

Bárbara M. Brizuela
Associate Professor
Department Chair
Director, Mathematics, Science, Technology, and Engineering Education Program
Department of Education
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EDUCATION

Doctor in Education. Harvard University Graduate School of Education, Cambridge, MA. 2001

Learning and Teaching Department. Advisor: Dr. Eleanor Duckworth

Committee Members: Analúcia D. Schliemann, Claryce Evans, Emilia Ferreiro

Qualifying Paper: “To Understand is to Invent:” A Piagetian Perspective on the Creation of New Ideas in the Process of Knowledge Construction. 1999

Dissertation: Children’s ideas about the written number system. 2001

Master of Arts, General Studies in Education. Tufts University, Medford, MA. 1996

Thesis: Facilitating children’s adaptation to school: A psychopedagogical model

Advisor: Dr. Martha J. García-Sellers

Licenciada en Ciencias Pedagógicas. Universidad de Belgrano, Bs. As., Argentina. 1993

Licenciada en Psicopedagogía. Universidad de Belgrano. 1993

Técnica en Construcción y Usos de Instrumentos de Evaluación. Universidad de Belgrano. 1991

HONORS

Fulbright Senior Scholar. Bariloche, Argentina. 2009

Spencer Research Grant. 2008-2009

Schuster Faculty Fellow in Arts & Sciences. Tufts University. 2008-2009

Spencer Fellow. Harvard Graduate School of Education. 1997-2000

Roy E. Larsen Fellow. Harvard University Graduate School of Education. 1996-1997

Tuition Scholarship. Graduate School of Arts and Sciences, Tufts University. 1995-1996

Graduated with honors from Universidad de Belgrano. 1992

Full Merit Scholarship. Universidad de Belgrano. 1992

Tuition Scholarship. Universidad de Belgrano. 1990

All round excellence cup. Northlands School, Buenos Aires, Argentina. 1987

PUBLICATIONS

BOOKS:

1. Schliemann, A. D., Carraher, D., & Brizuela, B. M. (2011). *El carácter algebraico de la aritmética: de las ideas de los niños a las actividades en el aula* (Spanish translation of *Bringing Out the Algebraic Character of Arithmetic: From Children’s Ideas to Classroom Practice*). Buenos Aires: Editorial Paidós.

2. Schliemann, A. D., Carraher, D., & Brizuela, B. M. (2007). *Bringing Out the Algebraic Character of Arithmetic: From Children's Ideas to Classroom Practice*. Mahwah, NJ: Lawrence Erlbaum and Associates.
3. Wong, P. Y., & Brizuela, B. M. (2007). *Building Math: Stranded*. Portland, ME: Walch Publishing. (Winner of "Distinguished Achievement Award" from the Association of Educational Publishers, 2008.)
4. Wong, P. Y., & Brizuela, B. M. (2007). *Building Math: Everest Trek*. Portland, ME: Walch Publishing. (Winner of "Distinguished Achievement Award" from the Association of Educational Publishers, 2008.)
5. Wong, P. Y., & Brizuela, B. M. (2007). *Building Math: Amazon Mission*. Portland, ME: Walch Publishing. (Winner of "Distinguished Achievement Award" from the Association of Educational Publishers, 2008.)
6. Brizuela, B. M. (2006). *Desenvolvimento matematico na criança: Explorando notações*. Porto Alegre, Brazil: Artmed Editora. (Portuguese translation of Mathematical Development in Young Children: Exploring Notations.)
7. Brizuela, B. M. (2004). *Mathematical Development in Young Children: Exploring Notations*. NY: Teachers College Press.

EDITED VOLUMES:

1. Brizuela, B. M., & Gravel, B. E. (forthcoming). (Eds.) *"Show me what you know" Exploring representations across STEM disciplines*. Book contract signed with Teachers College Press.
2. Alvarado, M., & Brizuela, B. M. (Eds.) (2005). *Haciendo números. Las notaciones numéricas vistas desde la psicología, la didáctica y la historia*. México: Editorial Paidós.
3. Brizuela, B. M., Stewart, J. P., Carrillo, R. G., & Berger, J. G. (Eds.). (2000). *Acts of inquiry in qualitative research*. Cambridge, MA: Harvard Educational Review.

ARTICLES IN REFEREED JOURNALS:

1. Bautista, A., Pérez Echeverría, M. P., Pozo, J. I., & Brizuela, B. M. (in press, 2012). Piano students' conceptions of learning, teaching, assessment, and evaluation. *Estudios de Psicología*, 33(1).
2. Schliemann, A.D., Carraher, D.W., & Brizuela, B. M. (2012, in press). Algebra in Elementary School and its Impact on Middle School Learning. *Recherches en Didactique des Mathématiques*, Paris, France.
3. Caddle, M., & Brizuela, B. M. (2011). Fifth Graders' Additive And Multiplicative Reasoning: Establishing Connections Across Conceptual Fields Using A Graph. *Journal of Mathematical Behavior*, 30(3), 224-234.
4. Martinez, M. V., Brizuela, B. M., & Castro Superfine, A. (2011). Integrating Algebra and Proof in High School Mathematics: An Exploratory Study. *Journal of Mathematical Behavior*, 30, 30-47.
5. Brizuela, B. M., & Alvarado, M. (2010). First graders' work on additive problems with the use of different notational tools. *Revista IRICE Nueva Época*, 21, 37-44.
6. Brizuela, B. M., & Cayton, G. A. (2010). Anotar números desde pre-escolar hasta segundo grado: el impacto del uso de dos sistemas de representación en la presentación. *Cultura & Educación*, 22(2), 149-167.

