

WILLIAM R. PENUEL
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EDUCATION

- 1993-1996 **PhD in Developmental Psychology**
Clark University
Dissertation: *Communicative Processes in Cultural Identity Formation: A Mediated Action Account*
Chair: James V. Wertsch
Committee Members: James Paul Gee, Nancy Budwig
- 1991-1992 **EdM in Counseling Processes**
Harvard Graduate School of Education
Master's Project: *An Ethnographic Evaluation of an HIV/AIDS Prevention Program*
Advisor: Robert L. Selman
- 1988-1991 **BA in Psychology**
Clark University
Bachelor's Thesis: *Animals as Objects of Moral Concern: A Narrative Approach*
Advisor: Bernard Kaplan

HONORS AND AWARDS

Distinguished Professor, University of Colorado Boulder Regents (2020)
Outstanding Postdoc Mentor Award, University of Colorado Boulder (2020)
Elected Member, National Academy of Education (2019)
Fellow, International Society of the Learning Sciences (2019)
Fellow, International Society for Design and Development in Education (2015)
AERA Fellow (2014)
Jacob Hiatt Fellow in Psychology (1994-95)
Phi Beta Kappa (1991)
Graduated Summa Cum Laude from Clark University (1991)
Outstanding Undergraduate in Psychology (1991)

POSITIONS HELD

- 2011-present **Professor of Learning Sciences and Human Development**
Institute of Cognitive Science and School of Education
University of Colorado-Boulder

POSITIONS HELD (Cont'd)

2006-2011	Director of Evaluation Research Center for Technology in Learning SRI International
2000-2006	Senior Education Researcher Center for Technology in Learning SRI International
1998-2000	Research Social Scientist Center for Technology in Learning SRI International
1997-98	Program Evaluator San Francisco Unified School District
1996-97	Program Evaluation Coordinator Metropolitan Nashville Public Schools

COURSES TAUGHT

Advanced Qualitative Analysis, University of Colorado
Compassion and Dignity for Educators, University of Colorado
Designing Storylines for Curricular Transformation, University of Colorado
Psychological Foundations of Education, University of Colorado
Open Educational Resources in Science Education, University of Colorado
Educational Evaluation, University of Colorado
Seminar in Human Development, University of Colorado
Adolescent Development and Educational Psychology, University of Colorado
Adolescent Development for Teachers, University of Colorado
Learning with Technology in and out of School, University of Colorado
Contexts that Promote Youth Development, Stanford University
Technology in Science Education, University of South Carolina
Assessment of Student Multimedia Projects, Foothill College

MANUSCRIPTS IN PREPARATION

*Student author

Ahn, J., Van Steenis, E., & Penuel, W. R. (in preparation). Centering work to organize community-engaged research. In D. Peurach, J. Russell, L. Cohen-Vogel, W. R. Penuel, (Eds), *Handbook of improvement research in education*. New York, NY: Rowman and Littlefield.

- Biddy, Q., *Gendreau Chakarov, A., Jacobs, J., Penuel, W. R., Recker, M., & Sumner, T. (in preparation). Professional development supporting middle school teachers to integrate computational thinking into their science classes. In C. Mouza, A. Yadav & A. Leftwich (Eds.). *Preparing teachers to teach computer science: Models, practices and policies*. Information Age Publishing.
- Manz, E., Heredia, S. C., Allen, C. D., & Penuel, W. R. (in preparation). Learning in and through researcher-teacher collaboration. In G. Jones, J. A. Luft, & T. R. Tretter (Eds.), *Handbook of Science Teacher Education*. New York, NY: Routledge.
- Penuel, W. R., Farrell, C. C., & *Daniel, J. (in preparation). Research-practice partnerships: Linking policy, practice, and research for equity. In L. Cohen-Vogel, J. Scott, & P. Youngs (Eds.), *Handbook of Education Policy Research*. Washington, DC: AERA.
- Penuel, W. R., Allen, A.-R., & *Raza, A., & Watkins, D. (in preparation). Supporting the use of student experience data to inform science teaching. *Journal of Teacher Education*.
- Penuel, W. R., Allen, C. D., Heredia, S. C., & Manz, E. (in preparation). Design-Based Implementation Research as an approach to studying teacher learning in research-practice partnerships focused on equity. In A. C. Superfine, S. Goldman, M. M. Ko (Eds.), *Changing content and contexts of teacher learning: Supporting shifts in instructional practices*. New York, NY: Routledge.
- Penuel, W. R., & *Roberts, V. (in preparation). The theory and practice of democracy and community. In D. Peurach, J. Russell, L. Cohen-Vogel, W. R. Penuel, (Eds), *Handbook of improvement research in education*. New York, NY: Rowman and Littlefield.
- Russell, J. L. & Penuel, W. R. (in preparation). Introducing improvement research in education. In D. Peurach, J. Russell, L. Cohen-Vogel, & W. R. Penuel, (Eds), *Handbook of improvement research in education*. New York, NY: Rowman and Littlefield.
- Penuel, W. R., Wingert, K., *Riedy, R., & *Campanella, M. (in preparation). Developing validity evidence for measure of teacher vision for equitable science instruction. To be submitted to *International Journal of Science Education*.
- Wingert, K., *Riedy, R., *Campanella, M., & Penuel, W. R. (in preparation). Conditions for supporting equity and coherence in state systems of science education.

MANUSCRIPTS IN REVIEW

- Alzen, J., Edwards, K., Penuel, W. R., Reiser, B., Passmore, C., Greisemer, C., *Zivic, A., *Murzynski, C. (in revision). Exploring the connections between epistemic agency and a commitment to the collective enterprise of sensemaking in the science classroom. *Journal of Research in Science Teaching*.

Elliott, C. H., Potvin, A. S., Penuel, W. R., Bush, J. B., Manz, E., Stoler, A., Suárez, E. A., Krist, C., Tolbert, S., Nixon, J. & McKinney de Royston, M. (under review). Skillful caring in schools and in science and engineering classrooms. *International Society for the Learning Sciences Annual Meeting*.

Lo, A., *Glidewell, L., *O'Connor, K., Allen, A. R., Herrmann-Abell, C. F., Penuel, W. R., Wingert, K., & Lindsay, W. (under review). Promoting shifts in teachers' understanding and use of phenomena in instruction and assessment. *International Society for the Learning Sciences Annual Meeting*.

Mawasi, A., Cortez, A., *McKoy, A., & Penuel, W. R. (under review). "It disrupts power dynamics": Co-Design process as a space for intergenerational learning with distributed expertise. *International Society for the Learning Sciences Annual Meeting*.

Penuel, W. R. (in revision). Algunos principios de aprendizaje equitativo post-pandemia. *Education and the Knowledge Society*.

Potvin, A. S., Penuel, W. R., Dimidjian, S., & Jinpa, T. (under review). Supporting the development of skillful means in expressing compassion in schools. *Mindfulness*.

REFEREED JOURNAL ARTICLES

Penuel, W. R., Allen, A.-R., Henson, K., *Campanella, M., Patton, R., Rademaker, K., Reed, W., Watkins, D., Wingert, K., & Reiser, B. (in press). Learning practical design knowledge through co-designing storyline science curriculum units. *Cognition and Instruction: Special Issue on Co-Design*.

Wingert, K., Jacobs, J., Lindsay, W., Lo, A. S., Herrman-Abell, C. F., & Penuel, W. R. (in press). Understanding the priorities and practices of rural science teachers: Implications for designing professional learning. *The Rural Educator*.

