SRI Education

Modeling and Analyzing Education Systems: Two Applications for CSLS

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Problem 1: Scaling Educational Innovations
Problem 2: Reforming Educational Testing Systems

Problem 1: Scaling Educational Innovations

Challenges to Scaling Educational Innovations

- Emerging theory
  - Implementation models (variation, social dynamics)
  - Context of implementation
- Few resources to aggregate theory, design knowledge, research results
  - Publication is non-functional
  - Aggregating theory requires it's own theory (systemic research is expensive and often narrowly focused)

Current Approaches

- Emerging Theory: Design-based Methods (knowledge to practice)
  - Design-based Implementation Research
  - Research-Practitioner Partnerships
- Resources to Aggregate Results: Large-scale Evaluations
  - RCTs
  - What Works Clearing House

New Solutions via CSLS: Computational Models of Systems

- Emerging Theory: Participatory Modeling of Implementation
  - Models as 'boundary objects'
  - Integrating social networks and dynamics
- Resource to Aggregate Results: Functional, Reusable, Extensible
  - Retrospective analysis and simulation (prediction, experimentation)
    - Demonstrate success and failure
    - Illustrate crucial variation
  - Existing models are valuable in new contexts

Example: STEM recruitment and retention model in Higher Education

Problem 2: Reforming Educational Testing Systems

Challenges to Reforming Testing Systems

- System stakeholder outcomes do not align
  - Formal testing infrastructure vs. Classroom Learning
    - Trends (longitudinal comparisons)
    - Expensive
- Data streams do not converge
  - Classroom data is not easily aggregated or communicated
  - Large-scale data is not timely

Current Approaches

- Aligning system stakeholder outcomes
  - Vertical Assessment Systems (vertical alignment vs. vertical scaling)
  - Learning progressions (developmental alignment/coherence)
- Converging data streams
  - Cognitive models and data models (ITS)
  - Bayesian measurement models (game-based assessment) and emerging products of learning analytics
  - Computer-adaptive testing models

New Solutions via CSLS: Computational Models of Systems

- Aligning system stakeholder outcomes
  - Coordinate cognitive and measurement models across classroom and large-scale assessment contexts
    - Vast variation in student trajectories
  - Infrastructure for establishing this alignment in new contexts
- Converging data streams
  - New data corpuses for learning analytics/educational analytics
  - New insights into data organization and structure

Example: Formative Assessment Systems Model

Thank You

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