7. Bautista, A., Pérez Echeverría, M. del P., Pozo, J. I., & Brizuela, B. M. (2009). Piano students' conceptions of musical scores as external representations: A cross-sectional study. *Journal of Research in Music Education*, 57(3), 181-202.
8. Brizuela, B. M., & Cayton, G. (2008). The roles of punctuation marks while learning about written numbers. *Educational Studies in Mathematics*, 68, 209-225.
9. Brizuela, B. M. (2006). Young children's notations for fractions. *Educational Studies in Mathematics*, 62(3), 281-305.
10. Carraher, D. W., Schliemann, A. D., Brizuela, B. M., & Earnest, D. (2006). Arithmetic and Algebra in Early Mathematics Education. *Journal for Research in Mathematics Education* 37(2), 87-115.
11. Martinez, M. V., & Brizuela, B. M. (2006). A third grader's way of thinking about linear function tables. *Journal of Mathematical Behavior*, 25(4), 285-298.
12. Carraher, D.W., Schliemann, A.D., & Brizuela, B.M. (2005). Treating the operations of arithmetic as functions. [Videopaper]. In D. Carraher & R. Nemirovsky (Eds.), *Medium and meaning: Video papers in mathematics education research*, *Journal for Research in Mathematics Education* Monograph, Vol. XIII. 2005. [On CD-ROM]. 11 min. video (204 MB), 34 pages text (170 KB), 32 images (974 KB).
13. Brizuela, B. M., & Schliemann, A. D. (2004). Fourth graders solving linear equations. *For the Learning of Mathematics*, 24(2), 33-40.
14. Brizuela, B. M., & Lara-Roth, S. (2002). Additive relations and function tables. *Journal of Mathematical Behavior*, 20(3), 309-319.
15. Brizuela, B. M. (1999). Editor's Review. *Harvard Educational Review*, 69(4), 474-481.
16. Brizuela, B. M., & Sellers-García, M. J. (1999). School adaptation: A triangular process. *American Educational Research Journal*, 36(2), 345-370.
17. Soler-Gallart, M., & Brizuela, B. M. (1998). Cultural Action for Freedom: Editors' Introduction. *Harvard Educational Review*, 68(4), 471-475.
18. Brizuela, B. (1997). Inventions and conventions: A story about capital numbers. *For the Learning of Mathematics*, 17(1), 2-6.

ARTICLES IN NON-REFEREED JOURNALS:

1. Brizuela, B. M. (2008). Notaciones empleadas por los niños para representar fracciones (Spanish translation of "Young children's notations for fractions" published in 2006 in *Educational Studies in Mathematics*). *12(ntes) Enseñar Matemática. Nivel Inicial y Primaria*, 3, 19-40.
2. Brizuela, B. M., & Schliemann, A. D. (2008). Alumnos de diez años de edad resolviendo ecuaciones lineales (Spanish translation of "Fourth graders solving linear equations" published in 2004 in *For the Learning of Mathematics*). *12ntes. Enseñar Matemática Nivel Inicial y Primario*, 5, 7-24.
3. Carraher, D., Schliemann, A. D., & Brizuela, B. M. (2001). Algebra in the Early Grades. *Hands On!*, 24(1), 1-6.

BOOK CHAPTERS:

1. Brizuela, B. M., & Martinez, M. V. (forthcoming). Aprendiendo acerca de la comparación de funciones lineales. In J. A. Castorina, M. Carretero, & A. Barreiro (Eds.), *Desarrollo Cognitivo y Educación*. Buenos Aires: Editorial Paidós.

2. Brizuela, B. M., & Cayton, G. (forthcoming). Young Children's Self-Constructed Maps. In B. M. Brizuela & B. E. Gravel (Eds.), *"Show me what you know" Exploring representations across STEM disciplines*. NY: Teachers College Press.
3. Brizuela, B. M., & Gravel, B. E. (forthcoming). Introduction. In B. M. Brizuela & B. E. Gravel (Eds.), *"Show me what you know" Exploring representations across STEM disciplines*. NY: Teachers College Press.
4. Gravel, B. E., Scheuer, N., & Brizuela, B. M. (forthcoming). A case study of a student's efforts to make sense of air and the particle nature of gases through multiple representations. In B. M. Brizuela & B. E. Gravel (Eds.), *"Show me what you know" Exploring representations across STEM disciplines*. NY: Teachers College Press.
5. Brizuela, B. M., & Earnest, D. (2008). Multiple notational systems and algebraic understandings: The case of the "best deal" problem. In J. Kaput, D. Carraher, & M. Blanton (Eds.), *Algebra in the Early Grades* (pp. 273-301). Mahwah, NJ: Lawrence Erlbaum and Associates.
6. Alvarado, M., & Brizuela, B. M. (2005). Introducción. In M. Alvarado & B. M. Brizuela (Eds.) *Haciendo números. Las notaciones numéricas vistas desde la psicología, la didáctica y la historia*. (pp. 9-12). México: Editorial Paidós.
7. Brizuela, B. M. (2005). Relaciones entre representaciones: el caso de Jennifer, Nathan y Jeffrey. In M. Alvarado & B. M. Brizuela (Eds.) *Haciendo números. Las notaciones numéricas vistas desde la psicología, la didáctica y la historia*. (pp. 198-219). México: Editorial Paidós. (Spanish version of chapter in "Mathematical Development in Young Children: Exploring Notations".)
8. Brizuela, B. M. (2003). Números y letras: Primeras conexiones entre sistemas notacionales. In A. Teberosky & M. Soler-Gallart (Eds.), *Contextos de alfabetización inicial* (pp. 133-154). Barcelona: Editorial Horsori.
9. Brizuela, B. M. (2000). Algunas ideas sobre el sistema de numeración escrito en niños pequeños. In N. Elichiry (Ed.), *Aprendizaje de niños y maestros. La construcción del sujeto educativo* (pp. 15-27). Buenos Aires: Ediciones Manantial.
10. Soler-Gallart, M., & Brizuela, B. M. (2000). Editors' introduction. In P. Freire, *Cultural action for freedom* (pp. 1-5). Cambridge, MA: Harvard Educational Review.
11. Brizuela, B. (1998). Invenções e convenções: Uma história sobre números maiúsculos. In A. Schliemann & D. Carraher (Orgs.), *A compreensão de conceitos aritméticos. Ensino e pesquisa*. São Paulo: Papirus Editora. (Portuguese version of "Inventions and conventions: A story about capital numbers".)

PAPERS IN REFEREED CONFERENCE PROCEEDINGS

1. Martinez, M., & Brizuela, B. M. (2009). Modeling and proof in high school. In M. Tzekaki, M. Kaldrimidou, & H. Sakonidis (Eds.), *Proceedings of the 33rd Annual Meeting of the International Group for the Psychology of Mathematics Education* (vol 4, pp. 113-120). Thessaloniki, Greece: PME.
2. Brizuela, B. M., & Cayton, G. A. (2008). First and second graders' spontaneous use of punctuation marks within written numerals. In O. Figueras, J. L. Cortina, S. Alatorre, T. Rojano, & A. Sepúlveda (Eds.), *Proceedings of the 32nd Annual Meeting of the International Group for the Psychology of Mathematics Education* (vol. 1, p. 241). México: Cinvestav-UMSNH.

