

Abraham S. Lo, Ph.D.

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EDUCATION

Northwestern University, School of Education and Social Policy Evanston, IL, USA
Ph.D., Learning Sciences 2010-2017

- **Dissertation:** *Epistemic aims, considerations, and agency: Lenses for helping teachers analyze and support students' meaningful engagement in scientific practices*
- **Committee:** Brian J. Reiser, Ph.D. (chair), Christina V. Schwarz, Ph.D., Miriam G. Sherin, Ph.D., Bruce L. Sherin, Ph.D.

University of Pennsylvania, Graduate School of Education Philadelphia, PA, USA
Master of Science in Education, Secondary Education 2002-2003

- **Master's Thesis:** *Creating a Meaningful Learning Environment by Incorporating Students' Sociocultural Capital*
- **Advisors:** Kenneth Tobin, Ed.D.; Sonya Martin, Ph.D.; Sarah-Kate Lavan, Ph.D.

University of Pennsylvania, College of Arts and Sciences Philadelphia, PA, USA
Bachelor of Arts in Biology, cum laude 1998-2002

PROFESSIONAL APPOINTMENTS

BSCS Science Learning Colorado Springs, CO, USA
Science Educator 2018-Present

- Design NGSS-aligned instructional materials and professional development programs to promote the pedagogical and epistemic shifts involved with implementing NGSS-aligned teaching and learning

University of California Museum of Paleontology Berkeley, CA, USA
Museum Associate 2019-Present

University of California, Davis, School of Education Davis, CA, USA
Postdoctoral Scholar 2015-2016

- **Advisor:** Cynthia Passmore, Ph.D.

AWARDS & HONORS

- AERA Minority Dissertation Fellowship in Education Research, 2014-15
- Institute of Education Sciences Pre-Doctoral Training Fellowship, 2011-2014
- International Conference for the Learning Sciences Doctoral Consortium, 2014
- AERA 2015 Division C Graduate Student Seminar Participant, 2015
- Dean's Urban Teacher Education Scholar, University of Pennsylvania, 2002-2003
- University Fellowship, Northwestern University, 2010-2011
- Conference Travel Grant, Northwestern University, 2014, 2016

RESEARCH EXPERIENCE

BSCS Science Learning Colorado Springs, CO, USA
Co-PI: Preparing Teachers to Design Tasks to Support, Engage, and Assess Science Learning in Rural Schools (NSF Award No. 2010086, \$2,979,000) 2020-Present

- **Project Goal:** Use design-based implementation research to collaboratively design and assess the effectiveness of an online course sequence that supports teachers in implementing five-dimensional instruction and assessment.

Building Capacity to Analyze and Adapt Tasks Focused on 3-Dimensional Learning (NSF Award No. 1748757, \$299,837) 2018-Present

- **Project Goals:** Conduct early stage research to understand: (1) how we can prepare teachers to support three-dimensional (3D) science learning and (2) how teachers assess 3D science learning of diverse students
- Co-developed rubric to assess three-dimensionality of teacher-designed assessments and provide feedback to teachers
- Used rubric to identify areas of growth and ascertain the role that professional learning plays in supporting this growth

PI: Supporting Students' Meaningful Use of the CCCs (Carnegie Foundation & Digital Promise, \$9,000) 2022-Present

- **Project Goal:** Develop meaningful supports for students' use of the CCCs in OpenSciEd instructional materials

Co-PI: ENACT: Exploring Novel Approaches to Characterizing Teachers' Curriculum Enactment to Inform the Design of Professional Learning (Carnegie Foundation & Digital Promise, \$9,000) 2022-Present

- **Project Goal:** Refine a conceptual framework for characterizing the variation in teachers' implementation of the OpenSciEd instructional materials.

Communities Supporting Teacher Learning: Using Videocase Analysis of Teaching and Learning to Support Undergraduate Preservice Secondary Science Teachers (NSF Award No. 1725389, \$2,807,423) 2019-Present

- **Project Goal:** This program engages with stakeholders (university science faculty, university education faculty, and cooperating teachers) to use the STeLLA model in a coherent way to prepare undergraduate preservice teachers to teach secondary science.
- Oversee two University Teams as they seek to incorporate aspects of STeLLA into their pre-service teacher education program.
- Oversee research design and data analysis to understand the rationales for each University team's plan and how the changes they've made work together to improve preservice teachers' classroom practices and their students' science learning.