Farrell, C. C., Penuel, W. R., & Davidson, K. L. (2022). "What counts" as research? Comparing policy guidelines to the evidence education leaders report as useful. *AERA Open* 8 (1), 1-17. <https://doi.org/10.1177/23328584211073157>

Farrell, C. C., Penuel, W. R., Allen, A.-R., Anderson, E., *Bohannon, A., Coburn, C. E., & Brown, S. (2022). Learning at the boundaries of research and practice: A framework for understanding research-practice partnerships. *Educational Researcher*. <https://doi.org/10.3102/0013189X211069073>

Penuel, W. R., Reiser, B. J., McGill, T. A. W., Novak, M. Van Horne, K., Orwig, A. (2022). Connecting student interests and questions with science learning goals through project-based storylines. *Disciplinary and Interdisciplinary Science Education Research*, 4(1), 1-27. <https://doi.org/10.1186/s43031-021-00040-z>

- Biddy, Q., Chakarov, A. G., Bush, J., Elliot, C. H., Jacobs, J. Recker, M., Sumner, T., Penuel, W. R. (2021). A professional development to integrate computational thinking into middle-school science through co-designed storylines. *Contemporary Issues in Technology and Teacher Education*, 21 (1), 53-96.
<https://www.learntechlib.org/p/216072/>
- Edelson, D. C., Reiser, B. J., McNeill, K. L., Mohan, A., Novak, M., Mohan, L., Affolter, R., McGill, T., Bracey, Z. B., Noll, J. D., Kowalski, S., Novak, D., Lo, A., Landel, C., Krumm, A., Penuel, W. R., Van Horne, K., González-Howard, M., & Suárez, E. (2021). Developing research-based instructional materials to support large-scale transformation of science teaching and learning: The approach of the OpenSciEd middle school program. *Journal of Science Teacher Education*, 32(7), 780-804.
<https://doi.org/10.1080/1046560X.2021.1877457>
- Reiser, B. J., Novak, M., McGill, T. A. W., & Penuel, W. R. (2021). Storyline units: An instructional model to support coherence from the students' perspective. *Journal of Science Teacher Education*, 32(7), 805-829.
<https://doi.org/10.1080/1046560X.2021.1884784>
- Akkerman, S., Bakker, A., & Penuel, W. R. (2021). Relevance of educational research: An ontological conceptualization. *Educational Researcher*.
<https://doi.org/10.3102/0013189X211028239>
- Penuel, W. R., Furtak, E. M., & Farrell, C. C. (2021). Research-practice partnerships in education: Advancing an evolutionary logic of systems improvement. *Die Deutsche Schule*, 113(1), 45-62. <https://doi.org/10.31244/dds.2021.01.05>
- DiGiacomo, D., Van Horne, K., & Penuel, W. R. (2020). Choice and interest in designed learning environments: The case of FUSE Studios. *Information and Learning Sciences*.
<https://doi.org/10.1108/ILS-09-2019-0098>
- Esteban-Guitart, M., DiGiacomo, D. K., Penuel, W. R., & Ito, M. (2020). Principios, aplicaciones y retos del aprendizaje conectado. *Contextos Educativos: Revista de Educación*, 27, 157-176. <https://doi.org//10.18172/con.3966>
- Penuel, W. R., *Riedy, R., Barber, M. Puerach, D., LeBoeuf, W., & Clark, T. (2020). Principles of collaborative education research with stakeholders: Toward requirements for a new research and development infrastructure. *Review of Educational Research*. <https://doi.org/10.3102/0034654320938126>
- Staus, N. L., Falk, J. H., Penuel, W. R., Dierking, L., Wyld, J., & Bailey, D. (2020). Interested, disinterested, or neutral: Exploring STEM interest profiles and pathways in a low-income urban community. *EURASIA Journal of Mathematics, Science and Technology Education* 16 (6), em1853.
<https://doi.org/10.29333/ejmste/7927>

- Penuel, W. R. & Hill, H. C. (2019). Building a knowledge base on research-practice partnerships: Introduction to the special topic collection. *AERA Open*, 5 (4), 1-5. <https://doi.org/10.1177/2332858419891950>
- Furtak, E. M., & Penuel, W. R. (2019). Coming to terms: Addressing the persistence of “hands-on” and other reform terminology in the era of science-as-practice. *Science Education*, 103 (1), 167-186. <https://doi.org/10.1002/sce.21488>
- *Kaplan, R. G., *Riedy, R., Van Horne, K., & Penuel, W. R. (2019). Going on a statewide listening tour: Involving education leaders in the process of research to enhance the practical value of qualitative research. *Evidence and Policy: A Journal of Research, Debate, and Practice*, 15 (2) 179-196. <https://doi.org/10.1332/174426518X15193816575650>
- Penuel, W. R. (2019). Infrastructuring as a practice of design-based research for supporting and studying equitable implementation and sustainability of innovations. *Journal of the Learning Sciences*, 28 (4-5), 659-677. <https://doi.org/10.1080/10508406.2018.1552151>
- Penuel, W. R., Turner, M. L., Jacobs, J. K., Van Horne, K., & Sumner, T. (2019). Developing tasks to assess phenomenon-based science learning: Challenges and lessons learned from building proximal transfer tasks. *Science Education*, 103 (6), 1367-1395. <https://doi.org/10.1002/sce.21544>
- Penuel, W. R., & *Watkins. D. (2019). Building a system of assessment in a school system to promote equity and epistemic justice: A use-case of a research-practice partnership in science education. *Annals of the American Academy of Political and Social Science*, 683, 201-216. <https://doi.org/10.1177/0002716219843249>
- Allen, C. D., DiGiacomo, D., Van Horne, K., & Penuel, W. R. (2018). Pursuing interests and getting involved: Exploring the conditions of sponsorship in youth learning. *Digital Education Review*, 33, 120-129.
- Anderson, C. W., de Los Santos, E. X., Bodbyl, S., Covitt, B. A., Edwards, K., *Hancock, B., *Lin, Q., Penuel, W. R., Thomas, C. M., Welch, M. (2018). Designing educational systems to support enactment of the Next Generation Science Standards. *Journal of Research in Science Teaching*, 55 (7), 1026-1052. <https://doi.org/10.1002/tea.21484>
- DiGiacomo, D., Van Horne, K., *Van Steenis, E., & Penuel, W. R. (2018). The material and social constitution of interest. *Language, Culture, and Social Interaction*, 19, 51-60. <https://doi.org/10.1016/j.lcsi.2018.04.010>
- Esteban-Guitart, M., Coll, C., & Penuel, W. R. (2018). Learning across settings and time in a digital age. *Digital Education Review*, 33, 1-16.

- Frank, K. A., *Xu, R., & Penuel, W. R. (2018). Implementation of evidence-based practice in human service organizations: Implications from agent-based models. *Journal of Policy Analysis and Management*, 37(4), 867-895.
<https://doi.org/10.1002/pam.22081>
- Hopkins, M., Wiley, K., Penuel, W. R., & Farrell, C. C. (2018). Brokering research in science education policy implementation: The case of a professional association. *Evidence and Policy: A Journal of Research, Debate, and Practice*, 14 (3), 459-476.
<https://doi.org/10.1332/174426418X15299595170910>
- Penuel, W. R., Bell, P., Neill, T., Shaw, S., Hopkins, M., & Farrell, C. C. (2018). Building a Networked Improvement Community to promote equitable, coherent systems of science education. *AASA Journal of Scholarship and Practice*, 15(1), 30-38.
- Penuel, W. R., Farrell, C. C., Allen, A.-R., *Toyama, Y., & Coburn, C. E. (2018). What research district leaders find useful. *Educational Policy*, 32(4), 540-568.
<https://doi.org/10.1177/0895904816673580>
- Penuel, W. R. & O'Connor, K. (2018). From designing to organizing new social futures: Multiliteracies pedagogies for today. Special issue. *Theory into Practice*, 57(1), 64-71.
<https://doi.org/10.1080/00405841.2017.1411715>
- Shepard, L. A., Penuel, W. R., & Pellegrino, J. W. (2018). Using learning and motivation theories to coherently link formative assessment, grading practices, and large-scale assessment. *Educational Measurement: Issues and Practice*, 37(1), 21-34.
<https://doi.org/10.1111/emip.12189>
- Shepard, L. A., Penuel, W. R., & Pellegrino, J. W. (2018). Classroom assessment principles to support learning and avoid the harms of testing. *Educational Measurement: Issues and Practice*, 37(1), 52-57. <https://doi.org/10.1111/emip.12195>
- *Cartun, A., Penuel, W. R., & *West-Puckett, S. (2017). Blurring the boundaries between school and community: Implementing connected learning principles in English classrooms. *Journal of Adolescent and Adult Literacy*, 61 (2), 183-190.
<https://doi.org/10.1002/jaal.668>
- Huguet, A., Allen, A.-R., Coburn, C. E., Farrell, C. C., Kim, D. H., & Penuel, W. R. (2017). Locating data use in the microprocesses of district-level deliberations. *Nordic Journal of Studies in Educational Policy*, 3 (1), 21-28.
<https://doi.org/10.1080/20020317.2017.1314743>
- Maul, A., Penuel, W. R., Gallagher, L., *Dadey, N., Podkul, T., & *Price, E. (2017). Developing a measure of interest-related pursuits: The Connected Learning survey. *Educational Technology Research and Development*, 65 (1), 1-28.
<http://dx.doi.org/10.1007/s11423-016-9453-6>