3. Cayton, G. A., & Brizuela, B. M. (2008). Relationships between children's external representations of number. In O. Figueras, J. L. Cortina, S. Alatorre, T. Rojano, & A. Sepúlveda (Eds.), *Proceedings of the 32nd Annual Meeting of the International Group for the Psychology of Mathematics Education* (vol. 2, pp. 265-272). México: Cinvestav-UMSNH.
4. Huang, W., Brizuela, B. M., & Wong, P. (2008). *Integrating Algebra and Engineering in the Middle School Classroom*. Proceedings of the American Society for Engineering Education. Pittsburgh, PA.
5. Cayton, G. A., & Brizuela, B. M. (2007). First graders' strategies for numerical notation, number reading and the number concept. In J.-H. Woo, H.-C. Lew, K.-S. Park, & D.-Y. Seo (Eds.), *Proceedings of the 31st Annual Meeting of the International Group for the Psychology of Mathematics Education* (vol.2, pp. 81-88). Seoul, Korea: Seoul National University.
6. Martinez, M. V., & Brizuela, B. M. (2006). An unexpected way of thinking about linear function tables. In J. Novotná, H. Moraová, M. Krátka, & N. Stehliková (Eds.), *Proceedings of the 30th Annual Meeting of the International Group for the Psychology of Mathematics Education* (vol. 4, pp. 153-160). Prague, Czech Republic: Charles University.
7. Brizuela, B. M., & Schliemann, A. (2003). Fourth graders solving equations. In N. A. Pateman, B. J. Dougherty, & J. Zilliox (Eds.), *Proceedings of the 2003 joint meeting of PME and PMENA* (vol. 2, pp. 137-144). Honolulu: University of Hawai'i.
8. Schliemann, A. D., Carraher, D., Brizuela, B. M., Earnest, D., Goodrow, A., Lara-Roth, S., & Peled, I. (2003). Algebra in elementary school. In N. A. Pateman, B. J. Dougherty, & J. Zilliox (Eds.), *Proceedings of the 2003 joint meeting of PME and PMENA* (vol. 4, pp. 127-134). Honolulu: University of Hawai'i.
9. Schliemann, A. D., Carraher, D. W., & Brizuela, B. M. (2002). From unknown amounts to representing variables. In *Proceedings of the XIV Annual Meeting Psychology of Mathematics Education, North American Chapter* (pp. 127-129). Athens, GA: ERIC Clearinghouse.
10. Brizuela, B. M., & Lara-Roth, S. (2001). Additive relations and function tables. In H. Chick, K. Stacey, J. Vincent, & J. Vincent (Eds.), *The future of the teaching and learning of algebra Proceedings of the 12th ICMI Study Conference* (vol. 1, pp. 110-119). The University of Melbourne, Australia.
11. Carraher, D., Brizuela, B. M., & Earnest, D. (2001). The reification of additive differences in early algebra. In H. Chick, K. Stacey, J. Vincent, & J. Vincent (Eds.), *The future of the teaching and learning of algebra Proceedings of the 12th ICMI Study Conference* (vol. 1). The University of Melbourne, Australia.
12. Carraher, D., Schliemann, A. D., & Brizuela, B. M. (2001). Can young students operate on unknowns? In M. van der H.-P. (Ed.), *Proceedings of the 25th conference of the International Group for the PME* (vol. 1, pp. 130-140). Utrecht, The Netherlands: Freudenthal Institute.
13. Schliemann, A. D., Carraher, D., & Brizuela, B. M. (2001). When tables become function tables. In M. van der H.-P. (Ed.), *Proceedings of the 25th conference of the International Group for the PME* (vol. 4, pp. 145-152). Utrecht, The Netherlands: Freudenthal Institute.

14. Carraher, D., Brizuela, B. M., & Schliemann, A. D. (2000). Bringing out the algebraic character of arithmetic: Instantiating variables in addition and subtraction. In T. Nakahara & M. Koyama (Eds.), *Proceedings of the 24th conference of the International Group for the PME* (vol. 2, pp. 145-152). Hiroshima, Japan: Hiroshima University.

BOOKNOTES:

1. Brizuela, B. M. (1999). The kindness of children. *Harvard Educational Review*, 69 (2), 212-214.
2. Brizuela, B. M. (1998). Revolutionary multiculturalism: Pedagogies of dissent for the new millenium. *Harvard Educational Review*, 68 (2), 259-261.
3. Brizuela, B. M. (1997). The essential Piaget: An interpretive reference and guide. *Harvard Educational Review*, 67 (4), 835-836.

REVIEWS OF MY PUBLISHED WORK:

- Warren, E. (2007). Children's Invented Notations as Insights Into Mathematical Thinking: A Review of *Mathematical Development in Young Children: Exploring Notations*. *Journal for Research in Mathematics Education*, 38(3), 322-326.

IN THE NEWS

2012:

On page 2 of this article that appeared in The Boston Globe Magazine (http://articles.boston.com/2012-01-22/magazine/30646285_1_math-centers-math-circle-russian-school/2), I am referenced as saying about after school math programs that “there is little solid evidence to show that these programs do anything at all” and that I am “skeptical about the efficacy of after-school math centers.” In the interview that led to this reference, I had many more things to say, which did not make it to print! The bottom line is that I wish that all the money poured into creating and sustaining these programs were dedicated to curriculum development, professional development, and parental involvement in their children’s mathematics education.

2010:

Interview by Magazine Desde La Patagonia, published by Centro Regional Universitario Bariloche, Universidad Nacional del Comahue, reporting on my Fulbright Fellowship at their institution. Available at:
<http://ase.tufts.edu/education/faculty/docs/brizuelaDesdeLaPatagonia.pdf>

2009:

Aprender Matemática Puede Ser Divertido (Learning Mathematics Can be Fun). *Revista Acción*, 4(28), 8-9. 2009. Available at
<http://ase.tufts.edu/education/faculty/brizuela.asp>
Article in the outreach magazine of the Ministry of Science and Technology, Province of Córdoba, Argentina, reporting on a two-day workshop I held for in-service teachers in May 2009.

