Elementary School Data Issues: Implications for Research

October 11, 2013

Using Student Test Scores to Measure Teacher Performance:
The State of the Art in Research and Practice

East Lansing, Michigan

Eric Isenberg • Bing-ru Teh • Elias Walsh
Value-added models require
- Test score data
- Student background characteristics
- Teacher-student links

Administrative data supply all three
- NCLB requires testing in grades 3–8, high school
- Program participation, demographic data collected
- Student assignment or course scheduling data
Grades 4–5 Seen as Superior to Grades 6–8

- Self-contained classrooms for each teacher
- More equally balanced classrooms
  - No tracking in elementary schools
  - More homogeneous classrooms
- Potential problems with heterogeneous classrooms
  - Unobservable differences between students
  - Different degrees of alignment with post-test
  - Lack of overlap between teachers of different students
Teacher Misclassification to Subjects Common

- Battelle for Kids has confirmed rosters in many states, districts
- Based on 2012-2013 school year:
  - 1/3 of teacher rosters inaccurate
  - 1/4 of teachers linked to wrong subject
- Data worse in large, urban districts
DC Roster Confirmation

- Regular education teachers of math/reading in grades 4–8 receive list of students
- Teachers confirm
  - Subject
  - Students taught (can add or subtract students)
  - Portion of instructional time with student
- Central office staff resolves anomalies
- Principals verify rosters (starting in 2011–2012)
Compare Two Data Sets

- Confirmed DC Public Schools (DCPS) teacher-student links
  - Teachers linked to at least seven students in subject

- Unconfirmed course data for DCPS
  - List of students, eligible courses, and teachers
  - List of students and homeroom teachers
  - Students linked to departmentalized courses over homeroom
  - Teachers linked to at least seven students in subject
Differences in Teachers in Data Sets

Number of DCPS Teachers (2010-2011 and 2011-2012 school years)

- Teachers only in unconfirmed data: 122
- Teachers only in confirmed roster data: 889
- Teachers in both: 59
## Misclassification in Administrative Data

<table>
<thead>
<tr>
<th>Grade</th>
<th>Math Teachers Incorrectly Identified as Math Teachers (%)</th>
<th>Math Students Incorrectly Linked to Teachers (%)</th>
<th>Reading/ELA Teachers Incorrectly Identified as Reading/ELA Teachers (%)</th>
<th>Reading/ELA Students Incorrectly Linked to Teachers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 4</td>
<td>12.8</td>
<td>21.2</td>
<td>16.7</td>
<td>18.1</td>
</tr>
<tr>
<td>Grade 5</td>
<td>16.4</td>
<td>18.2</td>
<td>18.1</td>
<td>19.3</td>
</tr>
<tr>
<td>Grade 6</td>
<td>5.4</td>
<td>5.5</td>
<td>6.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Grade 7</td>
<td>0.0</td>
<td>4.2</td>
<td>0.0</td>
<td>7.7</td>
</tr>
<tr>
<td>Grade 8</td>
<td>0.0</td>
<td>4.1</td>
<td>0.0</td>
<td>7.4</td>
</tr>
</tbody>
</table>
When Departmentalization Matters

- **Departmentalization does not matter if**
  - Classrooms of students stay intact
  - Teachers are not linked to other data
  - Example: Distribution of effective teaching

- **Departmentalization does matter if**
  - Classrooms do not stay intact
  - Teacher value added linked to other data
  - Examples
    - How teacher mobility depends on effectiveness
    - Effect of teacher characteristics on student achievement
Heterogeneity of Classrooms Both Between and Within Schools

- **Variance of pre-test scores decomposed**

<table>
<thead>
<tr>
<th></th>
<th>Between Schools</th>
<th>Between Classrooms</th>
<th>Between Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Math</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 4–5</td>
<td>0.28</td>
<td>0.03</td>
<td>0.69</td>
</tr>
<tr>
<td>Grades 6–8</td>
<td>0.12</td>
<td>0.22</td>
<td>0.66</td>
</tr>
<tr>
<td><strong>Reading</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 4–5</td>
<td>0.23</td>
<td>0.04</td>
<td>0.73</td>
</tr>
<tr>
<td>Grades 6–8</td>
<td>0.12</td>
<td>0.15</td>
<td>0.73</td>
</tr>
</tbody>
</table>

- **Within-school sorting offset by between-school sorting**

- **Tracking, size of attendance areas play role**
Parallel Concerns at Both Grade Spans

- Unobservable differences in students
  - Parents of upper-track students
  - Parents living in more affluent attendance areas

- Lack of overlap between teachers of high- and low-achieving students
  - Tracking within schools
  - Segregation across schools

- Different alignment to post-test
  - Tracked courses cover different material
  - Different content at same grade level
Conclusions

- Do not trust unconfirmed elementary school teacher assignments
- Do not assume that classes are more balanced across district in elementary schools
- Do not worry if you do not link teacher value added to other data
For More Information

- Please contact:
  - Eric Isenberg
    - ejisenberg@mathematica-mpr.com
  - Bing-ru Teh
    - bteh@mathematica-mpr.com
  - Elias Walsh
    - ewalsh@mathematica-mpr.com