Mathematics teaching and learning in secondary schools: the impact of pedagogical practices on important learning outcomes

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Introduction & Aim:

The aim of this ESRC funded project is to understand (i) how learners' dispositions to study Mathematics develop through Secondary School, (ii) how mathematics pedagogies vary across different situations and contexts and (iii) how different pedagogies, programmes and school contexts influence learning outcomes, including dispositions. In addition, capturing five years of progression (Year 7-11) in one year will pose methodological challenges, the resolution of which will contribute to the literature of combining longitudinal and cross-sectional analyses, and dealing with missing data.

The Research Questions:

RQ1: How can we measure (i) teachers' (self-reported) pedagogic practices and (ii) students' dispositions to study and use mathematics? And how do these measures vary across key subgroups, background variables and institutional types?

RQ2: How do background and process variables and pedagogy predict students' learning dispositions, outcomes and decisions from Year 7 to Year 11?

RQ3: How can cross-sectional and longitudinal models be combined in the context of hierarchical data structures and missing data?

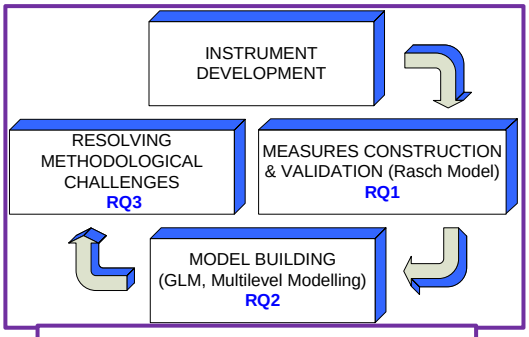

Figure 1: Analytical Framework

Research Methods

Instrumentation and Data collection:

Longitudinal data will be collected from students in Years 7 to 11 at three time intervals, via **online surveys** as shown in Figure 2.

During the first year of the project, data will also be collected regarding teachers' perceptions about their teaching with the students participating in the project.

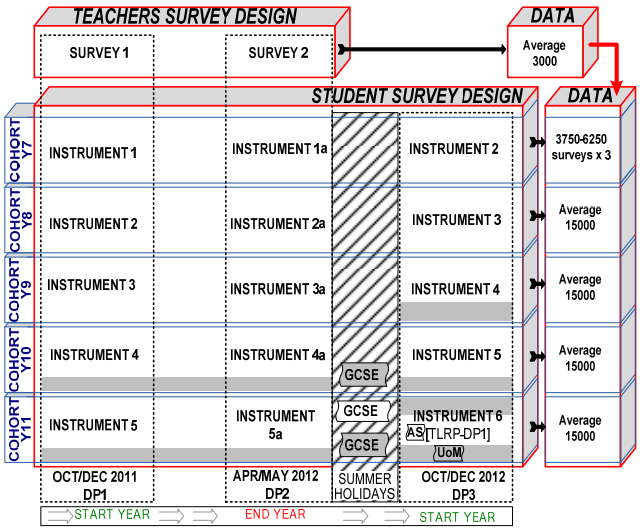

Figure 2: Data Collection

Methods for Analysis

A. Validation of the measures:

- Within the Rasch measurement framework (IRT)
- Partial credit and Rating Scale models
- Examination of item fit statistics, category statistics, differential item functioning (DIF), person-item maps

B. Statistical Modeling:

The design will lead to different data sets (Figure 2)
Teachers' surveys: Initial separate analysis with Generalised Linear Models (GLM) to compare pedagogic practice in different contexts and situations.
Student Datasets (complemented with teachers')
•Analysing data within and between each cohort:
•GLM, multilevel modeling

C. The methodological Challenge:

How can cross-sectional and longitudinal models be combined in ways that take appropriate account of (sometimes compound) hierarchical structures?

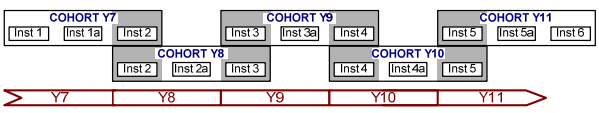

Figure 3: Cross sectional longitudinal design

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