Interview on the television program 12(ntes) [Teachers], which appears weekly on public television in Argentina. Volume 4, 2009. Available at
<http://ase.tufts.edu/education/faculty/brizuela.asp>

Reflexões no papel: Álgebra desde cedo (Reflections on paper: Algebra from the start).

Revista Nova Escola online. Edição 227, November 2009. Available at:

<http://revistaescola.abril.com.br/formacao/formacao-continuada/reflexoes-papel-algebra-notacoes-tabelas-equacoes-graficos-barbara-brizuela-investigacoes-511730.shtml>

Report by Beatriz Santomauro on an invited presentation I gave as part of "Education Week" organized by the Victor Civita Foundation with the purpose of celebrating teachers' day in Brazil. São Paulo, Brazil.

Let $x=x$. Tufts Journal, April 2009. Available at

http://tuftsjournal.tufts.edu/2009/04_1/features/03/

Article by Marjorie Howard on the Early Algebra project and our summer camp.

2003

The wedding of two programs will help kids learn mathematics. Tufts Journal, March 2003.

Available at <http://tuftsjournal.tufts.edu/archive/2003/march/features/math.shtml>

Article by Marjorie Howard on the Building Math project.

2001

Algebra in elementary school? No sweat. Tufts Journal, November 2001. Available at

<http://tuftsjournal.tufts.edu/archive/2001/november/features/index.shtml>

Article by Marjorie Howard on the Early Algebra Project.

INVITED TALKS AND PRESENTATIONS

2011:

Brizuela, B. M. (2011, April). *La representaciones externas como expresiones y amplificadoras del pensamiento.* Conference for the Masters in Educational Psychology at FLACSO (Facultad Latinoamericana de Ciencias Sociales), Buenos Aires, Argentina.

Brizuela, B. M. (2011, April). *El carácter algebraico de la aritmética: de las ideas de los niños a las actividades en el aula.* Book presentation at the Buenos Aires Book Fair.

Brizuela, B. M. (2011, December). *La construcción del símbolo para representar incógnitas y variables.* Invited presentation at the Second National Meeting on Cognitive Development, Culture, and Education. National Library, Buenos Aires, Argentina.

2010:

Brizuela, B. M. (2010, October). *The teaching and learning of Early Algebra among elementary school students.* Invited presentation at the Department of Mathematics Colloquium, University of Arizona at Tucson.

Brizuela, B. M., Schliemann, A. D., & Carraher, D. W. (2010, April). The early algebra, early mathematics project. *What do we know about Early Algebra: Reflecting on a Decade of Research.* Invited Symposium at the National Council of Teachers of Mathematics Research Presession, San Diego, California.

2009:

Brizuela, B. M., & Alvarado, M. (2009, April). *La construcción del sistema de numeración escrito en niños pequeños* [Young children's construction of the written number system]. Invited presentation at Universidad Nacional del Comahue, Centro Regional Universitario Bariloche.

- Brizuela, B. M. (2009, April). *El uso de notaciones como herramientas en la resolución de problemas* [The use of notations in the context of solving problems]. Invited presentation at Universidad Nacional del Comahue, Centro Regional Universitario Bariloche. Bariloche, Patagonia, Argentina.
- Brizuela, B. M. (2009, May). *Enseñanza y aprendizaje de álgebra temprana* [Teaching and learning of early algebra]. Invited two-day Workshop for in-service teachers. Secretaría de Promoción Científica, Ministerio de Ciencia y Tecnología, Gobierno de la Provincia de Córdoba, Argentina.
- Brizuela, B. M. (2009, August). *La enseñanza y aprendizaje del álgebra temprana en niños de 7 a 9 años de edad* [The teaching and learning of early algebra in children 7 to 9 years old]. Invited presentation at Universidad Pedagógica Nacional, Ajusco. México DF, México.
- Brizuela, B. M. (2009, September). *El uso de las notaciones en la solución de problemas matemáticos en niños de primaria* [The use of notations while solving mathematical problems among elementary school children]. Invited presentation at Universidad Autónoma de Madrid, Facultad de Psicología. Madrid, Spain.
- Brizuela, B. M. (2009, October). *As notações no contexto da resolução de problemas matemáticos* [Notations in the context of solving mathematical problems]. Invited presentation as part of “Education Week” organized by the Victor Civita Foundation with the purpose of celebrating teachers’ day in Brazil. São Paulo, Brazil.

2008:

- Alvarado, M., & Brizuela, B. M. (2008, September). *Las notaciones en el contexto de la resolución de problemas* [Notations in the context of solving problems]. Invited presentation at the “Jornadas sobre la enseñanza en el primer ciclo: Tensiones, perspectivas y propuestas”. Red Nacional de Alfabetización. Buenos Aires, Argentina.
- Brizuela, B. M., & Cayton, G. A. (2008, September). *Representaciones numéricas en niños pequeños: el cambio de sistemas de representación* [Numerical representations in young children: moving across representational systems]. Invited presentation at the Seminar “Nuevas Alfabetizaciones en la Educación del Siglo XXI”. Bariloche, Argentina.
- Brizuela, B.M., Martinez, M.V. & Cayton, G.A. (2008, June). *The Impact of Early Algebra on Later Algebra Learning: Results from a Longitudinal Intervention (2003-2008)*. Invited presentation at Pathways to Algebra conference, Mayenne, France.
- Brizuela, B. M., & Schliemann, A. D. (2008, September). *Alumnos de diez años de edad resolviendo ecuaciones lineales* [Fourth graders solving linear equations]. Invited presentation at the conference “Avances de investigaciones sobre aprendizajes numéricos”. Universidad Nacional de La Plata, Argentina.

2007:

- Brizuela, B. M. (2007, September). *Young children’s numerical representations across different systems*. Invited presentation at the Seminar: Learning with and about external representations. Barcelona, Spain: University of Barcelona.

2005:

- Alvarado, M., & Brizuela, B. M. (2005, August). *A psychogenetic analysis of young children’s*

production of written numbers. Paper presented as part of invited symposium: Early literacy, convened by Emilia Ferreiro and Gella Varnava-Skouras. XIIth European Conference on Developmental Psychology Submission, Tenerife, Islas Canarias, Spain.