- Penuel, W. R. (2017). Research-practice partnerships as a strategy for promoting equitable science teaching and learning through leveraging everyday science. *Science Education* 101 (5), 520-525. <https://doi.org/10.1002/sc.21285>
- Penuel, W. R., Briggs, D. C., Davidson, K. L., Herlihy, C., *Sherer, D. Hill, H. C., Farrell, C. C., Allen, A.-R. (2017). How school and district leaders access, perceive, and use research. *AERA Open* 3 (2), 1-17. <https://doi.org/10.1177/2332858417705370>
- Penuel, W. R., DeBarger, A. H., Boscardin, C. K., Moorthy, S., Beauvineau, Y., Kennedy, C. A., & *Allison, K. (2017). Investigating purposeful curriculum adaptation as a strategy to improve science teaching and learning. *Science Education*, 101 (1), 66-98. <https://doi.org/10.1002/sc.21249>
- Penuel, W. R., Van Horne, K., *DiGiacomo, D., & Kirshner, B. (2016). A social practice theory of learning and becoming across contexts and time. *Frontline Learning Research* 4 (4), 30-38. <https://doi.org/10.14786/flr.v4i4.205>
- Penuel, W. R., Clark, T. L., & Bevan, B. (2016). Infrastructures to support equitable STEM learning across settings. *Afterschool Matters*, 24, 12-20.
- *Severance, S., Penuel, W. R., Leary, H., & Sumner, T. (2016). Organizing for teacher agency in curricular co-design. *The Journal of the Learning Sciences*, 25 (4), 531-564. <https://doi.org/10.1080/10508406.2016.1207541>
- Coburn, C. E., & Penuel, W. R. (2016). Research-practice partnerships in education: Outcomes, dynamics, and open questions. *Educational Researcher*, 45(1), 48-54. <https://doi.org/10.3102/0013189X16631750>
- DeBarger, A. H., Penuel, W. R., Harris, C. J., & Kennedy, C. A. (2016). Building an assessment argument to design and use NGSS assessments to evaluate the efficacy of curriculum interventions. *American Journal of Evaluation*, 37(2), 174-192. <https://doi.org/10.1177/1098214015581707>
- Falk, J. H., Dierking, L., Staus, N., Penuel, W. R., *Bailey, D., & *Wyld, J. (2016). Understanding youth STEM interest and participation pathways within a community: The Synergies Project. *International Journal of Science Education, Part B*, 6 (4), 269-384. <https://doi.org/10.1080/21548455.2015.1093670>
- *Johnson, R., Penuel, W. R., *Severance, S., & *Leary, H. (2016). Teachers, tasks, and tensions: Lessons from a research-practice partnership. *Journal of Mathematics Teacher Education* 19 (2), 169-185. <https://doi.org/10.1007/s10857-015-9338-3>
- Leary, H., *Severance, S., Penuel, W. R., *Quigley, D., Sumner, T., & Devaul, H. (2016). Designing a deeply digital science curriculum: Supporting teacher learning and implementation with organizing technologies. *Journal of Science Teacher Education*, 27 (1), 61-77. <https://doi.org/10.1007/s10972-016-9452-9>

- Penuel, W. R. (2016). Studying science and engineering learning in practice. *Cultural Studies in Science Education*, 11(1), 89-104. <https://doi.org/10.1007/s11422-014-9632-x>
- Penuel, W. R., Bevan, B., Bell, P., Falk, J., & Buffington, P. (2016). Using social networks to enhance research use in planning for and supporting educational change. *Journal of Educational Change* 17 (2), 251-278. <https://doi.org/10.1007/s10833-015-9266-0>
- *Allen, C. D., & Penuel, W. R. (2015). Studying teachers' sensemaking to analyze teachers' responses to professional development focused on new standards. *Journal of Teacher Education* 66 (2), 136-149. <https://doi.org/10.1177/0022487114560646>
- Frank, K. A., Penuel, W. R., & Krause, A. E. (2015). What is a "good" social network for a system? The flow of know-how for organizational change. *Journal of Policy Analysis and Management*, 34(2), 378-402. <https://doi.org/10.1002/pam.21817>
- Penuel, W. R. (2015). Commentary on Briggs and Peck: Learning progressions as evolving tools in joint enterprises. *Measurement: Interdisciplinary Research and Perspectives* 13 (2), 123-127. <https://doi.org/10.1080/15366367.2015.1055145>
- Penuel, W. R., Allen, A.-R., Farrell, C., & Coburn, C. E. (2015). Conceptualizing research-practice partnerships as joint work at boundaries. *Journal for Education of Students at Risk (JESPAR)* 20 (1-2), 182-197. <https://doi.org/10.1080/10824669.2014.988334>
- Penuel, W. R., Harris, C. J., D'Angelo, C., DeBarger, A. H., Gallagher, L. P., Kennedy, C. A., & Cheng, B. H. (2015). Impact of project-based curriculum materials on student learning in science: Results of a randomized controlled trial. *Journal of Research in Science Teaching*, 52(10), 1362-1385. <https://doi.org/10.1002/tea.21263>
- Penuel, W. R., Phillips, R. A., & Harris, C. J. (2014). Analysing curriculum implementation from integrity and actor-oriented perspectives. *Journal of Curriculum Studies*, 46 (6), 751-777. <https://doi.org/10.1080/00220272.2014.921841>
- Hegedus, S., Dalton, S., Roschelle, J., Penuel, W. R., Dickey-Kurdziolek, M., & Tatar, D. (2014). Investigating why teachers continued use and sharing of an educational innovation after the research has ended. *Mathematical Thinking and Learning*, 16 (4), 1-22. <https://doi.org/10.1080/10986065.2014.953017>
- Penuel, W. R. (2014). Emerging forms of intervention research in education. *Mind, Culture, Activity*, 21 (2), 97-117. <https://doi.org/10.1080/10749039.2014.884137>

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- Gutiérrez, K. D., & Penuel, W. R. (2014). Relevance to practice as a criterion for rigor. *Educational Researcher*, 43 (1), 19-23. <https://doi.org/10.3102/0013189X13520289>
- Sun, M., Penuel, W. R., Frank, K. A., Gallagher, H. A., & Youngs, P. A. (2013). Shaping professional development to promote the diffusion of instructional expertise among teachers. *Educational Evaluation and Policy Analysis*, 35 (3), 344-369. <https://doi.org/10.3102/0162373713482763>
- Sun, M., Frank, K. A., Penuel, W. R., & Kim, C. (2013). How external institutions penetrate schools through formal and informal leaders. *Educational Administration Quarterly* 49 (4), 610-644. <https://doi.org/10.1177/0013161X12468148>
- Penuel, W. R., Frank, K. A., Sun, M., Kim, C., & Singelton, C. (2013). The organization as a filter of institutional diffusion. *Teachers College Record*, 115 (1), 1-33.
- Hand, V., Penuel, W. R., & Gutiérrez, K. D. (2012). (Re)framing educational possibility: Attending to power and equity in shaping access to and within learning opportunities. *Human Development*, 55, 250-268. <https://doi.org/10.1159/000345313>
- Harris, C. J., *Phillips, R. S., & Penuel, W. R. (2012). Examining teachers' instructional moves aimed at developing students' ideas and questions in learner-centered science classrooms. *Journal of Science Teacher Education*, 23(7), 768-788. <https://doi.org/10.1007/s10972-011-9237-0>
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- Penuel, W. R., Bates, L., Gallagher, L. P., Pasnik, S., Llorente, C., Townsend, E., Domínguez, X., VanderBorgh, M. (2012). Supplementing literacy instruction with a media-rich intervention: Results of a randomized controlled trial. *Early Childhood Research Quarterly*, 27 (1), 115-127. <https://doi.org/10.1016/j.ecresq.2011.07.002>
- Penuel, W. R., *Sun, M., Frank, K. A., & Gallagher, H. A. (2012). Using social network analysis to study how collegial interactions can augment teacher learning from external professional development. *American Journal of Education*, 119 (1), 103-136. <https://doi.org/10.1086/667756>
- Koch, M., Gorges, T., & Penuel, W. R. (2012). Build IT: Scaling and sustaining an afterschool computer science program for girls. *Afterschool Matters*, 16, 58-66.
- Penuel, W. R., Fishman, B. J., Cheng, B. H., & Sabelli, N. (2011). Organizing research and

