



## Hilda Borko

Charles E. Ducommun Professor in the Graduate School of Education

### CONTACT INFORMATION

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### Bio

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#### BIO

My research explores teachers' instructional practices, the process of learning to teach, the impact of teacher professional development programs on teachers and students, and the preparation of professional development leaders. My current projects include partnerships with local school districts to improve teaching and professional development in mathematics and science, and to build capacity within the school districts to prepare and support professional development leaders, with a focus on enduring robust learning opportunities for all students.

#### ACADEMIC APPOINTMENTS

- Professor, Graduate School of Education
- Member, Bio-X

#### BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Professor, School of Education, Stanford University (2007 - present)
- Professor/Associate Professor, School of Education, University of Colorado, Boulder, CO (1991 - 2007)
- Associate Professor, Department of Curriculum and Instruction, College of Education, University of Maryland, College Park, MD (1985 - 1991)
- Associate/Assistant Professor, Division of Curriculum and Instruction, College of Education, Virginia Polytechnic Institute and State University, Blacksburg, VA (1980 - 1985)
- Educational Evaluator, System Development Corporation, Santa Monica, CA (1978 - 1980)

#### PROFESSIONAL EDUCATION

- Ph.D., University of California, Los Angeles , Educational Psychology (1978)
- M.A., University of California, Los Angeles , Philosophy of Education (1973)
- B.A., University of California, Los Angeles , Psychology (1971)
- Teaching Credential, University of Southern California , California State Elementary Teaching Credential, specialization in Mental Retardation (1972)

#### LINKS

- Webpage: <https://web.stanford.edu/people/hildab>

## Research & Scholarship

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### RESEARCH INTERESTS

- Math Education
- Professional Development
- Science Education
- Teachers and Teaching

### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Toward a Scalable Model of Mathematics Professional Development: A Field Study of Preparing Facilitators to Implement the Problem-Solving Cycle

The Problem-Solving Cycle (PSC) model of mathematics professional development encourages teachers to become part of a collaborative and supportive learning community. As they participate in the PSC, teachers think deeply about both mathematics content and instruction, and they explore their instructional practices with their colleagues through the use of video and other classroom artifacts. One iteration of the PSC consists of three interconnected professional development workshops, all organized around a rich mathematical task. During Workshop 1, teachers collaboratively solve the mathematical task and develop plans for teaching it to their own students. Shortly after the workshop, the teachers implement the problem with their own students and their lessons are videotaped. In Workshop 2 teachers explore the role they played in implementing the problem. In Workshop 3 teachers critically examine students' mathematical reasoning.

The Problem-Solving Cycle model provides a structure for mathematics teachers to work together and share a common mathematical and pedagogical experience. Our previous research suggests that it is a promising model for enhancing teachers' knowledge and supporting changes in classroom practice.

In our current project, initiated in Fall 2007, we are working with a group of middle school mathematics teachers in a large urban district to foster their leadership capacity, and specifically to prepare them to facilitate the Problem-Solving Cycle. We will provide 2½ years of preparation and support for teachers who have been designated as "mathematics instructional leaders." These instructional leaders will in turn implement the PSC with the mathematics teachers in their schools. We will document the range and quality of the instructional leaders' implementation of the PSC. We will also analyze the impact of the professional development process on the mathematical knowledge and classroom teaching of the instructional leaders and the mathematics teachers with whom they work. In addition, we will analyze the impact on their students' mathematics achievement. By the conclusion of the project, we anticipate that the participating schools will have the infrastructure and capacity to carry out the PSC indefinitely, using their own resources. In addition, the project will produce a highly refined set of PSC facilitation materials—with a strong emphasis on supporting a linguistically and culturally diverse student population—that can be widely disseminated.

## Teaching

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### COURSES

#### 2023-24

- Boost Youth College Readiness through Effective Mathematics Tutoring: EDUC 129 (Win)
- Introduction to Research in Curriculum and Teacher Education: EDUC 424 (Spr)
- Introduction to Research-Practice Partnerships: EDUC 352A (Aut)

#### 2022-23

- Introduction to Research in Curriculum and Teacher Education: EDUC 424 (Spr)
- Introduction to Research-Practice Partnerships: EDUC 352A (Aut)

#### 2021-22

- Introduction to Research in Curriculum and Teacher Education: EDUC 424 (Spr)
- Introduction to Research-Practice Partnerships: EDUC 352A (Aut)

#### 2020-21

- Boost Youth College Readiness through Effective Mathematics Tutoring: EDUC 129 (Win)
- Introduction to Research in Curriculum and Teacher Education: EDUC 424 (Spr)
- Introduction to Research-Practice Partnerships: EDUC 352A (Aut)