2000:

Carraher, D., Schliemann, A. D., & Brizuela, B. M. (2000, October). *Early algebra, early arithmetic: Treating operations as functions*. Plenary address at the 22nd meeting of the PME North America meeting, Tucson, Arizona.

TEACHING EXPERIENCE

UNIVERSIDAD NACIONAL DEL COMAHUE, Centro Regional Universitario Bariloche, Patagonia, Argentina. Spring 2009.

Visiting Professor (Fulbright Scholar). Taught a course (“Enseñanza y aprendizaje de álgebra temprana”: Teaching and learning of early algebra) for in-service and pre-service Mathematics teachers in the Mathematics Department.

TUFTS UNIVERSITY DEPARTMENT OF EDUCATION, Medford, Massachusetts. 2007-ongoing

Associate Professor (with tenure). Fall 2007: Acting Chair; Acting Director, Mathematics, Science, Technology, and Engineering Education Program. Fall 2009-ongoing: Department Chair; Director, Mathematics, Science, Technology, and Engineering Education Program. Courses: Human Development and Learning; Development of Knowledge & Reasoning in the Science Curriculum; Mathematics Learning Environments; Methods of Educational Research; Symbols, Knowing, and Learning; Math, Science, Technology and Engineering Proseminar; Theory and Research in Early Childhood and Elementary Mathematics Education.

Design courses and teach courses, advise masters students, doctoral students, and preservice teachers at the elementary, middle, and high school levels, work on research projects, sit on university and departmental committees.

TUFTS UNIVERSITY DEPARTMENT OF EDUCATION, Medford, Massachusetts. 2001-2007

Assistant Professor. Courses: Human Development and Learning; Development of Knowledge & Reasoning in the Science Curriculum; Mathematics Learning Environments; Methods of Educational Research; Symbols, Knowing, and Learning; Math, Science, Technology and Engineering Proseminar; Theory and Research in Early Childhood and Elementary Mathematics Education.

Design courses and teach courses, advise masters students, doctoral students, and preservice teachers at the elementary, middle, and high school levels, work on research projects, sit on university and departmental committees.

TUFTS UNIVERSITY DEPARTMENT OF EDUCATION, Medford, Massachusetts. 2000-2001

Lecturer. Courses: Human Development and Learning, Seminar in Psychological Studies in Education, Research Seminar I and II.

Designed the course syllabus, reading list, and reading packet, taught classes, designed assignments and evaluations, and corrected student work and papers.

HARVARD GRADUATE SCHOOL OF EDUCATION, Cambridge, Massachusetts. Fall, 1998, Fall 1999

Teaching Fellow. Course: Teaching and Learning. Instructors: Prof. Eleanor Duckworth, Prof. Steve Seidel.

Taught a section of twelve students, led discussions, and commented on their weekly papers, journals, and fieldworks, and on their final class paper.

UNIVERSIDAD ORT, Montevideo, Uruguay. Summer 1999

Lecturer. Research Methods Seminar.

Designed and taught a one-week intensive seminar about research methods and design.

Supervised students in the design of their research projects.

TUFTS UNIVERSITY DEPARTMENT OF EDUCATION, Medford, Massachusetts. Fall, 1997

Lecturer. Course: Human Development and Learning.

Co-taught a graduate course in human development. Designed the course syllabus, reading list, and reading packet, taught classes, designed assignments and evaluations, and corrected student work and papers.

JUMPSTART BOSTON, Boston, Massachusetts. Summer, 1997

Supervisor.

Taught a class of kindergarten children who had been recommended to the program for diverse psychosocial and academic difficulties. Supervised the work of college students who were carrying out internships for work with young children.

ACADEMIA ARGÜELLO, Córdoba, Argentina. March 1993-December 1994

English Teacher.

Taught English to seventh grade students in a bilingual school. Developed curriculum, held parent conferences, and prepared progress reports.

NORTHLANDS SCHOOL, Buenos Aires, Argentina. March 1990-December 1992

Kindergarten Teacher.

Taught kindergarten children in a bilingual school. Worked cooperatively with a group of colleagues to create an integrated and project-oriented curriculum, in which projects and workshops were used as a medium for implementing the kindergarten curriculum.

Developed curriculum, held parent conferences, prepared progress reports, and investigated and shared theoretical and practical topics of interest and concern for staff development.

GOBLINS BILINGUAL KINDERGARTEN, Buenos Aires, Argentina. March 1989-December 1989

Kindergarten Teacher.

Taught preschool children in a school committed to bilingual education. Developed curriculum, held parent conferences, and prepared progress reports.

GOBLINS BILINGUAL KINDERGARTEN, Buenos Aires, Argentina. March 1988-December 1988

Teaching Aide.

Served as an aide, working with children ages 3 through 5. Prepared curriculum materials, substituted for teachers, and co-taught certain parts of the curriculum.

RESEARCH EXPERIENCE

TERC, Cambridge, Massachusetts. 1999-2001

Research Associate.

TERC is a research and development organization committed to improving mathematics and science learning and teaching. As a research associate, continued research begun in 1997 with Prof. Schliemann at Tufts University, into a National Science Foundation funded project entitled “Bringing Out the Algebraic Character of Arithmetic”, in which second to fourth graders’ algebraic reasoning and learning are explored through classroom teaching, interviews with children, and meetings with teachers.

HARVARD GRADUATE SCHOOL OF EDUCATION, Cambridge, Massachusetts

Spencer Research Training Fellow. 1999-2000

Developed a research project and carried out clinical interviews with 32 kindergarten children about their ideas about written numbers.

HARVARD GRADUATE SCHOOL OF EDUCATION, Cambridge, Massachusetts

Spencer Research Training Fellow. Mentor: Prof. Jeanne Bamberger (MIT), 1998-1999

Developed a research project whose aim was to explore young children’s understanding and learning of the written number system. Carried out pilot clinical interviews with preschool and kindergarten children, reviewed the literature, and prepared a report.

DEPARTMENT OF EDUCATION, Tufts University, Medford, Massachusetts

Research Assistant. Prof. Analúcia D. Schliemann, 1997-1999

Research funded by the National Science Foundation focused on analyzing young children’s early algebraic reasoning. Interviews with young children, in which they were presented with different types of tasks and problems, were analyzed, focusing on their types of reasoning and on their different uses of notations to solve the tasks. In 1998-1999, the project included leading the mathematics lessons in third grade classrooms once a week together with a team of researchers. Implemented the ideas that we had been developing over the last couple years within the context of the mathematics curriculum and the school requirements, and met with the classroom teacher to go over the work that was done in the classroom.