- development at the intersection of learning, implementation, and design. *Educational Researcher*, 40(7), 331-337. <https://doi.org/10.3102/0013189X11421826>
- Penuel, W. R., & Means, B. (2011). Using large-scale databases in evaluation: Advances, opportunities, and challenges. *American Journal of Evaluation* 32(1), 118-133. <https://doi.org/10.1177/1098214010388268>
- Penuel, W. R., Gallagher, L. P., & Moorthy, S. (2011). Preparing teachers to design sequences of instruction in Earth science: A comparison of three professional development programs. *American Educational Research Journal*, 48 (4), 996-1025. <https://doi.org/10.3102/0002831211410864>
- Penuel, W. R., Singleton, C., & Roschelle, J. (2011). Classroom network technology as a support for systemic mathematics reform: Examining the effects of Texas Instruments' MathForward Program on student achievement in a large, diverse district. *Journal of Computers in Mathematics and Science Teaching*, 30 (2), 179-202. <https://www.learntechlib.org/p/33242/>
- Fishman, B. J., Penuel, W. R., Hegedus, S., & Roschelle, J. (2011). What happens when the research ends? Factors related to the sustainability of a technology-infused mathematics curriculum. *Journal of Computers in Mathematics and Science Teaching*, 30(4), 329-353. <https://www.learntechlib.org/p/36145/>
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- Shear, L., & Penuel, W. R. (2010). Rock-solid support: Florida district weighs effectiveness of science professional learning. *Journal of Staff Development*, 31(5).
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Penuel, W. R., Wingert, K., Patton, R., Blue, M., Evans, S., Leventhal, A., Dolph, A., Lindsay, W., & Youmans, J. (2021). *How could a small amount of nuclear material power an entire city but also destroy it? Should we use it?* [Unit 4 in the inquiryHub Chemistry curriculum]. Boulder, CO: inquiryHub Research+Practice Partnership.

Allen, A.-R., Wortman, A., *Widman, S., Michalchik, V., & Penuel, W. R. (2020). *Partnering with Future Ready with the library*. Connected Learning Alliance.

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Penuel, W. R., Bell, P., Neill, T., Morrison, D., & *Tesoriero, G. (2018). *ACESSE Resource E: Selecting compelling anchoring phenomena for equitable science teaching*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/pd/sessione>.

Bell, P., Stromholt, S., Penuel, W. R., Van Horne, K., Neill, T., Shaw, S. (2017). *ACESSE Resource A: Introduction to formative assessment to support equitable 3D instruction*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/pd/sessiona>.

Bell, P., Stromholt, S., Van Horne, K., Penuel, W. R., Neill, T., Shaw, S. (2017). *How to assess three-dimensional learning in your classroom: Building assessment tasks that work*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/pd/sessionb>.

Penuel, W. R., Novak, M., McGill, T., Van Horne, K., & Reiser, B. J. (2017). *How to define meaningful daily learning objectives for science investigations*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/46>.

Bell, P., Van Horne, K., & Penuel, W. R. (2016). *How can assessments be designed to engage students in the range of science and engineering practices?* Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/26>.

Northwestern University and Inquiry Hub Partnership team. (2016-2018). *Why don't antibiotics work the way they used to: A next generation science storyline*. Available at: <http://www.nextgenstorylines.org/why-dont-antibiotics-work-like-they-used-to>.

Penuel, W. R., Allen, A.-R., Clark, T. R., & Ciplet, J. (2016). *The research-practice partnership toolkit*. Boulder, CO: Research+Practice Collaboratory. Available at: <http://researchandpractice.org/toolkit/>.

Penuel, W. R., & Van Horne, K. (2016). *Prompts for integrating crosscutting concepts into assessment and instruction*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/41>.

Penuel, W. R., & Bell, P. (2016). *Qualities of a good anchor phenomenon for a coherent sequence of science lessons*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/28>.

Van Horne, K., Penuel, W. R., & Bell, P. (2016). *Integrating science practices into assessment tasks*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/30>.

Penuel, W. R., Van Horne, K., & Bell, P. (2016). *Steps to designing a three dimensional assessment*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/29>.

*Cafarella, J., & Penuel, W. R. (2015). *Research brief: Supporting teacher professional communities to implement school-wide initiatives*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/24>.

Cook-Endres, T., Taylor, A., & Penuel, W. R. (2014). *Using curriculum adaptation as a strategy to help teachers learn about NGSS and developing aligned instructional materials*. Seattle, WA: University of Washington. Available at: <http://stemteachingtools.org/brief/5>.

INVITED PRESENTATIONS

Penuel, W. R. (2021, November). *Principios de aprendizaje equitativo postpandemia*. Invited keynote at the International Conference of Research in Education. Salamanca, Spain. Talk available at: <https://youtu.be/9N0WFUnVzoE>

Penuel, W. R. (2021, July). *Engaging students in addressing community priorities and global matters of concern through justice-focused design projects*. National Science Education Leadership Association Summer Leadership Institute. [virtual]

Penuel, W. R. (2021, May). *Centering the perspectives of nondominant groups and communities in designing and supporting meaningful science experiences*. University of Oslo, Oslo, Norway. [virtual]

Penuel, W. R. (2021, March). *Expanding design research to transform learning across settings*. Keynote presentation at the ICO International Spring School 2020, Rolduc Abbey, Kerkrade, the Netherlands. [virtual]

- Penuel, W. R. (2020, January) *Introduction to Design-Based Implementation Research*. Invited presentation to the Wheelock College of Education and Human Development, Boston University, Boston, MA.
- Penuel, W. R. (2020, January). *Introduction to Research-Practice Partnerships*. Invited presentation to the Wheelock College of Education and Human Development, Boston University, Boston, MA.
- Penuel, W. R. (2020, January). *Implementation Research in DBIR*. Invited presentation to the Wheelock College of Education and Human Development, Boston University, Boston, MA.
- Penuel, W. R. (2019, November). *Building equitable research-practice partnerships*. Invited presentation at the Simmons School of Education and Human Development, Southern Methodist University. Dallas, TX.
- Penuel, W. R., & Bruno, J. (2019, April). *Developing and supporting research-practice partnerships (RPPs)*. Invited presentation to the Annual Conference of the Council of State Science Supervisors. St. Louis, MO.
- Penuel, W. R. (2019, February). *Introduction to Design-Based Implementation Research*. Invited presentation to the Learning Sciences Research Institute, University of Illinois-Chicago. Chicago, IL.
- Penuel, W. R. (2019, January). *Introduction to Design-Based Implementation Research*. Invited presentation to the McKay School of Education, Brigham Young University. Provo, Utah.
- Penuel, W. R. (2018, November). *Making Science Learning Meaning for All Students, or Why “All Means All” Requires Getting to Know Student Interests, Experiences, and Identities*. Keynote at the Kentucky Science Teachers Association. Lexington, KY.
- Penuel, W. R., (2018, July). *Connected learning*. Invited presentation to the Bofill Foundation, Barcelona, Catalonia, Spain.
- Penuel, W. R. (2018, June). *Connecting science curriculum to students’ interests and identities*. Invited presentation at the University of Barcelona, Catalonia, Spain.
- Penuel, W. R. (2018, March). *Building an equitable and coherent system of assessments in a district: A partnership approach*. Annual Marzano Lecture, Rutgers University, New Brunswick, NJ.
- Penuel, W. R. (2018, January). *Strengthening infrastructures for promoting equity in mathematics education through research-practice partnerships*. Presentation to the Joint Mathematics Meetings, San Diego, CA.