University of California, Davis, School of Education

Davis, CA, USA

Modeling Scientific Practice in High School Biology: A Next Generation Instructional Resource (NSF Award No. 1348990, \$1,963,466)

2015-2016

- **Project Goal:** Design and investigate an integrated online resource (curricular, pedagogical, and professional supports) to support high school biology teachers' enactment and understanding of a year-long model-based instructional sequence
- Developed strategies for data collection, data analysis, curriculum development, and professional development for participating teachers
- Observed and provided professional support for three high school biology teachers' implementation of *Model Based Education Resource (MBER): Biology* curriculum
- Developed methodologies to understand teachers' decision making and planning

Northwestern University, School of Education and Social Policy

Evanston, IL, USA

Supporting Scientific Practices in Elementary and Middle School Classrooms (NSF Award No. 1020316, \$3,495,230)

2011-2015

- **Project Goal:** Develop a learning progression to characterize how learners' meaningful use of scientific practices can become increasingly more sophisticated over time through instructional, curricular, and professional development supports
- Co-designed research protocol and research instruments for investigating how teachers perceive the changes involved in bringing NGSS into science classrooms and how they adapt their teaching approaches to support their students in scientific practices
- Conducted teacher and student interviews about their understanding and use of scientific practices
- Designed and analyzed assessments used to assess students' understanding and use of scientific practices
- Coordinated data collection at five research sites and supervise undergraduate research assistants

Clark University

Worcester, MA, USA

Next Generation Science Exemplar System for Professional Development (NGSX)

2013-2014

- **Project Goal:** Develop web-based professional development system to help teachers engage with the major ideas within the NRC's Framework for K-12 Science Education and the NGSS.
- Assisted in the design of a middle-school pathway examining students' use of modeling and teacher strategies to support argumentation in classrooms
- Analyzed pre and post-intervention surveys to ascertain changes in participants' understanding of scientific practices and the effectiveness of the NGSX platform

PUBLICATIONS AND CONFERENCE PRESENTATIONS

- Lo, A. S.** (2017). *Epistemic aims, considerations, and agency: Lenses for helping teachers analyze and support students' meaningful engagement in scientific practices*. (Ph.D. Dissertation), Northwestern University, ProQuest Dissertations & Theses Global. (Order No. 10683645)
- Berland, L. K., Schwarz, C. V., Krist, C., Kenyon, L., **Lo, A. S.**, & Reiser, B. J. (2016). Epistemologies in practice: Making scientific practices meaningful for students. *Journal of Research in Science Teaching*, 53(7), 1082-1112. doi: 10.1002/tea.21257
- Edelson, D. C., Reiser, B. J., McNeill, K. L., Mohan, A., Novak, M., Mohan, L., Affolter, R., McGill, T. A. W., Buck Bracey, Z. E., Deutch Noll, J., Kowalski, S. M., Novak, D., **Lo, A. S.**, Landel, C., Krumm, A., Penuel, W. R., Van Horne, K., González-Howard, M., & Suárez, E. (2021, 2021/10/03). 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>
- Wingert, K., Jacobs, J., Lindsay, W., **Lo, A.S.**, Herrmann-Abell, C.F. & Penuel, W.R. (accepted). Understanding the priorities and practices of rural science teachers: Implications for professional development. *The Rural Educator*.
- Lo, A. S.**, Penuel, W. R., & Wingert, K. (2022). *Supporting Teachers in Designing Assessments Aligned to the Vision of the Framework: Findings from Two Design Studies* Paper to be presented at 2022 Annual Meeting of the American Educational Research Association, San Diego, CA.
- Lo, A. S.**, Glidewell, L., O'Connor, K., Allen, A., Herrmann-Abell, C. F., Penuel, W. R., Wingert, K., & Lindsay, W. (2022). *Promoting shifts in teachers' understanding and use of phenomena in instruction and assessment*. Paper to be presented at International Conference of the Learning Sciences, Hiroshima, Japan.
- Lo, A. S.**, Stennett, B., Hvidsten, C., Bekins, A., Gagnon, R., Martin, A., Newberg, J., Slykhuis, D., Smith, J., Strode, P., Foss, G., Lohmann, N., & Roberson, J. (2022, Jan 7). *Lessons Learned: Successes and challenges of fostering cross-stakeholder collaborations to enhance the effectiveness and coherence of secondary science preservice preparation programs* Related paper set presented at 2022 ASTE International Conference, Greenville, SC.
- Newberg, J., Gagnon, R., Smith, J., **Lo, A. S.***, Foss, G., Lohmann, N., & Roberson, J. (2022, Jan 7). *Successes and challenges of developing cross-stakeholder collaborations to enhance preservice teacher preparation*. Paper presented at 2022 ASTE International Conference, Greenville, SC. (*advised on practitioner paper)
- Lo, A. S.**, Stennett, B., Hvidsten, C., & Askinas, K. (2021, Jan 14). *Developing a common vision for supporting coherence in three preservice science teacher education programs*. Paper presented at 2021 Association for Science Teacher Education Conference (ASTE).
- Lo, A. S.**, Stennett, B., Hvidsten, C., & Askinas, K. (2021). *Adapting and Scaling the STeLLA PD Program Conceptual Framework in Preservice Teacher Education Programs*. Paper to be presented at 2021 National Association for Research in Science Teaching (NARST).
- Lo, A. S.** (2020). *Using cogenerative dialogues to help teachers support meaningful and coherent sensemaking through consensus*. Paper accepted for the NARST 2020 Annual International Conference [Cancelled conference], Portland, OR.
- Fick, S. J., Arias, A. M., Vo, T., Sherwood, C.-A., Benedict-Chambers, A., & **Lo, A. S.** (2020). Axes of Support: Explicit to Implicit and Practical to Epistemic. In M. Gresalfi & I. S. Horn (Eds.), *The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020* (Vol. 2, pp. 853-854). International Society of the Learning Sciences.
- Stennett, B., Hvidsten, C., **Lo, A. S.**, & Slykhuis, D. (2020). *STeLLA CO2: A New Vision for Coherent Science Teacher Preparation*. Paper presented at the 2020 ASTE International Conference, San Antonio, TX.
- Lo, A. S.**, Bear, J. R., Oshry, A., Stuhlsatz, M. A. M., & Marshall, C. R. (2019). Supporting the development of system thinking for explaining global change phenomena. Paper presented at the NARST 2019 Annual International Conference, Baltimore, MD.

