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Gary Olson, Amber Gardner, Amy Smith and Xin Wang. *Cartesian Graphs, Covariational Reasoning, and Powerful Positioning in College Algebra.*

Cartesian graphs are ubiquitous, yet students can face challenges conceiving of those graphs as representing relationships between attributes that are capable of varying and possible to measure (covariational reasoning). If students experience math instruction as a compliance driven pursuit of answers, they may miss opportunities to engage in covariational reasoning. We report results of a longitudinal study, conducted at an urban public university in the Midwest, across all sections of College Algebra (500 students) during three consecutive semesters. We implemented a three part intervention: Provide students with innovative online graphing activities (Techtivities); Foster instructors' examination of their power to impact students' learning opportunities; Measure students' covariational reasoning via a fully online, validated assessment. Instructors volunteered to participate in the study. Students in treatment sections received both the Techtivities and the assessment; students in comparison sections received the assessment only. Our findings revealed statistically significant differences between treatment and comparison students' covariational reasoning. We discuss implications for systemic efforts to promote students' covariational reasoning in introductory math courses. (Received September 17, 2019)