- Penuel, W. R. (2017, November). *Research-practice partnerships as a strategy for developing and using evidence in policy and practice*. Invited presentation at the Dean's Lecture Series, University of Sydney School of Education and Social Work, Sydney, Australia.
- Penuel, W. R., & Watkins, D. (2017, June). *Developing capacity through curricular co-design*. Invited presentation to the Board on Science Education, National Academies, Washington, DC.
- Penuel, W. R. (2017, April). *Building capacity through developing and supporting new curriculum materials in a research-practice partnership*. Invited presentation to the Center for Science Teaching and Learning at Northern Arizona University.
- Penuel, W. R. (2017, March). *Design-based implementation research*. Invited presentation at the Carnegie Foundation for the Advancement of Teaching Improvement Summit, San Francisco, CA.
- Penuel, W. R. (2017, March). *Selecting anchoring phenomena for equitable science teaching and learning*. Invited workshop for the Colorado Science Education Network, Boulder, CO.
- Shepard, L., & Penuel, W. R. (2017, February). *Deepening formative assessment practice*. Invited address to the FAST and Science SCAS of the Council of Chief State School Officers, New Orleans, LA.
- Penuel, W. R., & Bevan, B. (2017, January). *Developing research-practice partnerships*. Invited workshop series to teams developing proposals for NSF solicitation, "Computer Science for All: Research-Practice Partnerships), Atlanta, GA, Los Angeles, CA, and Chicago, IL.
- Penuel, W. R. (2016, November). *Designing and building infrastructures to support equitable STEM learning across settings*. Invited keynote address at the Bridging Learning Experiences Conference, Barcelona, Catalonia, Spain.
- Penuel, W. R. (2016, October). *Mapping research questions and program elements in partnership research*. Invited talk at the White House Office of Science and Technology Policy, Washington, DC.
- Penuel, W. R. (2016, October). *Design-Based Implementation Research*. Invited talk to the Institute for School Partnership, Washington University, St. Louis, MO.
- Penuel, W. R. (2016, May). *'Infrastructuring' as a practice for promoting equity and transformation in design-based implementation research*. Invited talk given at the Friday Institute for Educational Innovation, Raleigh, NC.
- Penuel, W. R. (2016, April). *Getting to scale with equitable teaching and learning*. Presidential Session at the American Educational Research Association Meeting, Washington, DC.

Penuel, W. R., Bell, P. L., Briggs, D. C., Buffington, P. J., Coburn, C. E., Farley-Ripple, E. N., Hill, H. C., May, H., & Spillane, J. P. (2016, April). *Reconceptualizing how we study and support research use*. Invited Panel at the American Educational Research Association Meeting, Washington, DC.

Penuel, W. R. (2015, October). *Getting to scale with new visions of teaching and learning*. Paper presented at the Using Continuous Improvement to Integrating Design, Implementation, and Scale Up, Nashville, TN.

Penuel, W. R. (2015, September). *'Infrastructuring' as a practice for promoting equity and transformation in design-based implementation research*. Paper presented at the International Society for Design and Development in Education (ISDDE) 15, Boulder, CO.

Penuel, W. R. (2015, May). *Design-Based Implementation Research: An introductory workshop*. Presentation given at the University of Girona. Girona, Catalonia, Spain: University of Girona.

Penuel, W. R., & Martin, C. (2015, April). *Design-Based Implementation Research as a strategy for expanding opportunity to learn in school districts*. Invited presentation to the Research Conference of the National Council of Teachers of Mathematics, Boston, MA.

Penuel, W. R. (2014, December). *Getting to scale and sustainability with design-based implementation research*. Invited presentation to Board on Science Education, National Academies, Irvine, CA.

Penuel, W. R. (2014, December). *Preparing teachers to support three-dimensional science learning*. Invited presentation at "Sharing the Adventure with the Student: Exploring the Intersections of NASA Space Science and Education, A Workshop." National Academy of Sciences, Washington, DC.

Penuel, W. R. (2014, November). *Developing assessments for the Next Generation Science Standards*. Invited presentation and workshop for the Colorado Front Range Science Supervisors, Denver, CO.

Penuel, W. R., Shea, M. V., Frost, F., & Gallagher, D. (2014, October). *Strategies for negotiating problems of practice with partners*. Invited presentation to the Math-Science Partnership Conference, Washington, DC.

Penuel, W. R. (2014, October). *Assessment and the Next Generation Science Standards*. Invited presentation and workshop for the Colorado Science Education Network, Boulder, CO.

Penuel, W. R. (2014, September). *Supporting instructional shifts in the Next Generation Science Standards*. Invited presentation and workshop for the Colorado Front Range Science Supervisors, Denver, CO.

- Penuel, W. R., *Heredia, S., Rigby, J., & Russell, J. (2014, August). *Fidelity and beyond: Developing and using implementation evidence in research and development projects*. Invited symposium at the National Science Foundation's DRK-12 Principal Investigators Meeting.
- Penuel, W. R. (2014, June). *Research-based models for professional development*. Invited presentation to Building State Capacity in State Science Education Meeting, Denver, CO.
- Shouse, A., & Penuel, W. R. (2014, June). *Adapting instructional models to NGSS practices: What needs to be done to reach all learners?* Invited presentation to Building State Capacity in State Science Education Meeting, Denver, CO.
- Penuel, W. R., & McLaren, P. (2014, April). *Developing assessments of science proficiency: Recommendations of NRC Report*. Invited presentation to Council of State Science Supervisors Annual Conference, Boston, MA.
- Penuel, W. R. (2014, February). *Studying and supporting interest development*. Invited presentation as part of CREATE speaker series, Michigan State University, East Lansing, MI.
- Penuel, W. R., Falk, J., & Dierking, L. (2013, December). *The Synergies Agent-Based Model: Preliminary work, challenges and opportunities*. Invited presentation to the Seoul National University, Seoul, South Korea.
- Penuel, W. R., & Fishman, B. J. (2013, November). *Design-Based Implementation Research: Working in partnership to transform the relation of research and practice*. Webinar presented through MSP Net to the NSF Math and Science Partnership community.
- Penuel, W. R. (2013, October). *Developing and using implementation evidence in research and development efforts*. National Science Foundation, Washington, DC.
- Penuel, W. R. (2013, September). *Improving implementation of innovative teaching practices: From fidelity to principled adaptation of curricula*. Invited presentation at the University of Twente, the Netherlands.
- DeBarger, W. R., Penuel, W. R., & Harris, C. H. (2013, September). *Designing NGSS assessments to evaluate the efficacy of curriculum interventions*. Invited presentation for the Joint meeting of the Council of Chief State School Officers and the State Collaborative on Assessment and Student Standards, Washington, DC.
- Penuel, W. R. (2013, August). *Introduction to the Next Generation Science Standards*. Invited presentation to the Boulder Valley School District, Boulder, CO.
- Penuel, W. R. (2013, August). *Designing for change in complex educational systems*. Invited presentation to Waterbury Summit, Pennsylvania State University, State College, PA.

Penuel, W. R. (2013, July). *Design-Based Implementation Research: Working in partnership(s) to transform the relation of research and practice*. Paper presented at the Maine Physical Science Partnership, University of Maine, Bangor, ME.

Penuel, W. R., & Fishman, B. J. (2013, May). *Design-Based Implementation Research: Working in partnership to transform the relation of research and practice*. Presentation to the Northwestern University Multidisciplinary Program in Education Sciences, Evanston, IL.

Penuel, W. R. (2013, April). *Research, development, and assessment with badges: An equity and diversity perspective*. Presentation at the STEM Badges: Current Terrain and Beyond Meeting, National Science Foundation, Arlington, Virginia.

Penuel, W. R. (2013, March). *Digital media and learning in early childhood*. Invited presentation to the National Center for Quality Teaching and Learning, University of Washington, Seattle, WA.

Penuel, W. R. (2012, September). *Planning for change: Issues of implementation and scale*. Keynote address presented at the Nevada STEM Smart Workshop, Las Vegas, NV.

Penuel, W. R. (2009, January). *Organizing, leading, and sustaining innovation in professional learning communities*. Keynote address presented at the Microsoft Innovative Schools Conference, London, England.

SELECTED RECENT PRESENTATIONS

Peurach, D., Russell, J. L., Penuel, W. R., Eddy-Spicer, D., Datnow, A., Cannata, M., Cohen-Vogel, L., & Daly, A. (2021, April). *Introducing the foundational handbook on improvement research in education*. 2-21 Carnegie Foundation Summit on Improvement in Education, virtual.

Farrell, C. C., Penuel, W. R., Davidson, K. L., Arce-Trigatti, P., & Soland, J. (2021, April). *Assessing the effectiveness of research-practice partnerships: An evidence-centered design approach*. Paper presented at the Annual Meeting of the American Educational Research Association. [virtual]

Penuel, W. R., Wingert, K., Curran, A., Warrior, D., & Sidler, E. (2021, April). *Co-created learning: Interest surveys and content dissemination*. Paper presented at the Annual Meeting of the American Educational Research Association. [virtual]

Rhinehart, A., *Arada, K., Penuel, W. R., & *Garcia, M. M. (2021, April). *How state leaders would change their state systems of science education*. Paper presented at the NARST Annual Meeting, virtual.