### STANFORD ADVISEES

#### Doctoral Dissertation Reader (AC)

Jane Weiss

#### Doctoral Dissertation Advisor (AC)

Kelly Boles, Jim Malamut

#### Master's Program Advisor

Danielle Fong, Pearlyn Kwang

#### Doctoral (Program)

Kelly Boles, Victoria Delaney, Meghan Durkin, Faith Kwon, Jim Malamut, Lena Phalen

### Publications

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#### PUBLICATIONS

- **The indispensable role of the goal construct in understanding and improving teaching practice** *PROFESSIONAL DEVELOPMENT IN EDUCATION*  
Janssen, F., Westbroek, H., Borko, H.  
2023
- **Teachers' engagement with student mathematical agency and authority in school-based professional learning** *TEACHING AND TEACHER EDUCATION*  
Dyer, E. B., Jarry-Shore, M., Fong, A., Deutscher, R., Carlson, J., Borko, H.  
2023; 121
- **Leveraging portfolios in professional development for middle school science teachers' assessment and data-use practice** *SCIENCE EDUCATION*  
Kloser, M., Borko, H., Wilsey, M., Rafanelli, S.  
2022
- **TEACHER FACILITATION OF ELEMENTARY SCIENCE DISCOURSE AFTER A PROFESSIONAL DEVELOPMENT INITIATIVE** *ELEMENTARY SCHOOL JOURNAL*  
Borko, H., Zaccarelli, F., Reigh, E., Osborne, J.  
2021
- **Learning to Lead: an Approach to Mathematics Teacher Leader Development** *INTERNATIONAL JOURNAL OF SCIENCE AND MATHEMATICS EDUCATION*  
Borko, H., Carlson, J., Deutscher, R., Boles, K. L., Delaney, V., Fong, A., Jarry-Shore, M., Malamut, J., Million, S., Mozenter, S., Villa, A.  
2021
- **Middle School Science Teachers' Conceptions of Assessment Practice Throughout a Year-long Professional Development Experience** *EDUCATIONAL ASSESSMENT*  
Wilsey, M., Kloser, M., Borko, H., Rafanelli, S.  
2020; 25 (2): 136–58
- **Impacts of a Practice-Based Professional Development Program on Elementary Teachers' Facilitation of and Student Engagement With Scientific Argumentation** *AMERICAN EDUCATIONAL RESEARCH JOURNAL*  
Osborne, J. F., Borko, H., Fishman, E., Gomez Zaccarelli, F., Berson, E., Busch, K. C., Reigh, E., Tseng, A.  
2019

- **The role of video-based discussion in model for preparing professional development leaders.** *International journal of STEM education*  
Borko, H., Carlson, J., Mangram, C., Anderson, R., Fong, A., Million, S., Mozenter, S., Villa, A. M.  
2017; 4 (1): 29
- **Evidence of Middle School Science Assessment Practice From Classroom-Based Portfolios** *SCIENCE EDUCATION*  
Kloser, M., Borko, H., Martinez, J. F., Stecher, B., Luskin, R.  
2017; 101 (2): 209-231
- **The role of video-based discussion in model for preparing professional development leaders** *International Journal of STEM Education*  
Borko, H., Carlson, J., Mangram, C., Anderson, R., Fong, A., Million, S., Mozenter, S., Villa, A. M.  
2017; 4 (1)
- **A Practice-Based Professional Development Program to Support Scientific Argumentation From Evidence in the Elementary Classroom** *JOURNAL OF SCIENCE TEACHER EDUCATION*  
Fishman, E. J., Borko, H., Osborne, J., Gomez, F., Rafanelli, S., Reigh, E., Tseng, A., Million, S., Berson, E.  
2017; 28 (3): 222-49
- **Methodological contributions to video-based studies of classroom teaching and learning: a commentary** *ZDM-MATHEMATICS EDUCATION*  
Borko, H.  
2016; 48 (1-2): 213-218
- **THE ROLE OF VIDEO-BASED DISCUSSIONS IN PROFESSIONAL DEVELOPMENT AND THE PREPARATION OF PD LEADERS** *DIGITAL VIDEO FOR TEACHER EDUCATION: RESEARCH AND PRACTICE*  
Borko, H., Virmani, R., Khachatryan, E., Mangram, C., Calandra, B., Rich, P.  
2015: 89-108
- **Examining novice teacher leaders' facilitation of mathematics professional development** *JOURNAL OF MATHEMATICAL BEHAVIOR*  
Borko, H., Koellner, K., Jacobs, J.  
2014; 33: 149-167
- **Facilitating Video-Based Professional Development: Planning and Orchestrating Productive Discussions** *TRANSFORMING MATHEMATICS INSTRUCTION: MULTIPLE APPROACHES AND PRACTICES*  
Borko, H., Jacobs, J., Seago, N., Mangram, C., Li, Y., Silver, E. A., Li, S.  
2014: 259-281
- **Five research-based heuristics for using video in pre-service teacher education** *JOURNAL FOR EDUCATIONAL RESEARCH ONLINE-JERO*  
Blomberg, G., Renkl, A., Sherin, M., Borko, H., Seidel, T.  
2013; 5 (1): 90-114
- **Measuring instructional practice in science using classroom artifacts: lessons learned from two validation studies** *JOURNAL OF RESEARCH IN SCIENCE TEACHING*  
Martinez, J. F., Borko, H., Stecher, B. M.  
2012; 49 (1): 38-67
- **Measuring Classroom Assessment Practice Using Instructional Artifacts: A Validation Study of the QAS Notebook** *EDUCATIONAL ASSESSMENT*  
Felipe Martinez, J., Borko, H., Stecher, B., Luskin, R., Kloser, M.  
2012; 17 (2-3): 107-131
- **Using video representations of teaching in practice-based professional development programs** *ZDM-MATHEMATICS EDUCATION*  
Borko, H., Koellner, K., Jacobs, J., Seago, N.  
2011; 43 (1): 175-187
- **Culture Currents** *INTERNATIONAL JOURNAL OF LEADERSHIP IN EDUCATION*  
Borko, H., Bowers, C.  
2010; 13 (2): 235-238
- **Humility and Wisdom Necessary Ingredients to Reverse the Widget Effect** *JOURNAL OF TEACHER EDUCATION*  
Borko, H., Liston, D., Whitcomb, J.  
2009; 60 (4): 361-363