DEPARTAMENTO DE INVESTIGACIONES EDUCATIVAS, CINVESTAV, México

Visiting Scholar. Mentor: Prof. Emilia Ferreiro, Jan-Feb. 1998

Attended a course on “Theoretical and Practical Problems of Transcription,” participated actively in a Research Seminar and was responsible for one of the weekly presentations. Collaborated in data collection for a research project, reviewed relevant literature and carried out pilot interviews related to my dissertation topic. Presented research to colleagues at the Universidad Autónoma de Querétaro.

HARVARD GRADUATE SCHOOL OF EDUCATION, Cambridge, Massachusetts

Spencer Research Training Fellow. Mentor: Prof. Martha J. García-Sellers (Tufts University), 1997-1998

Participated in the project “A Training Program for Strengthening Interaction Between School and Home,” carrying out an exploratory study of the role of teachers in bilingual classrooms.

EDUCATION SECRETARIAT, MUNICIPALITY OF THE CITY OF BUENOS AIRES, Argentina

Research Assistant. Department of Educational Research, October 1991-December 1992

Analyzed children's writing from a psycholinguistic perspective and developed curricular activities designed to address what children were expressing in their linguistic productions. Participated in the development of workshops for teachers based on the findings of the research.

PROFESSIONAL EXPERIENCE

HARVARD UNIVERSITY GRADUATE SCHOOL OF EDUCATION, Cambridge, Massachusetts

Tutor for the Harvard University - Universidad ORT Uruguay Project. 1996-2000
Project involved the supervision of research projects that Uruguayan graduate students in education were carrying out. Sent detailed feedback to students and local tutors regarding the research projects that they were designing.

EDICIONES MANANTIAL, Buenos Aires, Argentina

Editorial Consultant. 1999

Revised Spanish translations of English language books in the area of education.
Proposed publication and translation of books in the area of education.

HARVARD EDUCATIONAL REVIEW, Cambridge, Massachusetts

Manuscript Editor. 1998-1999

Oversaw the disposition of all solicited and unsolicited manuscripts. Decided on the appropriateness of manuscripts for consideration by the Editorial Board.

HARVARD EDUCATIONAL REVIEW, Cambridge, Massachusetts

Member of the Editorial Board. 1997-1999

Harvard Educational Review is a quarterly journal of educational opinion and research. Selected, edited, and published articles and book reviews.

ACADEMIA ARGÜELLO, Córdoba, Argentina

Psychopedagogue in the Orientation Department. March 1994-December 1994

Worked in the primary (Grades 1 - 7) and kindergarten (ages 4 through 5) levels of a bilingual school. Carried out comprehensive evaluations of children, teachers, classrooms, and families and designed intervention plans with them. Worked together with teachers to adapt their teaching practices and methods in order to address their students' needs, interests, and understandings.

FUNDING

2002

General Electric Math Excellence Fund—"Integrating Algebra and Engineering in the Classroom"—co-PI—\$360,870.

MA Board of Higher Education, Improving teacher quality state grant program—"Leadership program in discrete mathematics"—co-PI—\$95,150.

2003

National Science Foundation, Research on Learning and Education (ROLE) Program—"From Early Algebra to Algebra"—Senior Researcher—\$1,527,925.

Tufts University FRAC program, Faculty Grants-in-Aid—\$1,491.60—"Children Representing Mathematics".

2004

MA Board of Higher Education, Improving teacher quality state grant program—“Problem Solving and Critical Thinking with Discrete Mathematics K-12”—co-PI—\$186,707.

2005

Tufts University FRAC program, Faculty Grants-in-Aid—\$1,456 — “Mapping Our Worlds: Representations of Places and Spaces”.

2006

Tufts University FRAC program, Faculty Grants-in-Aid—\$1,456 —“Young Children’s Numerical Representations”

2007

National Science Foundation, Research in and Evaluation on Education in Science and Engineering (REESE) Program—\$936,229—“The Impact of Early Algebra on Later Algebra Learning”—Principal Investigator.

Tufts University FRAC program, Faculty Grants-in-Aid—\$1,456—“ Building Math: Integrating Algebra and Engineering in Middle School Classrooms”.

2008-2009

Spencer Foundation Grant—\$40,000—“Young Children’s Numerical Representations Across Different Systems”.

2010

National Science Foundation, Math/Science Partnership (MSP) Program—\$9,550,799—“The Poincaré Institute for Mathematics Education”—Senior Researcher.

National Science Foundation, Robert Noyce Teacher Scholarship Program—\$2,130,768—“Urban Mathematics and Science Teacher Collaborative”—Co-Principal Investigator.

2011

National Science Foundation, DRK-12 Program—\$418,086—“Children's Understanding of Functions in Grades K-2”—Co-Principal Investigator.

CONFERENCE PRESENTATIONS

2012:

Paper presented as part of the Symposium Measuring Early Algebra Impact: Quantitative Studies of Children’s Algebra Learning. National Council of Teachers of Mathematics Research Pre-session, Philadelphia, Pennsylvania.

2011:

Brizuela, B. M., & Alvarado, M. (2011, June). *Mathematical representations as tools among early elementary school children*. Paper presented at a symposium at the annual meeting of the Jean Piaget Society, Berkeley, California.

2010:

Alvarado, M., & Brizuela, B. M. (2010, September). *First graders’ work on additive problems with the use of different notational tools: Labeled tables, unlabeled tables,*

and written language. Paper presented at a symposium at the European Association for Research on Learning and Instruction (EARLI), SIG-Writing. Heidelberg, Germany.

Hynes, M., Brizuela, B. M., & Crismond, D. (2010, June). Middle school teachers' use and development of engineering subject matter knowledge: Analysis of three cases. Paper presented American Society for Engineering Education. Louisville, KY.

2009:

Gravel, B. E., & Brizuela, B. M. (2009, April). *Children's multiple representations of their ideas about air*. Paper presented at the American Education Research Association Annual Meeting, San Diego, CA.