- Penuel, W., **Lo, A. S.**, Jacobs, J., Gardner, A., Stuhlsatz, M. A. M., & Wilson, C. D. (2019). *Tools for Supporting Teachers to Build Quality 3D Assessment Tasks*. Paper presented at the NARST 2019 Annual International Conference, Baltimore, MD. <http://learndbir.org/resources/tools-for-supporting-teachers-to-build-quality-3d-assessment-tasks>
- Bean, J.R. & **Lo, A.S.** (2018) *Using the NextGenStorylines Approach to Help Students Understand the Processes of Science and Global Change*. Workshop presented at National Association for Biology Teachers Conference, San Diego, CA.
- Lo, A.S.**, & Lewis, E. (2017) *A District's Approach to Implementing the CA-NGSS Integrated Model in Grades 6-8*. Presentation at 2017 California Science Education Conference, Sacramento, CA.
- Lewis, E., & **Lo, A.S.** (2017) *Toolkit for Science Pedagogy: Supporting SFUSD Teachers with the NGSS Shifts*. Presentation at 2017 California Science Education Conference, Sacramento, CA.
- Lo, A. S.** (2016). *Epistemic aims, considerations, and agency: Lenses for helping teachers analyze and enhance students' meaningful engagement in scientific practices*. Paper presented at the NARST 2016 Annual International Conference, Baltimore, MD.
- Griesemer, C. D., & **Lo, A. S.** (2016). *Successes and challenges in promoting student sense making in modeling classrooms*. Paper presented at the NARST 2016 Annual International Conference, Baltimore, MD.
- Lo, A. S.** (2015). *Learning to Notice: Supporting students as epistemic agents and meaningful participants in scientific modeling*. Poster presented at invited session *Promising Scholarship in Education: Dissertation Fellows and Their Research* at the 2015 Annual Meeting of the American Educational Research Association, Chicago, IL.
- Lo, A. S.** (2015). *Supporting students as epistemic agents and the meaningfulness of their engagement in modeling*. Paper presented at the NARST 2015 Annual International Conference, Chicago, IL.
- Lo, A. S.**, Krist, C., Reiser, B. J., & Novak, M. (2014). *Examining shifts in teachers' understanding of NGSS and their impact on planned instruction*. Paper presented at the NARST 2014 Annual International Conference, Pittsburgh, PA.
- Lo, A. S.** (2014). *Learning to notice: Supporting students' meaningful engagement in scientific practices*. In J. L. Polman, E. A. Kyza, D. K. O'Neill, I. Tabak, W. R. Penuel, A. S. Jurow, K. O'Connor, T. Lee & L. D'Amico (Eds.), *Learning and becoming in practice: The international conference of the learning sciences (ICLS) 2014* (Vol. 3, pp. 1754). Boulder, CO: International Society of the Learning Sciences.
- Lo, A. S.** (2013). *Understanding differences in student participation in persuasive discourse while engaged in scientific modeling*. Paper presented at the NARST 2013 Annual International Conference, San Juan, Puerto Rico.
- Lo, A. S.** (2013). *Examining student attention to epistemologies in practice while evaluating scientific models*. Paper presented at the 2013 Annual Meeting of the American Educational Research Association, San Francisco, CA.
- Reiser, B. J., **Lo, A. S.**, Draney, K., Sussman, J., & Toyama, Y. (2013). *Using assessments to capture students' understanding of epistemologies in practice across content area and time*. Paper presented at the 2013 Annual Meeting of the American Educational Research Association, San Francisco, CA.
- Reiser, B. J., & **Lo, A. S.** (2012). *A framework for supporting and assessing scientific practices*. Paper presented at the NARST 2012 Annual International Conference, Indianapolis, IN.
- Baker, R., Blatt, E., Hurwitz, J., **Lo, A. S.** (2003). *How school environment influences students' learning: A look at two magnet schools in the Philadelphia School System*. Paper presented at the 24th Annual Ethnography in Education Research Forum, Philadelphia, PA.