- **Growing Talent Promising Professional Development Models and Practices** *JOURNAL OF TEACHER EDUCATION*  
Whitcomb, J., Borko, H., Liston, D.  
2009; 60 (3): 207-212
- **The End of Education in Teacher Education Thoughts on Reclaiming the Role of Social Foundations in Teacher Education** *JOURNAL OF TEACHER EDUCATION*  
Liston, D., Whitcomb, J., Borko, H.  
2009; 60 (2): 107-111
- **Wicked Problems and Other Thoughts on Issues of Technology and Teacher Learning** *JOURNAL OF TEACHER EDUCATION*  
Borko, H., Whitcomb, J., Liston, D.  
2009; 60 (1): 3-7
- **Classroom Assessment Practices, Teacher Judgments, and Student Achievement in Mathematics: Evidence from the ECLS** *EDUCATIONAL ASSESSMENT*  
Martinez, J., Stecher, B., Borko, H.  
2009; 14 (2): 78-102
- **Teachers, Teaching, and Teacher Education: Comments on the National Mathematics Advisory Panel's Report** *EDUCATIONAL RESEARCHER*  
Borko, H., Whitcomb, J. A.  
2008; 37 (9): 565-572
- **Conversations in Search of a Common Denominator** *JOURNAL OF TEACHER EDUCATION*  
Liston, D., Borko, H., Whitcomb, J.  
2008; 59 (5): 383-388
- **Why teach? - Part II** *JOURNAL OF TEACHER EDUCATION*  
Whitcomb, J., Borko, H., Liston, D.  
2008; 59 (4): 267-272
- **An education president for the 21st century: Introducing eight letters to the 44th president of the United States** *JOURNAL OF TEACHER EDUCATION*  
Borko, H., Whitcomb, J., Liston, D.  
2008; 59 (3): 207-211
- **The teacher educator's role in enhancing teacher quality** *JOURNAL OF TEACHER EDUCATION*  
Liston, D., Borko, H., Whitcomb, J.  
2008; 59 (2): 111-116
- **Why teach?** *JOURNAL OF TEACHER EDUCATION*  
Whitcomb, J. A., Borko, H., Liston, D.  
2008; 59 (1): 3-9
- **PROVIDING FEEDBACK TO TEACHER CANDIDATES FOR NATIONAL BOARD CERTIFICATION: A STUDY OF TEACHER PREFERENCES AND LEARNING** *ASSESSING TEACHERS FOR PROFESSIONAL CERTIFICATION*  
Wolf, K., Davis, A., Borko, H., Stake, R. E., Kushner, S., Ingvarson, L., Hattie, J.  
2008; 11: 413-436
- **Artifact Packages for Characterizing Classroom Practice: A Pilot Study** *EDUCATIONAL ASSESSMENT*  
Borko, H., Stecher, B. M., Alonzo, A. C., Moncure, S., McClam, S.  
2005; 10 (2): 73-104