

THE CONTRIBUTIONS OF NON-CARTESIAN PHILOSOPHIES OF MATHEMATICS TO WESTERN MATHEMATICAL EDUCATION INSTRUCTION

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Cartesian mind/body dualism is foundational in Western mathematics teaching and learning. My dissertation explores the possible existence of non-Cartesian ontologies and how these affect mathematical conceptualization. Are there other ways of perceiving and understanding mathematics? And, if so, how can these be used to restructure mathematics' teacher education and, therefore, classroom learning?

My dissertation question concerns the existence of Cartesian dualism, i.e. is Rene Descartes philosophical argument that the mind and body are two distinct entities. Most of Western philosophical and mathematical thought is based on this supposition. But what if the mind and body are philosophically one unit? Would this affect how we teach and learn mathematics in our schools because it would affect our perception of reality? For instance, some Native Americans see form and object as process based reflecting a world of continuous, non-atomistic change. This differs from Western thought that sees form and object as things, referring to an atomistic world view. Moreover, is space only space, or is space really space-time in that it exists only in relation to a flow of events? Does our world view affect our mathematical epistemologies, and, therefore, how we teach and learn mathematics in their schools? Or is it the other way around? What can we learn about how to teach mathematics from it through an alternative lens?

Recent philosophical mathematical inquiries into this topic include research in cognitive science, intuitive learning acquisition, number spiritualization, and artificial intelligence, i.e. computers with 'embodied minds'. My dissertation research begins with an investigation of these theories in light of my previous studies in philosophy, and maths and science education. I include an exploration of autobiographies of Western, Eastern and Native American people, examining their accounts of how they learn and/or teach mathematics. Further research looks at the Japanese Buddhist philosophies (including the Kyoto School) on the issues of mind/body dualism, and how

this influences mathematical conceptualization. There is a growing body of research on this topic in physics, especially concerning proofs of Einstein's theories of space, time and relativity. I will form my own hypotheses based on this research.

My qualitative research includes on-site research at a Native American reservation with community controlled public schools, and those with non-community controlled schools. What qualifies as learning in each school? What is the measure of success for teacher and student? What is the measure of success for the state education administration? My quantitative research includes comparative multi-level analyses of school test scores from community and non-community controlled Native American public schools. Are there correlations between what the schools believe they are teaching and, the state and national standards? Is this a reflection of different mathematical epistemologies at work in the classroom? Are these epistemologies a reflection or rejection of Cartesian mind/body dualism? This research will give me the comparative data that I need to either prove or disprove my hypotheses. The outcome will inform future mathematics teacher education because contributes to the discourse on how we think, learn and teach mathematics.