Developing statistical inquiry:

Prospective secondary math and science teachers' investigations of equity and fairness through analysis of accountability data

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Concerns about equity in the ways that schools are using the data from the results of their students' state-mandated exams (Confrey & Makar, in press) prompted this mixed-method study, based on the model of Design Research (Cobb et al., 2003). The study was conducted to provide insight into the ways that understanding of the statistical concepts of variation and distribution, developed in the context of learning about equity and assessment, can allow prospective teachers to broaden their understanding of equity and gain experience with conducting an inquiry of an ill-structured problem through the use of data generated by high-stakes tests to investigate equity and fairness in the accountability system. The study took place in an innovative one-semester course for preservice teachers designed to support and develop understanding of equity and fairness in accountability through data-based statistical inquiry (Confrey, Makar, and Kazak, 2004). The prospective teachers' investigations were conducted using Fathom Dynamic Statistics (Finzer, 2001), a learning software built for novice data analysts which emphasizes visualization and building inferential thinking through highlighting relationships between multiple variable displays. Semi-structured investigations during the course led up to a three-week self-designed

inquiry project in which the prospective teachers used data to investigate an area of interest to them about equity in accountability, communicating their findings both orally and as a written paper.

Results from the study provide insight into prospective teachers' experiences of conducting inquiry of ill-structured problems and their struggle with articulating beliefs of equity. The study also reports how statistical concepts documented in structured settings showed that the subjects developed rich conceptions of variation and distribution, but that the application of these concepts as evidence in their inquiry of an ill-structured problem was more challenging for them. No correlation was found between the level of statistical evidence in the structured and open-ended inquiry settings, however there was a significant correlation between prospective teachers degree of engagement with their topic of inquiry and the depth of statistical evidence they used, particularly for minority students. Implications and suggestions for improving the preparation of teachers in the areas of statistical reasoning, inquiry, equity, and interpreting assessment data are provided.