

SUPPORTING VISUAL SPATIAL REPRESENTATIONS IN BUILDING EARLY NUMERACY

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Over the past decade there has been increased interest in the role of imagery in developing mathematical understanding. Studies (e.g. Cruz, Febles, & Díaz, 2000) explore the use of visual imagery in solving mathematical problems, both numeric and geometric, and challenge learning models that do not adequately account for mathematical conceptions that are more spatially based. As recognition of this, various assessments of young children's early number development have incorporated the assessing and supporting of visual image-making (e.g. The Early Numeracy Research Project of Victoria, Australia; The British Columbia, Canada Early Numeracy Project).

Our work with the British Columbia Early Numeracy Project [ENP] provides us with a valuable context to analyze: 1) children's developing visual mental imagery and 2) how teachers support their students' numeracy development through visual imagery tasks. The ENP has involved sixteen teachers and their students from five school districts, including rural and urban schools, across the province to develop assessment tasks and instructional resources on four aspects of early numeracy: mathematical disposition, number skills, number concepts, and spatial thinking.

Analyzing data collected through teachers' one-to-one performance assessment interviews with approximately 200 students (twenty-one of these video-taped) we map out student responses and representations to two of these tasks. Through interviews with all 16 project teachers and other teachers now using the ENP assessment and resource materials we find that teachers are particularly surprised and intrigued at learning more about how their students are using visual images, making mental representations, and designing transformation to solve problems. Teachers report being able to recognize their students' mathematical thinking in a new way. However, although interested, only a few teachers have reported actively exploring how they might use what they've learned about their students' visual image making to support numeracy development.

Results of this study are significant in that they provide us with portraits of how young children use visual mental representation to solve problems and what teachers' think about their students' strategies together with the implications this has for practice. Digital video images of students' working on the tasks, visual mappings of student responses, and excerpts from teachers' analysis of their students and their participation in the project will be displayed.

References:

Crez, I., Febles, M., & Díaz, J. (2000). Kevin: A visualiser pupil. *For the Learning of Mathematics*, 20(2) 30-36.