- Farrell, C. C., & Penuel, W. R. (2020, April). *Methodological trade-offs for research-practice partnership evaluation*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA. [Conference cancelled]
- Farrell, C. C., Penuel, W. R., *Daniel, J., *Steup, J., & Coburn, C. E. (2020, April). *Research-practice partnerships: Current practices, future possibilities*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA. [Conference cancelled]
- Penuel, W. R., Raza, A., Watkins, D. A., Allen, A., Sumner, T. (2020, April). *Measuring and supporting student experiences in biology classrooms: Design tensions in assessing interest and identity dimensions of science learning*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA. [Conference cancelled]
- Wingert, K., & Penuel, W. R., Urbano-Torres, A. (2020, April). *Power, pollution and particles: Designing a youth-led chemistry curriculum*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA. [Conference cancelled]
- Biddy, Q., *Gendreau Chakarov, A., Sumner, T., Recker, M., & Penuel, W. R. (2020, January). *Integrating computational thinking into middle school science through co-designed storylines*. Paper presented at the Association for Science Teacher Education International Conference, San Antonio, TX.
- Alzen, J., Penuel, W. R., Reiser, B. J., & Passmore, C. (2019, March). *What goes into facilitating purposeful sensemaking in the classroom? Theorizing about teacher learning*. Paper presented at the NARST International Conference, Baltimore, MD.
- Kali, Y., Van Horne, K., *Watkins, D., Jacobs, J., & Penuel, W. R. (2019, April). *Ethical dilemmas and deliberative dialogue as means for increasing students' science capital: A World Café-inspired design*. Paper presented at the Annual Meeting of the American Educational Research Association, Toronto, Ontario, Canada.
- Morrison, D., *Riedy, R., & Penuel, W. R. (2019, March). Practical measures to sense and support states' implementation efforts of science education reform. Paper presented at the NARST International Conference, Baltimore, MD.
- Penuel, W. R., (2019, March). *Viewing collective activism through the lenses of critical science education research*. Paper presented at the NARST International Conference, Baltimore, MD.
- Penuel, W. R., Lo, A., Jacobs, J., Stuhlsatz, M., Wilson, C., & Van Horne, K. (2019, March). *Tools for supporting teachers to build quality 3D assessment tasks*. Paper presented at the NARST International Conference, Baltimore, MD.

- *Riedy, R., *Tesoriero, G., & Penuel, W. R. (2019, April). *Understanding the vision for science in Next Generation Science Standards adopting and nonadopting states*. Paper presented at the Annual Meeting of the American Educational Research Association, Toronto, Ontario, Canada.
- *Widman, S., *Repko-Erwin, M., & Penuel, W. R. (2019, April). *Negotiating mutualism: A comparative case study of researchers and practitioners collaboratively scaling STE(A)M education initiatives*. Paper presented at the Annual Meeting of the American Educational Research Association, Toronto, Ontario, Canada.
- Penuel, W. R., *Frumin, K., Van Horne, K., & Jacobs, J. (2018, April). *A phenomenon-based assessment system for three-dimensional science standards: Why do we need it and what can it look like in practice?* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.
- Penuel, W. R., Reiser, B. J., Novak, M., McGill, T., *Frumin, K., Van Horne, K., Sumner, T., & *Watkins, D. A. (2018, April). *Using co-design to test and refine a model for three-dimensional science curriculum that connects to students' interests and experiences*. Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.
- Penuel, W. R., Van Horne, K., Jacobs, J., & *Turner, M. (2018, April). *Developing a validity argument for practical measures of student experience in project-based science classrooms*. Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.
- Penuel, W. R., Van Horne, K., Jacobs, J., Sumner, T., Watkins, D., & *Quigley, D. (2017). *Developing NGSS-aligned curriculum that connects to students' interests and experiences: Lessons learned from a co-design partnership*. Paper presented at the NARST Annual Conference, San Antonio, TX.
- Weidler-Lewis, J., Penuel, W. R., & Van Horne, K. (2017, April). *Developing a measure of teachers' vision for equitable science teaching and learning*. Paper presented at the NARST Annual Conference, San Antonio, TX.
- D'Angelo, C., Moorthy, S., *Allen, C. D., Harris, C. D., Penuel, W. R. (2016, April). *Exploring variation in curriculum implementation through data visualization of teacher talk*. Paper presented at the 2016 NARST International Conference, Baltimore, MD.
- *Severance, S., Penuel, W. R., Manz, E. I., & Leary, H. A. (2016, April). *Teacher learning of modeling practices in the NGSS across professional development and classroom settings*. Paper presented at the 2016 NARST International Conference, Baltimore, MD.
- Pinkard, N., Penuel, W. R., *Dibie, O., *Sultan, A. M., *Quigley, D., Sumner, T., Van Horne, K., Acholonu, U. (2016, April). *Mapping and modeling the abundance, diversity, and accessibility of summer learning opportunities at the scale of a city*. Paper presented at the American Educational Research Association Annual Meeting, Washington, D. C.

Penuel, W. R., *Severance, S., Reiser, B. J., Kincaid, P., Miller, J., Yacoubian, J., Martin, C., & Leary, H. (2015, April). *Curriculum co-design as a strategy for supporting equitable implementation of Next Generation Science Standards*. Paper to be presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Penuel, W. R., Falk, J., Dierking, L., Hendry, M., Harrison, J., & Staus, N. (2015, April). *Using agent-based modeling to gain insight into interest development*. Paper to be presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Penuel, W. R., Harris, C. J., D'Angelo, C., Gallagher, L. P., Cheng, B. H., Moorthy, S., & Krajcik, J. (2015, April). *Supporting next generation science teaching and learning with curriculum materials: Results from an efficacy study*. Paper to be presented at NARST Annual Conference, Chicago, IL.

*Cafarella, J., Penuel, W. R., Staus, N., *Wyld, J., *Bailey, D., Dierking, L., & Falk, J. (2015, April). *Investigating complementary approaches to measuring interest in science*. Paper to be presented at NARST Annual Conference, Chicago, IL.

*Cartun, A., & Penuel, W. R. (2015, April). *Youth voices on sponsorship of literacy in an emerging participatory culture in a school setting*. Paper to be presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

*Severance, S., *Allen, C., & Penuel, W. R. (2015, April). *Leveraging professional development to design and enact NGSS-aligned materials in uncertain policy contexts*. Paper to be presented at NARST Annual Conference, Chicago, IL.

Penuel, W. R., Bevan, B., Bell, P., Buffington, P., & Falk, J. (2014, April). *Using social network concepts to enhance research use in planning for educational change*. Paper presented in Presidential Session of the Annual Meeting of the American Educational Research Association, Philadelphia, PA.

Penuel, W. R., & Otero, V. (2014, April). *Design-Based Implementation Research for improving undergraduate STEM education*. Paper presented in Presidential Session of the Annual Meeting of the American Educational Research Association, Philadelphia, PA.

Maul, A., Penuel, W. R., *Dadey, N., Gallagher, L. P., Podkul, T., & Sauerteig, D. (2014, April). *Emerging validity evidence for a survey measure of connected learning*. Paper presented at the Annual Meeting of the American Educational Research Association, Philadelphia, PA.

*Allen, C., Penuel, W. R., & D'Angelo, C. (2014, March). *Beyond content and standards knowledge: Examining systemic coherence through teacher sensemaking for the successful implementation of the Next Generation Science Standards*. Paper presented at the NARST Annual Meeting, Pittsburgh, PA.

Penuel, W. R. (2013, April). *The change laboratory as a method of design-based research*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Penuel, W. R. (2013, April). *Theorizing science learning in practice*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Penuel, W. R., Llorente, C., Van Brunt, J., & Drummond, M. (2013, April). *Synthesis of recent literature on technology and media for early literacy learning*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Penuel, W. R., Sun, M., Frank, K. A., & Gallagher, H. A. (2013, April). *Using social network analysis to study how collegial interactions can augment teacher learning from external professional development*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Penuel, W. R., DeBarger, A., Kim, C. B., Moorthy, S., Beauvineau, Y., Kennedy, C. A., . . . *Allison, K. (2013, April). *Improving learning by improving classroom assessment in Earth science: Findings from the Contingent Pedagogies project*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, San Juan, PR.

