

# REPORT ON CHAIR/FRAC LEAVE

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January, 2003 to December, 2003

## Books:

Schliemann, A.D., Carraher, D.W., & Brizuela, B. (under final revision). Bringing Out the Algebraic Character of Arithmetic: From Children's Ideas to Classroom Practice. Studies in Mathematical Thinking and Learning Series. Lawrence Erlbaum Associates. Accepted for publication by the Series Editor. Book contract signed.

## Articles and Presentations:

### Articles in Refereed Journals:

Brizuela, B.M., & Schliemann, A.D. (accepted for publication). Fourth graders solving equations. For the Learning of Mathematics (refereed).

Carraher, D., Schliemann, A., & Brizuela, B. (in press). Early Algebra, Early Arithmetic. In D. Carraher & R. Nemirovsky (Eds.) Media and Meaning. Monographs of the Journal for Research in Mathematics Education (refereed).

Carraher, D., Schliemann, A., & Brizuela, B. (revised and resubmitted). The Relationships between Arithmetic and Algebra in Early Mathematics Education. Journal for Research in Mathematics Education (refereed).

Schliemann, A.D., Carraher, D.W., Brizuela, B.M., Earnest, D., Goodrow, A., Lara-Roth, S. & Peled, I. (in preparation). Algebra in elementary school. Educational Studies in Mathematics. [Expanded version of Congress Presentation: one of the 18 (out of 176) research papers presented at the 27<sup>th</sup> Psychology of Mathematics Education Conference and chosen to be part of a special issue of this journal.]

### Book Chapters and Conference Proceedings:

Brizuela, B.M., & Schliemann, A.D. (2003). Fourth graders solving equations. Proceedings of the 27<sup>th</sup> International Conference for the Psychology of Mathematics Education, Vol. 2, pp. 137-144. University of Hawai'i, Honolulu, HI, July, 2003.

Carraher, D.W. & Schliemann, A.D. (in preparation). Ten-Year Olds Comparing Two Functions. In J. Kaput, D. Carraher, & M. Blanton (Eds.), Studies of Early Algebra.

Earnest, D. & Schliemann, A.D. (submitted). The dots problem: Third graders working with functions. Proceedings of the 28<sup>th</sup> International Conference for the Psychology of Mathematics Education.

Goodrow, A. & Schliemann, A.D. (2003). Linear function graphs and multiplicative reasoning in elementary school. Proceedings of the 27<sup>th</sup> International

- Conference for the Psychology of Mathematics Education. University of Hawai'i, Honolulu, HI, July, 2003.
- Nunes, T., Schliemann, A.D. & Carraher, D. (in press). Mathematics in the streets and in schools. In T. Carpenter, J. Dossey, & J., Koehler (Eds.) Classics in Mathematics Education Research (Vol. 1). Reston, VA: National Council of Teachers of Mathematics. (Original paper published in 1985, British Journal of Developmental Psychology)
- Schliemann, A.D., Carraher, D.W., Brizuela, B.M., Earnest, D., Goodrow, A., Lara-Roth, S. & Peled, I. (2003). Algebra in elementary school. Proceedings of the 27<sup>th</sup> International Conference for the Psychology of Mathematics Education, Vol. 4, pp. 127-134. University of Hawai'i, Honolulu, HI, July, 2003.

### **Conference Presentations:**

- Brizuela, B.M., & Schliemann, A.D. (2003). Fourth graders solving equations. 27<sup>th</sup> International Conference for the Psychology of Mathematics Education, Honolulu, HI, July, 2003.
- Carraher, D. & Schliemann, A. (2003). Algebra in Early Arithmetic. Workshop for teachers. 2003 National Council of Teachers of Mathematics Meeting. San Antonio, TX, April 2003.
- Carraher, D.W & Schliemann, A.D. (2003). Ten-Year Olds Comparing Two Functions. Fifth Meeting of the Early Algebra Group. Honolulu, HI, July, 2003.
- Goodrow, A. & Schliemann, A.D. (2003). Linear function graphs and multiplicative reasoning in elementary school. 27<sup>th</sup> International Conference for the Psychology of Mathematics Education. Honolulu, HI, July, 2003.
- Schliemann, A.D. & Goodrow, A. (2003). Function graphs and multiplicative structures in third grade. 2003 Meeting of the American Educational Research Association. Chicago, IL, April.
- Schliemann, A.D., Carraher, D.W., Brizuela, B.M., Earnest, D., Goodrow, A., Lara-Roth, S. & Peled, I. (2003). Algebra in elementary school. 27<sup>th</sup> International Conference for the Psychology of Mathematics Education, Honolulu, HI, July, 2003.

