

# THE TEACHING AND LEARNING OF GEOMETRIC PROOF: AN EMERGING THEORY<sup>4</sup>

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Our work addresses the need for research connecting pedagogical factors to the learning of geometric proof (Herbst, 2002; Martin & McCrone, in press). In particular, we explore the following question: What relationships exist among social, psychological, and pedagogical factors in the development of proof understanding?

The theoretical lens through which we view the data is the emergent perspective as described by Cobb and Yackel (1996). Student ability to develop proofs is seen as constructed on both a psychological level and a social level, including social norms, sociomathematical norms, and classroom mathematical practices (Cobb & Yackel, 1996). We also focus on teachers' pedagogical choices (Martin & McCrone, in press) and their role in influencing student understanding.

Results presented in this paper are based on classroom observations from two proof-based geometry classes (one standard, one honors) taught by two different teachers in two large high schools in the mid-western United States as well as clinical interviews in which focus students discussed their responses on a written Proof Construction Assessment (McCrone & Martin, 2002) as well as to new tasks posed in the interview.

In a process similar to Cobb and Whitenack (1996), we developed themes to explore connections among pedagogical choices, classroom microculture and psychological factors related to proof understanding. These themes were: *student reasoning*, *proof modeling and assessment*, and *establishment of shared understandings*. Focusing on these themes led us to identify potentially salient features of teacher's practice. For example the choice to emphasize the production of a correct final product (proof) left many students ill-equipped to handle independent reasoning. However, when student reasoning took place during class, students appeared to be better able to construct proofs independently.

## References

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