Penuel, W. R., *York, A. J., Kirshner, B., Falk, J. H., Dierking, L. D., Haun-Frank, J., . . . *Bailey, D. (2012, April). *Youth participatory research as a boundary practice in place-based partnerships for expanding learning opportunities in communities*. Paper presented at the Annual Meeting of the American Educational Research Association, Vancouver, BC.

Penuel, W. R., & Means, B. (2010, November). *Using large-scale databases in evaluation: Advances, opportunities, and challenges*. Paper presented at the Annual Meeting of the American Evaluation Association, San Antonio, TX.

Penuel, W. R. (2010, October). *Leveraging student interest and choice in designs for STEM learning in formal and informal contexts*. Paper presented at the Principal Investigators Meeting of the National Science Foundation's Science of Learning Centers, Arlington, VA.

Stevens, R., & Penuel, W. R. (2010, October). *Studying and fostering learning through joint media engagement*. Paper presented at the Principal Investigators Meeting of the National Science Foundation's Science of Learning Centers, Arlington, VA.

Penuel, W. R. (2010, September). *The role of intra-organizational processes in mediating institutional diffusion*. Paper presented as part of the IES Lecture Series at the University of Pennsylvania, Philadelphia, PA.

Penuel, W. R., Frank, K. A., Sun, M., Kim, C., & Singleton, C. (2010, August). *The role of intra-organizational processes in mediating institutional diffusion*. Paper presented at the Annual Meeting of the American Sociological Association, Atlanta, GA.

Penuel, W. R., Cheng, B., Harris, C. J., & Phillips, R. (2010, April). *Translating design principles into practice: A comparative case study of three design-based research projects in the LIFE Center*. Paper presented at the Annual Meeting of the American Educational Research Association, Denver, CO.

Penuel, W. R., Bates, L., Townsend, E., Gallagher, L. P., Pasnik, S., & Llorente, C. (2010, March). *A media-rich curriculum for improving early literacy outcomes of low-income children: Evaluation results for the Ready to Learn Initiative*. Paper presented at the Annual Conference of the Society for Research on Effectiveness in Education, Washington, DC.

*Phillips, R. S., Harris, C. J., Penuel, W. R., & Cheng, B. (2010, March). *Teachers managing students' ideas, questions, and contributions in the context of an innovative inquiry-based elementary science unit*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Philadelphia, PA.

Gallagher, L. & Penuel, W. R. (2009, April). *Preparing teachers to design instruction in middle school Earth science: Impacts of three professional development programs on student learning*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Penuel, W. R. (2009, April). *Evaluating the DELTA Project*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

O'Connor, K., & Penuel, W. R. (2009, April). *Organizing as a metaphor for learning and research on learning*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Fishman, B. J., Penuel, W. R., Hegedus, S. J., Tatar, D., Dickey, M., Moniz, R., et al. (2009, April). *What happens when the research ends? Factors related to the sustainability and scalability of a research-based innovation*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Penuel, W. R. (2009, January). *Organizing, leading, and sustaining innovation in professional learning communities*. Keynote Presentation at the Microsoft Innovative Schools Conference, London, England.

Fishman, B. J., Penuel, W. R., Gallagher, L. P., Lopez-Prado, B., & Korbak, C. (2008, June). *The mediating role of coherence in curriculum implementation*. Paper presented at the 8th International Conference of the Learning Sciences, Utrecht, the Netherlands.

Rafanan, K., Roschelle, J., Bhanot, R., Gorges, T., & Penuel, W. R. (2008, June). *Measuring mathematics discourse in technology-supported collaborative activities*. Paper presented

at the 8th International Conference of the Learning Sciences, Utrecht, the Netherlands.

Penuel, W. R., & Gallagher, L. P. (2008, March). *Comparing three approaches to preparing teachers to teach for deep understanding in Earth science: Short-term impacts on teachers' instructional planning and practice*. Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.

Penuel, W. R., McWilliams, H., & McAuliffe, C. (2007, December). *Investigating the role of the teacher in science curriculum: New evidence for an old debate*. Paper presented at the American Geophysical Union Fall Meeting 2007, San Francisco, CA.

Penuel, W. R., Riel, M., Frank, K. A., & Krause, A. (2007, April). *Teacher networks and the diffusion of innovations*. Paper presented at the 4th Lake Arrowhead Conference on Human Complex Systems, Lake Arrowhead, CA.

*Joshi, A., & Penuel, W. R. (2007, April). *The role of institutionalized norms of autonomy and equality in shaping interactions of teachers*. Paper presented at the 4th Lake Arrowhead Conference on Human Complex Systems, Lake Arrowhead, CA.

Penuel, W. R., Riel, M., & Sussex, W. (2007, April). *A network perspective on teacher collaboration: Teachers' social capital and the enactment of curricular reforms*. Paper presented at the American Educational Research Association Annual Meeting, Chicago, IL.

Penuel, W. R., Frank, K. A., & Krause, A. (2007, April). *A social network approach to examining the effects of distributed leadership in schoolwide reform initiatives*. Paper presented at the American Educational Research Association Annual Meeting, Chicago, IL.

Penuel, W. R., Frank, K. A., & Riel, M. (2007, February). *Instructional change and improved achievement: The significance of the internal social structure of schools*. Paper presented at the Conference on Human and Social Capital in Learning Systems, Pittsburgh, PA.

Penuel, W. R., Kreikemeier, P., Venezky, D. Y., Blank, J. G., Davatzes, A. E. K., & Davatzes, N. C. (2006, December). *Assessing teachers' comprehension of what matters in Earth science*. Paper presented at the American Geophysical Union Fall Meeting 2006, San Francisco, CA.

Penuel, W. R., Sussex, W., & Korbak, C. (2005, October). *Mapping the distribution of expertise and resources in a school: A social capital approach to evaluating school capacity*. Paper presented at the Joint Conference of the Canadian Evaluation Society and the American Evaluation Association, Toronto, Ontario.

Penuel, W. R., & Sussex, W. (2005, August). *GLOBE Year 10 evaluation results*. Paper presented at the 10th Annual GLOBE Conference, Prague, Czech Republic.

Penuel, W. R., Riel, M., Korbak, C., & Means, B. (2004, April). *Investigation of a social capital approach to the adoption of reform practices*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Penuel, W. R., Shear, L., Korbak, C., & Sparrow, E. (2004, April). *The roles of regional partners in supporting an international science inquiry program*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Yarnall, L., & Penuel, W. R. (2004, April). *Designing handheld software to support classroom assessment*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Penuel, W. R., & Means, B. (2004, February). *The effectiveness of technology-supported science education: Studying what works how, when, and for whom*. Paper presented at the Annual Meeting of the American Association for the Advancement of Science, Seattle, WA.

RECORD OF EXTERNAL FUNDING FOR RESEARCH

As Principal Investigator or Project Director

2021-2022	“Science Performance Assessment Learning Collaborative: Initiative for Curriculum-Embedded Assessment” \$132,250 Funder: Learning Policy Institute
2021-2023	“OpenSciEd High School Developers Consortium: Supporting Equity and Building Capacity through Collaborative Science Curriculum” \$7,000,000 Funder: Carnegie Corporation of New York
2020-2024	“Preparing Teachers to Design Tasks to Support, Engage, and Assess Science Learning in Rural Schools” \$2,999,000 Funder: National Science Foundation
2020-2023	“Collaborative Research: EMBEDS: Exploring the Mathematics of Biological Ecosystems with Data Science” \$200,000 Funder: National Science Foundation
2018-2021	“Deepening Learning through Culturally Relevant Phenomenon-Based Science Teaching” \$1,000,000 Supplement for 2018: \$409,000 Funder: Hewlett Foundation