Martinez, M., & Brizuela, B. M. (2009, July). *Modeling and proof in high school*. Research report presented at the annual meeting of the International Group for the Psychology of Mathematics Education. Thessaloniki, Greece.

2008:

Brizuela, B. M., & Cayton, G. A. (2008, October). *Interpretación y producción de números en niños de 5 a 7 años de edad a través de diferentes sistemas de representación: análisis factoriales* [Interpretation and production of numbers in 5-7 year old children through different representational systems: Factorial analyses]. Paper presented at the 4th International Conference on Writing, Speech, and Context. Querétaro, México.

Brizuela, B. M., & Cayton, G. A. (2008, July). *First and second graders' spontaneous use of punctuation marks within written numerals*. Short oral presentation at the annual meeting of the International Group for the Psychology of Mathematics Education. Morelia, México.

Cayton, G. A., & Brizuela, B. M. (2008, July). *Relationships between children's external representations of number*. Research report presented at the annual meeting of the International Group for the Psychology of Mathematics Education. Morelia, México.

Huang, W., Brizuela, B. M., & Wong, P. (2008, June). *Integrating Algebra and Engineering in the Middle School Classroom*. American Society for Engineering Education. Pittsburgh, PA.

2007:

Cayton, G. A., & Brizuela, B. M. (2007, July). *First graders' strategies for numerical notation, number reading and the number concept*. Paper presented at the annual meeting of the International Group for the Psychology of Mathematics Education. Seoul, Korea: Seoul National University.

2006:

Brizuela, B. M., & Martinez, M. V. (2006, April). *Fourth graders' understanding of the comparison between two linear functions*. American Educational Research Association Annual Meeting. San Francisco, California.

Martinez, M. V., & Brizuela, B. M. (2006, July). *An unexpected way of thinking about linear function tables*. Paper presented at the annual meeting of the International Group of Psychology of Mathematics Education, Prague, Czech Republic.

2005:

Brizuela, B. M., & Cayton, G. (2005, August). *Young children's external representation of space through spontaneously generated maps*. Poster presented as part of the Poster Workshop "Children's interaction with external representations" convened by Eduardo Martí and Annick Weil-Barais. XIIth European Conference on Developmental Psychology Submission, Tenerife, Islas Canarias, Spain.

2003:

Brizuela, B. M., & Earnest, D. (2003, April). *Multiple notational systems and algebraic understandings*. Paper presented at the symposium "Early algebra: Asking the right questions", at the annual meeting of the American Educational Research Association (AERA), Chicago, IL.

Brizuela, B. M., & Schliemann, A. D. (2003, July). *Fourth graders solving equations*. Paper presented at the annual meeting of the International Group of Psychology for Mathematics Education (PME), Hawaii.

Schliemann, A. D., Carraher, D., Brizuela, B. M., Earnest, D., Goodrow, A., Lara-Roth, S., & Peled, I. (2003, July). *Algebra in elementary school*. Paper presented at the annual meeting of the International Group of Psychology for Mathematics Education (PME), Hawaii.

2002:

Schliemann, A. D., Carraher, D. W., & Brizuela, B. M. (2002, October). *From unknown amounts to representing variables*. Paper presented at the annual meeting of the North American Chapter of Psychology of Mathematics Education (PME-NA), Athens, Georgia.

2001:

Brizuela, B. M., & Lara-Roth, S. (2001, December). *Additive relations and function tables*. Paper presented at the 12th ICMI meeting entitled "The Future of the Teaching and Learning of Algebra", The University of Melbourne, Australia.

Carraher, D., Brizuela, B. M., & Earnest, D. (2001, December). *The reification of additive differences in early algebra*. Paper presented at the 12th ICMI meeting entitled "The Future of the Teaching and Learning of Algebra", The University of Melbourne, Australia.

Carraher, D., Brizuela, B. M., & Earnest, D. (2001, April). *The reification of differences*. Paper presented at the annual NCTM meeting, Orlando, Florida.

Carraher, D., Schliemann, A. D., & Brizuela, B. M. (2001, July). *Can young students operate on unknowns?* Paper prepared for a research forum at the annual PME conference, Utrecht, The Netherlands.

Schliemann, A. D., Carraher, D., & Brizuela, B. M. (2001, July). *When tables become function tables*. Paper presented at the annual PME conference, Utrecht, The Netherlands.

2000:

Brizuela, B. M., Carraher, D., & Schliemann, A. D. (2000, April). *Mathematical notation to support and further reasoning ("to help me think of something")*. Paper presented as part of the research symposium "Research on Algebra in the Elementary Years" at the

National Council of Teachers of Mathematics (NCTM) Research Pre-session, Chicago, IL.

Brizuela, B. M., Schliemann, A. D., Carraher, D. (2000, July). *Notations as representations of algebraic thinking and as a tool for algebraic learning*. Paper presented at the ICME conference, Tokyo, Japan.

Carraher, D., Brizuela, B. M., Schliemann, A. D. (2000, July). *Bringing out the algebraic character of arithmetic: Instantiating variables in addition and subtraction*. Paper presented at the ICME conference, Tokyo, Japan.

Carraher, D., Brizuela, B. M., Schliemann, A. D. (2000, July). *Bringing out the algebraic character of arithmetic: Instantiating variables in addition and subtraction*. Paper presented at the PME conference, Hiroshima, Japan.

Schliemann, A. D., Carraher, D., Brizuela, B. M. (2000, April). *From quantities to ratio, functions, and algebraic relations*. Paper presented at the annual meeting of the American Educational Research Association (AERA), New Orleans.

1999:

Brizuela, B. M. (1999, June). *Children's construction of the written number system*. Paper presented at a symposium at the annual meeting of the Jean Piaget Society, Mexico City.

Carraher, D. W., Schliemann, A. D., & Brizuela, B. M. (1999, April). *Bringing out the algebraic character of arithmetic*. Paper presented at a symposium at the annual meeting of the American Educational Research Association (AERA), Montreal, Canada.

del Prado Hill, P., & Brizuela, B. M. (1999, April). *Students' Constructions of Social Class*. Paper presented at a symposium at the annual meeting of the American Educational Research Association (AERA), Montreal, Canada.

