The overall goal of Data Connections is to develop, refine, and disseminate statistical models that develop a coherent picture of mathematics teaching and learning, particularly in regard to MSP programs.

Our research is intended to inform the MSP community—including PIs, evaluators, educational researchers, professional developers, K-12 educators & administrators, and policy makers—about the appropriate uses of VAMs to measure the impact of MSPs.

Value-Added Modeling (VAM) Techniques
- Estimate contribution of educational factors to growth in achievement, while controlling for effect of non-educational factors
- Potential to identify characteristics of highly effective teachers
- Require a single developmental scale and quality longitudinal data

Layered Value-Added Models
- Utilize incomplete student records for efficient use of available data
- Model relationship between multiple test scores on same student
- Potential to identify characteristics of highly effective teachers
- Including PIs, evaluators, educational researchers, professional developers, K-12 educators & administrators, and policy makers

Layered Value-Added Models
- Assumed in current VAM
- Methodology for Less than Perfect Data
- Z-scores
- Parallel Processing
- Normal Curve Equivalent
- Binning by Quantile
- VAM's fairness to teachers with special assignments
- Ceiling effect in assessment and how to quantify

What is Value-Added?
- Value-added refers to growth in achievement above what is expected across time for a given student.

Layered Model
- Links past teachers to subsequent student outcomes
- Student Score = overall mean + cumulative effects of previous and current teachers + random residual variation

Non-layered Model
- Links current teachers to student outcomes, so ignores effects of instruction in earlier years
- Student Score = overall mean + effects of current teachers + random residual variation

Concerns Under Exploration
- Challenges Related to Value Added Modeling
- What is needed to document an MSP impact:
  - Initial long-term timeframe realized, including longitudinal trajectory of teacher linked student data
  - Quality baseline that accurately depicts initial student level
  - Achievement measurement without ceiling effect
  - Alignment between desired student learning outcomes & what student achievement instruments can measure
- Public concerns about VAM: Real or Urban Legends
  - Lack of randomization invalidates VAM
  - Special teacher assignments penalize or reward teachers unfairly
  - Too much emphasis on achievement, miss other important aspects of effective teaching
- Student mobility
  - How to estimate teacher effects on students when students have multiple teachers in a year
  - Requires potentially unrealistic assumptions (each teacher’s effect is proportional to the time the student spent in his/her classroom)
- No easy choices regarding inclusion of covariates
  - Researchers must choose between potentially confounding teacher effects with student-level variables and potentially underestimating teacher effects.
  - Plethora of instruments to measure student achievement in math.
  - Districts change tests and/or use different tests for different grade levels
  - More needs to be known about the performance of alternative methodology (z-scores, binning, etc.) relative to one another and possible alternatives.
  - Teacher effect estimates should be linked to other valid measures of teacher effectiveness
  - The challenge for VAM is to augment models with aspects in addition to achievement that predict (or allow us to characterize) effective teaching and learning so that the refined models enhance rather than dilute our ability to identify and reward good teaching.

References