2017-2021	<p>“Building Capacity for Using Data on Student Experience as Formative Assessment (SEFA) to Promote Equitable Instruction”</p> <p>\$400,000</p> <p>Funder: Spencer Foundation</p>
2017-2020	<p>“EAGER: Examining an Innovative Approach to Supporting Science Teachers Practice towards Three-Dimensional Learning Goals through Adapting Classroom Assessment Tasks”</p> <p>\$299,837</p> <p>Funder: National Science Foundation</p>
2017-2018	<p>“Developing a Typology of Continuous Improvement Research in Education”</p> <p>\$75,000</p> <p>Funder: Spencer Foundation</p>
2016-2018	<p>“EAGER: Smart and Connected Communities: Reducing Friction in the L3 Connects Infrastructure: Embedding a Recommender System into Mobile Apps to Support Real-time Brokering”</p> <p>\$189,988</p> <p>Funder: National Science Foundation</p>
2016-2019	<p>“Partnership for Building Capacity for Improvement in State Science Education”</p> <p>\$ 1,499,998</p> <p>Funder: National Science Foundation</p>
2014-2018	<p>“National Center for Research in Policy and Practice”</p> <p>\$4,995,000</p> <p>Funder: Institute of Education Sciences, U.S. Department of Education</p>
2012-2017	<p>“Connected Learning Research Network Survey Study”</p> <p>\$729,295</p> <p>Funder: MacArthur Foundation</p>
2011-2012	<p>“Developing and Testing Theories of Implementation: A Workshop on Design Research with Educational Systems”</p> <p>\$184,779</p> <p>Funder: REESE Program, National Science Foundation</p>
2010-2015	<p>“Evaluation of the Ready to Learn Content Alliance”</p> <p>\$4,874,999</p>

Funder: Office of Innovation and Improvement, U.S.
Department of Education

2008-2012 “Developing Contingent Pedagogies: Integrating Technology-Enhanced Feedback into a Middle School Science Curriculum to Improve Conceptual Teaching and Learning”
\$2,199,970
Funder: DRK-12 Program, National Science Foundation

2007-2009 “Evaluation of the MathForward Initiative”
\$728,000
Funder: Texas Instruments, Inc.

2006-2010 “Evaluation of the Ready to Learn Initiative”
\$2,070,000
Funder: Office of Innovation and Improvement, U.S.
Department of Education

2006-2009 “Analyzing the Flow of Network-Embedded Expertise in Schools: A Longitudinal Study of Individual and Organizational Change”
\$551,484
Funder: Human and Social Dynamics Program, National Science Foundation

2005-2009 “Comparing the Efficacy of Three Approaches to Transforming Instruction in Earth Science Education”
\$1,864,415
Funder: Institute of Education Sciences, U.S. Department of Education

2004-2008 “21st Century Community Learning Centers Program Implementation Study”
\$1,642,462
Funder: Program and Policy Studies Service, U.S.
Department of Education

2003-2007 “Evaluation of the Global Learning to Benefit the Environment (GLOBE) Program: A Systemic Approach.”
\$910,659
Funder: Elementary, Secondary, and Informal Education, National Science Foundation

2003-2007 “Exploration of a Social Capital Framework for Evaluative Studies of Technology Integration”
\$1,346,733
Funder: ROLE, National Science Foundation

2003-2005	<p>“Evaluation of the <i>Routes to Learning</i> Initiative” \$75,000 Funder: Koret Foundation</p>
2002-2005	<p>“Handheld Assessment: Portable Scaffolds for Project-based Learning in Science?” \$ 1,822,042 Funder: ROLE, National Science Foundation</p>
<i>As Co-Principal Investigator</i>	
2020-2024	<p>“Developing a Model of Teacher Learning to Support Computationally Rich Communication in Science Classrooms” Funder: James S. McDonnell Foundation \$2,499,702</p>
2019-2021	<p>“Advancing Coherent and Equitable Systems of Science Education: Supporting Middle Schools” Funder: Bill and Melinda Gates Foundation \$152,238</p>
2019-2023	<p>“Advancing Coherent and Equitable Systems of Science Education” Funder: National Science Foundation \$1,261,856</p>
2019-2021	<p>“Measuring the Effectiveness of Research-Practice Partnerships in Education” Funder: William T. Grant Foundation \$635,337</p>
2018-2020	<p>“Research-Practice Partnerships White Paper 2.0” Funders: William T. Grant Foundation and Spencer Foundation \$125,000</p>
2018-2023	<p>“Developing a Model of Teacher Learning to Support Classroom Enactment of Three-Dimensional Science Teaching” Funder: James S. McDonnell Foundation \$5,000,000 (CU Portion: \$203,428)</p>
2017-2020	<p>“Collaborative Research: Using a School-Based Sensing Platform and Targeted Teacher Professional Development to</p>

	Support Computational Thinking Integration and Student Learning” Funder: National Science Foundation \$2,123,801
2016-2019	“Capturing Connected Learning in Libraries” \$772,864 Funder: Institute of Museum and Library Services
2016-2017	“EAGER: Early Stage Research on Automatically Identifying Instructional Moves in Mathematics” \$299,928 Funder: National Science Foundation
2015-2017	“Curriculum Units That Exemplify Three Dimensional Learning and Assessment” \$ 834,528 Funder: Gordon & Betty Moore Foundation
2013-2018	“A Research+Practice Collaboratory” \$1,441,305 Funder: National Science Foundation
2012-2016	“INDP: Inquiry Hub” \$1,520,531 Funder: National Science Foundation
2012-2016	“From Users to Coproducers of Research Evidence: A Study of Place-Based Research Partnerships” \$591,901 Funder: William T. Grant Foundation
2011-2015	“Synergies: Understanding and Connecting STEM Learning in the Community” \$601,177 Funder: Noyce Foundation
2010-2015	“Efficacy Trial of Project Based Inquiry Science” \$5,000,000 Funder: National Science Foundation
2006-2011	“Evaluation of the National Writing Project” \$5,000,000 Funder: U.S. Department of Education
2003-2005	“The CATAALYST - Planning a Rigorous Study” \$231,607

Funder: National Science Foundation

PATENTS

Method and Apparatus for Group Learning via Sequential Explanation Templates

US8092227 B2

January 10, 2012

EXTERNAL PROFESSIONAL SERVICE

2018-present	Member, Board on Science Education (BOSE), National Academies of Sciences, Engineering, and Medicine
2018-present	Editorial Board member, <i>the Journal of the Learning Sciences</i>
2016-present	Ad hoc reviewer, Spencer Foundation grants
2014-present	Editorial Board member, <i>Mind, Culture, Activity</i>
2014-2018	Standing review panel member, Institute of Education Sciences, <i>Researcher-Practitioner Partnerships Program</i>
2007-2019	Editorial Board Member, <i>Teachers College Record</i>
2007-2018	Regular reviewer, <i>Sociology of Education</i>
2010-2017	Editorial Board Member, <i>American Journal of Evaluation</i>
2012-2016	Advisory board member, Building Capacity for State Science Education Initiative, Council of State Science Supervisors
2008-2015	Editorial Board Member, <i>Cognition & Instruction</i>
2014	Reviewer, National Science Foundation DRK-12 program
2012-2014	Conference co-chair, 11 th International Conference of the Learning Sciences
2012-2013	Member, National Research Council committee on Assessment and the Next Generation Science Standards
2011-2013	Member, Geographical Sciences Education Research Committee
2011-2013	Member, Geographical Sciences Education Research Committee

2011-2013	Associate Editor, <i>American Educational Research Journal</i>
2009-2012	Regular reviewer, <i>Elementary School Journal</i>
2008	Reviewer, Informal Science Education Program (NSF)
2006	Reviewer, Human and Social Dynamics Program (NSF)
2005-2011	Reviewer, <i>Science Education</i>
2004	Reviewer, SBIR program (NSF)
2003	Reviewer, ROLE program (NSF)
1996-2000	Reviewer, <i>Journal of Research on the Teaching of English</i>
1995-1997	Vice President, Cultural-Historical SIG of the American Educational Research Association

MEMBERSHIPS

American Educational Research Association
 International Society of the Learning Sciences
 National Association for Research in Science Teaching
 National Science Teachers Association

STUDENTS

Current Doctoral Students (chair or co-chair)

Melissa Campanella, University of Colorado Boulder

Tanya Ennis, University of Colorado Boulder

Robbin Riedy, University of Colorado Boulder

Past Students (chair or co-chair)

Heather MacGillivray, University of Colorado Boulder (Ph.D., 2014)

Chad Nash, University of Colorado Boulder (Ph.D., 2015)

Sam Severance, University of Colorado Boulder (Ph.D., 2016)

Carrie D. Allen, University of Colorado Boulder (Ph.D., 2016)

Ashley Potvin, University of Colorado Boulder (Ph.D., 2017)

Josephina Chang-Order, University of Colorado Boulder (Ph.D., 2019)