1998:

Brizuela, B. M. (1998, July). *Children's construction of the written number system*. Poster presented at the biennial meeting of the International Society for the Study of Behavioral Development (ISSBD), Bern, Switzerland.

del Prado Hill, P., & Brizuela, B. M. (1998, February). *Students' constructions of social class*. Roundtable presentation at the Third Annual Student Research Conference, Harvard Graduate School of Education, Cambridge, MA.

Schliemann, A.D., Calderone, T., Pendexter, W., & Brizuela, B. M. (1998, July). *Algebraic notation and problem solving: Help or hindrance*. Paper presented at the biennial meeting of the International Society for the Study of Behavioral Development (ISSBD), Bern, Switzerland.

1997:

Brizuela, B. M. (1997, December). *El rol de las invenciones en la interpretación de notaciones matemáticas en los niños*. Paper presented at the Symposium in honor of Hermine Sinclair, Mexico City, Mexico.

Brizuela, B. M. (1997, April). *Facilitating school adaptation: An intervention study with Hispanic immigrant children*. Poster presented at the biennial meeting of the Society for Research in Child Development (SRCD), Washington, DC.

Brizuela, B. M. (1997, March). *Teaching-learning-research: Extended clinical interviewing as a context for exploring*. Paper presented in a symposium at the Second Annual Student Research Conference, Harvard Graduate School of Education, Cambridge, MA.

1996:

Brizuela, B. M. (1996, August). *Inventions and conventions in children's understanding of place value*. Poster presented at the biennial meeting of the International Society for the Study of Behavioral Development (ISSBD), Québec City, Canada.

MASTERS THESIS SUPERVISED (AS COMMITTEE CHAIR)

Tufts University—completed thesis:

Dan Barber—School Satisfaction: A Comparison of High School Students. 2003

Erin Cejka—Inservice Teachers' Approaches to Open-Ended Engineering Design Problems and the Engineering Design Process. 2005

Daniel Cogan-Drew—Do You See What I See? Using Video To Foster Pre-Service Teachers' Observation of Classroom Events. 2005

Elsa Head—STOMP Teachers. 2011

DOCTORAL DISSERTATIONS SUPERVISED (AS COMMITTEE CHAIR)

Tufts University—completed dissertations:

Mara V. Martinez — Integrating Algebra And Proof In High School: Student Work With Variables And Parameters On The Calendar Sequence. 2008. (Assistant Professor at University of Illinois at Chicago, Department of Mathematics, Statistics, and Computer Science.)

Gabrielle A. Cayton — Young Children's External Representations Of Number. 2008. (Associate Research Scientist at Educational Testing Service, Princeton, NJ.)

Morgan Hynes — Teaching Middle-School Engineering: An Investigation Of Teachers' Subject Matter And Pedagogical Content Knowledge. 2009. (Research Assistant Professor at Tufts University's Center for Engineering Education and Outreach.)

Merredith D. Porstmore — Exploring How Experience With Planning Impacts First Grade Students' Planning and Solutions to Engineering Design Problems. 2009. (Research Assistant Professor at Tufts University's Center for Engineering Education and Outreach.)

Araceli Martinez Ortiz—Fifth grade students' understanding of ratio and proportion in an engineering robotics program. 2010. (Director of Educator Quality, P-16 Initiatives, Texas Higher Education Coordinating Board.)

Jason Kahn—"I remember when we stayed still and the computer still made lines": Young children's invented and conventional representations of motion. 2010. (Research Associate at Children's Hospital, Boston.)

Brian Gravel—Elementary students' multiple representations of their ideas about air. 2011. (Lecturer/Director in STEM Elementary Education at Tufts University.)

Christopher Wright—Learning to "see" sound: An investigation into the intellectual and linguistic resources that urban middle school African American boys utilize in the practice of representing sound transmission. 2011. (Post-doctoral fellow at TERC, Cambridge, MA.)

Camille Burnett-Bradshaw—Eleventh Graders’ Understandings Of Mathematical Functions. 2011. (Research Associate at the Kaput Center for Research and Innovation in STEM Education, University of Massachusetts at Dartmouth.)

SERVICE

University-based:

- Member of the Math, Science, and Technology/Engineering Education program. This has involved attending meetings, reading proposals, and being a part of a faculty search committee.
- Graduate School Policy and Programs committee member.
- Institutional Review Board, Social, Behavioral, and Education Research committee member.
- Learning Outcomes Assessment Committee.

EDITORIAL BOARDS

- Editorial Board, Revista IRICE, Instituto Rosario de Investigaciones en Ciencias de la Educación (CONICET, equivalent of NSF in Argentina), Rosario, Santa Fé, Argentina. 2010-ongoing.
- Associate Editor, Revista Infancia y Aprendizaje. 2011-ongoing.

REVIEWER

JOURNALS

- Child Development
- Cognition and Instruction
- Developmental Psychology
- Early Childhood Research Quarterly
- European Journal of Psychology of Education
- Infancia y Aprendizaje
- Journal for Research in Mathematics Education
- Mathematical Thinking and Learning
- Revista IRICE

BOOKS

- Reviewer for book *Representational systems and practices as learning tools in different fields of knowledge*, Sense Publishers. Editors: Christopher Andersen, Nora Scheuer, María Puy Pérez Echeverría, and Eva Teubal.
- Reviewer for book *Developing Essential Understanding of Algebraic Thinking for Teaching Mathematics in Grades 3-5* published by National Council of Teachers of Mathematics.

NATIONAL SCIENCE FOUNDATION

- REESE Panel, April 2007
- DRK-12 Panel, March 2008

CONICET (Argentina)

- Outside evaluator for the assessment of researchers wishing to enter into the “Researcher Career” (Concurso de Ingreso a la Carrera del Investigador) in CONICET (equivalent of NSF), Argentina.

ADVISORY BOARDS

2009-ongoing: NSF funded “Math Core for Museums”. Collaboration among: Science Museum of Minnesota, North Carolina Museum of Life and Science, San Diego State University, Museum of Science, Explora Museum in Albuquerque New Mexico, and TERC.

2009-2012: NSF funded “Creation and Dissemination of Upper-Elementary Mathematics Assessment Modules”. PI: Heather Hill, Harvard Graduate School of Education.

INSTITUTIONAL AFFILIATIONS

International Group for the Psychology of Mathematics Education.

LANGUAGES

Bilingual in Spanish and English

Fluent in oral and written French

COUNTRIES LIVED IN

Argentina, Ecuador, México, United States, Venezuela