

Enriching Mathematics Education

By Dr. Paul Betts

I believe that teachers' professional learning is facilitated by collaborative processes grounded in teachers' actual practice. Lesson study, a model of professional learning that is commonly practiced in Japan, is one such model that exhibits these qualities. Teachers work together by planning and observing each other's lessons, and then they use this information individually to refine their own lessons.

In my research, I have considered the importance of safe and critical collaborations in teachers' professional learning. I have found that the teacher's identity is a very important factor in relation to mathematics instruction. For example, a teacher may position herself as a confident problem solver, and so this quality is privileged when she is developing mathematics teaching practices. The importance of teacher identity complicates current calls for mathematics teachers to know mathematics more deeply. Professional learning of mathematics teaching cannot be viewed as a universal adoption of effective mathematics teaching practices because the identity of teachers varies with each individual and this identity matters a great deal.

Of particular interest to me is the potential of lesson study as a model for sustaining richer professional learning opportunities for K–8 mathematics teachers. In tension with various calls for the increased professional knowledge of teachers, I maintain that professional learning is an act of identity making within a social context, rather than merely an opportunity to learn more information about teaching. My work in teacher education is ongoing and currently is focused

on pre-service education structures that enhance the learning experiences of teacher candidates.

Other projects that I have pursued in the last 10 years include participation in CRYSTAL-funded research, in partnership with a Manitoba First Nation, to explore the intersection of mathematics learning outcomes with Aboriginal cosmology. In this work, the ancient holistic understandings of various Aboriginal cosmologies are seen as synchronous with ultramodern learning theories that are built around complexity and chaos theory. When learning and education are seen as embedded, interacting systems, one must then question the idea that teaching is a linear set of practices.

I have also worked with gifted high school students concerning their perceptions of the nature of mathematics. Gifted high school students are able to make sense of, critique, and debate various and contrary epistemological theories of the nature of mathematics. One of the main findings of this work is that the identity of learners is intricately tied up with their sense making and positioning. For example, those who tend to view mathematics negatively within their personal experiences tend to favour non-absolutist formulations of the nature of mathematics.

Inspired by my close work with teachers in schools, I am currently working on how teachers can help children who struggle to learn mathematics. Although evidence is emerging on the various cognitive mechanisms that may account for a (mathematical) learning disability or for a child's difficulty to

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learn mathematics, this clinical work provides little pedagogic guidance for teachers to help children. My work specifically aims to bridge the gap between clinical work and the needs of teachers by investigating possible interventions that could be implemented

within regular classroom settings to help children who struggle to learn mathematics.

My work as a teacher at the University of Winnipeg includes course work in Early and Middle Years math teaching methods and general teaching methods. Specific to mathematics, the main goals include developing non-linear and heuristic understandings of problem solving and ways to teach them. They also include providing students with rich representations of number (which they need to develop number sense) and mitigating against math anxiety. In general, I focus on building theoretical teaching ideas from practical experiences.

Profile **Dr. Paul Betts**

Dr. Paul Betts has worked at the University of Winnipeg since 2003, where he is currently an Associate Professor in the Faculty of Education. Prior to coming to Winnipeg, he taught at Brandon University for four years while working on a Ph.D. at the University of Regina. He also taught Grades 1/2, 7/8, and 9 to 13 mathematics and science for seven years in both Manitoba and Ontario. He received his B.Ed. from York University, specializing in junior high and high school teaching of mathematics and science. He also

earned an H.B.Sc. (math major, chemistry minor) and a Master's in Mathematics while at York University in the late 1980s and early 1990s.

Paul completed a Ph.D. in mathematics education in 2005. His dissertation concerned the identity making of teacher candidates while working to understand the nature of the mathematics that they will teach in elementary school. This work in pre-service teacher education has served as a foundation for several research projects considering teacher education for pre-service, beginning, and in-service teachers.

