Right-sizing the Classroom

Making the Most of Great Teachers

#TeacherAccess

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What if... we tried playing to our strengths in schools?

<table>
<thead>
<tr>
<th>Typical method</th>
<th>Class-size shifting</th>
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Prior research tilts toward teachers

**Teacher Quality**
- Large impacts on students across multiple contexts
  - Significant results across subjects and grades, though sizes vary
- Good teacher = extra $\frac{1}{4}$ to $\frac{1}{2}$ year of learning

**Class Size**
- Small impacts, that are near zero in some contexts
  - Largest in lower grades, initial exposure
- Equivalent impact of 10 to 20 student reduction in class size

Sources: Hanushek and Rivkin, 2010; Nye, et al., 2004; Whitehurst and Chingos, 2011.
Data & Methods

- **North Carolina data**
  - Grades 5 and 8; Math, Reading and Science test scores
  - Four years of data

- **Focus specifically on schools where students can be reallocated across teachers**
  - Approximately 90% of NC students are in such schools

- **In 2010/11 target year:**
  - Document current patterns of sorting occurring in NC
  - Simulate classroom assignments that could arise under strategic assignment; calculate student learning gains and access to effective teachers
## Target Year Current Assignments

### Table 2. Snapshot of Observed Class Size Assignment in North Carolina

<table>
<thead>
<tr>
<th></th>
<th>Grade 5</th>
<th>Grade 8</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Math</td>
<td>Reading</td>
</tr>
<tr>
<td>Average class-size deviation within school</td>
<td>2.738</td>
<td>3.073</td>
</tr>
<tr>
<td>Within-school correlation of expected teacher performance and class size</td>
<td>0.045</td>
<td>0.086</td>
</tr>
</tbody>
</table>
Table 2 (cont’d). Snapshot of Observed Class Size Assignment in North Carolina

<table>
<thead>
<tr>
<th></th>
<th>Grade 5</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Math</td>
<td>Reading</td>
</tr>
<tr>
<td>Proportion of students assigned to</td>
<td>0.258</td>
<td>0.287</td>
</tr>
<tr>
<td>top-quartile teachers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of FRL students assigned to</td>
<td>0.235</td>
<td>0.260</td>
</tr>
<tr>
<td>top-quartile teachers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note – Strategically assigning students only remediates within-school gaps, not across-school gaps
Students Gain in Simulated Classrooms

Additional students beyond equal class size on the x-axis is determined separately within each grade and school, so total class size for the largest classes may vary across the sample. Changes in student learning on the y-axis is measured in student standard deviation units, and averaged across all students in schools and classrooms where class-size shifting is feasible.
Results are particularly strong in 8th grade

- Moving 6 students is nearly 2 weeks in 8th grade math and science
  - Roughly equivalent to current levels of class size deviations observed
  - Equivalent to removing bottom 5% of teachers, without removing them!

- Maximum gains for 5th grade are roughly equal to 2 days

- Why the difference?
  - Past performance more reliable predictor in 8th grade
  - Self-contained vs. single-subject assignments
Access Gaps Still Persist

Additional students beyond equal class size on the x-axis is determined separately within each grade and school, so total class size for the largest classes may vary across the sample. The proportion measures describe the proportion of students assigned to teachers with the given characteristics. These proportions are calculated across all students, and on FRL and non-FRL student subgroups.
Teacher / parent surveys suggest some support

- 83% of teachers choose money over smaller classes
- 73% of parents choose top teacher over smaller classes

How to reward teachers, so this isn’t a punishment?

- Non-monetary – aides, status, removing out-of-classroom work
- Monetary – bonuses using money from savings due to fewer remedial instructors, or lowering pay for leading smaller classes
Conclusion

- **Efficient** – Class-size shifting can make educationally significant improvements in student learning, esp. 8th grade
  - Caveats: assuming linear class size, performance invariant to mixing classes

- **No change in equity** – No relative improvement in student access to effective teachers

- Feasibility issues
  - Laws, policies, collective bargaining agreements may need to change
  - Could disrupt dynamic among workforce
Recommendations

- This paper is NOT:
  - Prescribing how classes should be assigned
  - Suggesting that all schools should adopt at the highest levels of sorting

- However, I do recommend:
  - Shifting focus of class assignments to prioritize learning
  - Experimenting with different levels of sorting where conditions allow
  - Compensating teachers fairly, or even generously, for extra work
Two Noteworthy Points

1. Deviations in class size will reflect differences in expected performance
   - If teachers are expected to be equal, no advantage to moving students

2. In theory, strong and weak teachers can be defined according to schools’ preferred measures
   - Due to lack of other performance data, I base these results on value-added estimates
## Table 2. Estimated Class-size Effects and Teacher Value-added Variation

<table>
<thead>
<tr>
<th>Class size</th>
<th>Grade 5</th>
<th></th>
<th></th>
<th>Grade 8</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Math</td>
<td>Reading</td>
<td>Science</td>
<td>Math</td>
<td>Reading</td>
<td>Science</td>
</tr>
<tr>
<td></td>
<td>-0.0052***</td>
<td>-0.0020***</td>
<td>-0.0047***</td>
<td>-0.0035***</td>
<td>0.0000</td>
<td>-0.0024***</td>
</tr>
<tr>
<td></td>
<td>(0.0005)</td>
<td>(0.0005)</td>
<td>(0.0005)</td>
<td>(0.0002)</td>
<td>(0.0003)</td>
<td>(0.0003)</td>
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<tr>
<td>Standard deviation of EB-adjusted teacher FE</td>
<td>0.1513</td>
<td>0.0801</td>
<td>0.1927</td>
<td>0.1333</td>
<td>0.0612</td>
<td>0.1500</td>
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</tbody>
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