119/perc.2014.pr.015  
 6. Shih-Yin Lin, Scott S. Douglas, John M. Aiken, Edwin F. Greco, Brian D. Thoms, Marcos D. Caballero, and Michael F. Schatz. "Peer Evaluation of Video Lab Reports in an Introductory Physics MOOC". In: *2014 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2014, pp. 163–166. doi: 10.1119/perc.2014.pr.037  
 5. Marcos D. Caballero and Steven J. Pollock. "Assessing Student Learning in Middle-Division Classical Mechanics/Math Methods". In: *2013 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2013, pp. 81–84. doi: 10.1119/perc.2013.pr.008 
 4. John M. Aiken, Shih-Yin Lin, Scott S. Douglas, Edwin F. Greco, Brian D. Thoms, Marcos D. Caballero,

- and Michael F. Schatz. "The Initial State of Students Taking an Introductory Physics MOOC". in: *2013 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and Dyan L. Jones. 2013, pp. 53–56. doi: 10.1119/perc.2013.pr.001 ✓
3. Marcos D. Caballero, Bethany R. Wilcox, Rachel E. Pepper, and Steven J. Pollock. "ACER: A Framework on the Use of Mathematics in Upper-division Physics". In: *2012 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and N. Sanjay Rebello. 2012, pp. 90–93. doi: 10.1063/1.4789659 📄 📄
 2. Bethany R. Wilcox, Marcos D. Caballero, Rachel E. Pepper, and Steven J. Pollock. "Upper-division Student Understanding of Coulomb's Law: Difficulties with Continuous Charge Distributions". In: *2012 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and N. Sanjay Rebello. 2012, pp. 418–421. doi: 10.1063/1.4789741 📄 📄
 1. John M. Aiken, Marcos D. Caballero, Scott S. Douglas, John B. Burk, Erin M. Scanlon, Brian D. Thoms, and Michael F. Schatz. "Understanding Student Computational Thinking with Computational Modeling". In: *2012 Physics Education Research Conference Proceedings*. Ed. by Paula V. Engelhardt, Alice D. Churukian, and N. Sanjay Rebello. 2012, pp. 46–49. doi: 10.1063/1.4789648 📄 📄