Statistics has achieved a position of status in the secondary curriculum (College Board, 2006b; Franklin et al., 2007; NCTM, 2000) and understanding of statistics is essential for high school mathematics teachers if they are to engage students in thoughtful pursuit of statistical ideas. High school teachers typically are ill-prepared in the area of statistics (Ben-Zvi & Garfield, 2004a; CBMS, 2001; Shaughnessy, 1992, 2007). Using methods of design research, this study investigated 56 high school mathematics teachers’ understanding of the statistical concept of comparing distributions and demonstrated that a modest four-day, statistics-oriented, technology-rich, professional development program may significantly improve teachers’ understanding.

Comparing distributions was broadly conceived to encompass a triadic, multidirectional relationship between the statistical concepts of distribution, variability, and sampling distributions. Innovative statistical professional development materials for high school mathematics teachers were constructed and implemented, and the efficacy of the professional development was examined through coordinating analyses of written pre/post-content assessments, pre/post-interviews, written teacher reflections, and professional development video artifacts. In addition to improved statistical content knowledge, teachers developed facility with dynamic statistical technology (CPMP-Tools
and Fathom2) and resampling approaches to statistics. Teachers participated in a reflective, learner-centered classroom environment with the potential to impact their own teaching practices. More broadly, the results of this study have implications for professional development of in-service mathematics teachers, pre-service teachers’ statistical education, and the education of secondary students.