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Teacher Qualifications and Student Math Achievement in Secondary Schools: An Exploratory Study

Abstract

Researchers have established that teacher quality is one of the most important factors in student academic success. Questions remain, however, about how qualifications of the most effective teachers lead to improved teaching and learning for academically vulnerable student populations. Previous studies have shown that certain teacher qualifications do seem to predict the achievement of populations of students who are academically at risk for mathematics failure, such as those with disabilities (Feng & Sass, 2013) and English Language Learners (ELLs; Betts, Zau, & Rice, 2003). Further, findings from several studies suggest that teachers' qualifications may work in concert with each other to predict student achievement. These studies have demonstrated interactions between such variables as experience and certification in predicting student achievement. However, none of these studies examined how typologies of teacher qualifications impact the mathematics achievement of students from traditionally low-achieving subpopulations. In addition, researchers have not attempted to examine the relative importance of teacher qualifications variables in predicting students' mathematics achievement.

Therefore, this study aims to use detailed administrative data on teachers and students from the state of North Carolina to identify homogeneous, mutually exclusive teacher qualification typologies, and examine the effect of these typologies on the mathematics learning gains of traditionally low-performing secondary school students such as students with disabilities, ELLs, and other low-achieving students. The study is also designed to identify which variable representing teacher qualifications is the most predictive of student learning. Accordingly, the study will include three separate analytical procedures including (a) Latent Class Analysis (LCA), to identify teacher quality typologies, (b) education production function models with random and fixed effects, to estimate "value-added" models that relate student math scores to teacher qualification typologies, and (c) Random Forest Regression (RFR), to determine variable importance. In addition, implications for education policy as well as limitations of the current study will be discussed and directions for future research will be offered.