INVITED PRESENTATIONS

- Lo, A. S.** (Producer). (2018). *Designing instructional units using the NextGenStorylines Approach to support student sensemaking. Implementing the NGSS*. [Webinar] Retrieved from https://nagt.org/nagt/profdev/workshops/ngss_summit/sept2018/index.html
- Allen, C., Ciasullo, N., Leach, D., **Lo, A. S.**, Oleksiak, J., Parks, S. (2008). *Your Child is More than a Test Score*. Council for the Advancement of Public Schools, Upper Merion Middle School, King of Prussia, PA, March 27, 2008.

PROFESSIONAL DEVELOPMENT EXPERIENCE

BSCS Science Learning

Colorado Springs, CO

Science Educator

2018-Present

- Design and facilitate professional development for facilitators and teachers using the OpenSciEd middle school science curriculum materials (opensci.ed.org)
- Lead video-based, lesson analysis professional learning to support teacher learning about the use of the STeLLA strategies and improve science teachers' content and pedagogical content knowledge
- Provide professional development and instructional coaching to support K-12 NGSS implementation
- Co-designed and facilitated in-person and online professional development to prepare teachers and teacher leaders to use the Understanding Global Change framework and curriculum materials
- Co-facilitate workshops for teachers and teacher leaders to use the *Five Tools and Processes for Translating the NGSS into Instruction and Classroom Assessment* to design NGSS-aligned instruction and assessment

San Francisco Unified School District

San Francisco, CA

Middle School Content Specialist and Instructional Coach

2017-2018

- Designed and enacted district-wide professional development for 6th, 7th, and 8th grade teachers to support the development, implementation, and revision of a NGSS-aligned, middle school science curriculum
- Co-designed professional development for all secondary teacher leaders and science teachers to use video and student artifacts to cultivate cultures of reflective practice and develop strategies for organizing productive classroom discourse
- Collaborated with curriculum writers from SFUSD and Stanford to revise curriculum materials
- Served as instructional coach for science teachers in high-need middle schools
- Co-designed research instruments used to assess the effectiveness of curriculum materials and professional development

University of California, Davis, School of Education

Davis, CA, USA

Initiative for Innovations in STEM Teaching, Achievement, and Research (I-STAR)

2015-2016

- **Project Goal:** Develop online resource to help K-12 math and science teachers understand the reasoning practices found in the CCSS and NGSS
- Developed video-based resources to help teachers notice students' use of math and science practices to develop disciplinary ideas: <http://www.practices-resource.com/video-cases>
- Coordinated development of resources and tools to help teachers understand the pedagogical and epistemological shifts involved in supporting practices-centered instruction and facilitate students' use of modeling and argumentation in math and science classrooms.

Northwestern University, School of Education and Social Policy

Evanston, IL, USA

Teaching Assistant

2013-2014

- Courses
 - *MSED 451: Teaching K-12 Science with the Next Generation Science Standards* (Summer, 2013)
 - *LS 435: New Approaches to Science Teaching* (Winter, 2014)
- Co-developed tools and processes to help teachers use the NextGenStorylines Approach to develop NGSS-aligned curriculum units
- Involved in all aspects of course design, instruction, planning, and assessment of student work
- Coordinated the recruitment and enrollment of 31 teachers and administrators for Summer NGSS Course

Supporting Scientific Practices in Elementary and Middle School Classrooms

2011-2015

- Instructional coach for teachers implementing a NGSS-aligned, middle school science curriculum, *Investigating and Questioning Our World through Science and Technology* (IQWST)
- Designed professional development and instructional interventions to support students' meaningful engagement in scientific practices
- Led district wide professional development for two high schools (24 teachers) to help teachers understand the shifts required for implementing NGSS and designing NGSS-aligned instructional units