### **CDs with videos and analysis of research data:**

Development of the updated version of six CDs with lesson plans, captioned videos, student work, and research papers produced as a result of the NSF Grant # 9909591, Bringing Out the Algebraic Character of Arithmetic, for distribution to teachers and researchers:

- TERC - Tufts Early Algebra Early Arithmetic Group (2003). Variables: The Candy Box Problem. CD for Teachers with lesson plans, captioned videos, student work, and research paper. Cambridge, MA.
- TERC - Tufts Early Algebra Early Arithmetic Group (2003). Number Lines. CD for Teachers with lesson plans, captioned videos, student work, and research paper. Cambridge, MA.
- TERC - Tufts Early Algebra Early Arithmetic Group (2003). Operating on Unknowns: The Piggy Bank Problem. CD for Teachers with lesson plans, captioned videos, student work, and research paper. Cambridge, MA.

TERC - Tufts Early Algebra Early Arithmetic Group (2003). Comparing Functions. CD for Teachers lesson plans, captioned videos, student work, and research paper. Cambridge, MA.

TERC - Tufts Early Algebra Early Arithmetic Group (2003). Graphs. CD for Teachers with lesson plans, captioned videos, student work, and research paper. Cambridge, MA.

TERC - Tufts Early Algebra Early Arithmetic Group (2003). Equations. CD for Teachers with lesson plans, captioned videos, student work, and research paper. Cambridge, MA.

## **Research and Grants:**

### Bringing Out the Algebraic Character of Arithmetic

National Science Foundation, Research on Education Policy and Practice (REPP) Program, awarded to TERC and Tufts University (Grant # 9909591) Jan 01, 2000 to Dec. 31, 2003.

Total award: \$ 1,025,713 (Tufts sub-contract: \$407,872)

As Co-PI of this project I participated in the final data analysis and in the development of the final report to NSF. The report was approved by NSF officers. A series of papers and congress presentations on data from this project were developed in collaboration with the research team (see above).

### Algebra in Early Mathematics

National Science Foundation, Research on Learning (ROLE) Program, awarded to TERC and Tufts University (Grant # 0310171)

Total amount awarded: \$1,527,925. Tufts sub-contract: \$703,417.

July 2003 to June 2006.

As Co-PI of this project I participated in the design, implementation, and data collection of 24 Early Algebra 60-minute lessons and 24 30-minute review of homework activities, in two third grade classrooms in a Boston Public School.

### Center for Model Learning

PI of grant proposal presently under review: Coordinated and substantially contributed to the development of the pre-proposal (approved by NSF-Centers for Learning and Teaching Program in November 2003) and the full proposal (submitted in February 2004). The proposed amount of nearly \$10,000,000.00 will support collaboration across Tufts, MIT, TERC, BU, Princeton, CalState, and other institutions and centers for the development of research and the preparation of teachers and researchers in the Tufts MAT, MS, and PhD programs in Mathematics, Science, Technology, and Engineering Education.

### Fulcrum Institutes for Online Science Learning

Deeply involved in the development of grant proposal by faculty in the Department of Education and the Department of Physics and Astronomy, in partnership with TERC. The proposal was submitted on December 2003 to the NSF Math Science Partnership Program (about \$5,000,000).

## **Other activities:**

Participation in the implementation of the Graduate Program (M.S. and Ph.D.) in Mathematics, Science and Technology/Engineering Education at Tufts University, approved by Tufts University in January 2003.

Participation in Masters and Ph.D. Committees:

- (a) Advisor and Chair of Interdisciplinary Ph.D. Dissertation Committee for Tracy Noble.
- (b) Advisor and Chair of Dissertation Committee of Joan Martin, PhD Program in Mathematics, Science, Technology, and Engineering Education.
- (c) Member of Ph.D. Dissertation Committee of Susanna Lara-Roth, Tufts University Department of Child Development.
- (d) Member of Ph.D. Dissertation Committee of Ellen Boiselle, Tufts University Department of Child Development.
- (e) Member of Ed.D. Committee of Mary Jane Schmitt, Harvard Graduate School of Education.

Chair of Faculty Search Committee for position in Science Education.

Organization of Colloquium presentation by Irit Peled (University of Haifa, Israel). Tufts University, April 2003.

Member of the Editorial Board for the American Educational Research Journal.

Member of the Editorial Board for the European Journal of Psychology of Education.

Participation in NSF panels for the MSP and TPC programs.

Participation in the NIH panel for Cognition and Learning Program.