

SUPPORTING MATHEMATICAL LITERACY FOR KINDERGARTEN CHILDREN AT-RISK

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Children entering first-grade are expected to solve written addition and subtraction exercises early in the school year. Therefore, the quality of informal number knowledge which the children bring from kindergarten prepares them for initial success or frustration with school mathematics. Evidence has been found for differences in informal arithmetic understandings by kindergarten children from different socio-economic backgrounds (Ginsburg, Klein, & Starkey, 1998). A research-based program was introduced by our staff to enhance the development of mathematics in a group of children of immigrants, identified as being at-risk for school failure.

The program provided informal instruction to small groups of children, an hour a week per group of four children, including structured game-based activities for all four, or for two, three, or one child. The teachers were advised how to extend these activities over the week.

The project included up to 115 children each year in 16 kindergartens. The children participated in an initial interview with tasks of counting, identifying numerals and using a mental number line, knowledge critical for developing understanding of addition and subtraction (Griffin, Case, & Siegler, 1995). Data from the interviews were updated regularly for an "on-line" assessment of the children's progress. The staff was engaged in a continuous process of examining together the children's thinking about numbers, and exchanging ideas for appropriate activities to most effectively match the children's development. The project was an adaptation of the "Classroom conceptual research" model of Fuson, Sherin, & Smith (1998).

Results at the end of each year (May, 2000 and May, 2001) showed significant improvement in the children's arithmetic knowledge. A follow-up is planned to record the children's experience in first-grade.

Fuson, K. C., Sherin, B., Smith, S. (1998). A Vygotskian action-research model for developing and assessing conceptual models and instructional materials inter-actively. In S. Berenson, et al (Eds.) *Proceedings of the 20th Annual Meeting of PME-NA*. Columbus, OH:ERIC.

Ginsburg, H.P., Klein, A., & Starkey, P. (1998). The development of children's mathematical thinking: Connecting research with practice. In W. Damon, I.E. Sigel, & K. A. Renninger (Eds.), *Handbook of child psychology (5th Edition)*, *Child psychology in practice* (Vol.4, pp.401-476). New York: Wiley.

Griffin, S., Case, R., & Siegler, R.S. (1995). Rightstart: Providing the central conceptual prerequisites for first formal learning in arithmetic to students at risk for school failure. In K. McGilly (ed.), *Classroom lessons: Integrating cognitive theory and classroom practice*. Cambridge, MA: MIT Press.