Instructor, NU-TEACH: Alternative Certification Program

2011-2013

- Conducted professional development sessions with elementary and secondary teachers to refine their attention to student thinking and help their students engage in authentic scientific inquiry
- Observed and evaluated intern lessons and teaching portfolios
- Facilitated video clubs using video from interns' classrooms

Wissahickon School District

Ambler, PA, USA

2005-2007

- Designed and conducted school-wide professional development sessions to help teachers redesign science labs for inquiry and integrate SmartBoard technology into their instructional practice
- Facilitated roundtable discussions to improve the implementation of inclusion in regular education science classrooms

University of Pennsylvania, Graduate School of Education

Philadelphia, PA, USA

Consultant, *Fieldwork Seminar (EDUC-555)*

2005-2008

- Facilitated discussions and provided resource materials for student teachers
- Hosted classroom management and routines workshop for student teachers, June 2006

CURRICULUM DEVELOPMENT EXPERIENCE

- NextGenStorylines/OpenSciEd Instructional Model
 - OpenSciEd (opensci.org): 6.1 One-Way Mirror (NGSS Design Badge), 6.2 Cup Design (NGSS Design Badge), 6.3 Storms, 6.4 Everest (NGSS Design Badge), 6.5 Tsunami (NGSS Design Badge), and 6.6 Healing (NGSS Design Badge) units
 - University of California Museum of Paleontology: Understanding Global Change Sea Level Rise Unit
- BSCS 5E Instructional Model
 - San Francisco Unified School District Middle School Core Science Curriculum (www.sfusdscience.org)
- Model Based Education Resource: Biology, University of California, Davis (www.modelbasedbiology.com)
- AP Environmental Science, George Lucas Education Foundation
- Honors Physical Science, Wissahickon High School
- Earth Science I, High Tech High (Mastery Charter High School)

K-12 TEACHING CERTIFICATIONS

- Pennsylvania Instructional II Certification (Biology, Chemistry, & General Science 7-12)
- California Single-Subject Teaching Credential (Biological Sciences and Chemistry)
- Qualified Teacher Status with exemption from induction, General Teaching Council for England

K-12 TEACHING EXPERIENCE

Wycombe High School

High Wycombe, Buckinghamshire, UK

Teacher of Science

2008-2010

- **Courses Taught:** Key Stage 3 Science; GCSE Biology, Chemistry, and Physics; and AS Biology
- **Pastoral and Classroom Mentor** for 3 PGCE (teacher education) students
- **Evaluation:** Lesson observations rated “outstanding” by internal and external assessors

Sixth Form Tutor

- Provided pastoral, academic, and interpersonal advice for 18 students attending post-compulsory education
- Reviewed students’ personal statements and wrote university references

Wissahickon High School

Ambler, PA, USA

Teacher, Biology and Physical Science

2004-2008

- **Course Taught:** Honors, Academic (college-prep), and Inclusion Biology; Honors Physical Science
- **Leadership:** E-Classroom Pilot Teacher and Trainer
- **Faculty Sponsor:** Student Council, Future Teachers of America, Pennsylvania Junior Academy of Science, Montgomery County Science Research Competition, Delaware Valley Science Fair, & student graduation projects
- Designed department quarterly progress assessments and website

Franklin Towne Charter High School

Philadelphia, PA, USA

Teacher, Biology and Physics

2003-2004

High Tech High Philadelphia Charter School (Mastery Charter High School)

Philadelphia, PA, USA

Student Teacher, Earth Science

2002-2003

- Co-designed inquiry-based and technology-infused Earth Science I curriculum
- Mentored 8 students through Guardian Angel program, co-sponsored school choir, taught study skills elective
- Designed and maintained science department resource website

TEACHING HONORS & AWARDS

- Certificate of Achievement, Buckinghamshire Children and Young People's Services, July 2010
- Recognized by National Honor Society, Wissahickon High School, March 2008
- Staff Member of the Month, Wissahickon High School, March 2005

PROFESSIONAL AFFILIATIONS

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

PROFESSIONAL SERVICE

- Advisory Board Member, New Visions for Public Schools, New York, NY
- Reviewer, Journal of Science Education and Technology
- Reviewer, National Association for Research in Science Teaching
- David B. Brownlee Fellow for School of Arts and Sciences Advising, University of Pennsylvania, 2002-2003
- Alumni Admissions Interviewer, University of Pennsylvania, 2006, 2014-2015