Longitudinal Outcomes Study

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Context & Study Purpose

• All 50 states and DC adopted new college- and career-ready (CCR) standards in math and ELA/literacy between 2007 and 2015.

• This study is intended to assess the effects of the CCR standards and aligned assessments on key student outcomes for all students and for key student subgroups (e.g., ELLs and SWDs).
Research Questions

1. Does implementing **CCR standards** result in increases in student college and career readiness?

2. Does the adoption of **assessments** aligned with CCR standards result in increases in student college and career readiness?

3. Does the effect of implementing CCR standards and aligned assessments **vary by student subgroup, subject, and grade level**?
4. Is the effect of implementing CCR standards and aligned assessments on student learning moderated by the policy attributes characterizing state implementation efforts?

5. Is the effect of implementing CCR standards and aligned assessments on student learning moderated by the extent to which state standards are aligned with assessments?
### Data & Measures:
State-Level Student Outcome Data From NCES

- State-level NAEP scores in math and reading for grades 4 and 8

<table>
<thead>
<tr>
<th>Math</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math composite score</td>
<td>Reading composite score</td>
</tr>
<tr>
<td>Subscale 1: algebra</td>
<td>Subscale 1: gaining information</td>
</tr>
<tr>
<td>Subscale 2: data analysis</td>
<td>Subscale 2: literary experience</td>
</tr>
<tr>
<td>Subscale 3: geometry</td>
<td></td>
</tr>
<tr>
<td>Subscale 4: measurement</td>
<td></td>
</tr>
<tr>
<td>Subscale 5: number properties</td>
<td></td>
</tr>
</tbody>
</table>

- 9 ~ 12 waves of NAEP data available from 1990 through 2017
- High school graduation
- College enrollment
Analytic Approach

Comparative Interrupted Time Series (CITS) Design:

- Effects of CCR standards are assessed by comparing the change in the student achievement trend from before to after CCR adoption between “treatment” (T) and “comparison” (C) states.
Definitions of T and C States

• T and C states are defined based on the quality of states’ prior content standards as measured by:
  1) **Prior Rigor Index**: a measure of the rigor of each state’s 2010 standards (Carmichael et al., 2010)
  2) **Prior CCSS-Similarity Index**: a measure of the similarity between each state’s 2009 math standards and the CCSS for math (Schmidt & Houang, 2012)

• **Assumption**: The CCR standards represented a stronger form of treatment for states whose prior standards were less rigorous and less like CCSS than for states whose prior standards were more rigorous and more like CCSS.
## State Classification for CITS Analyses

<table>
<thead>
<tr>
<th></th>
<th>Classification Based on Prior Rigor Index</th>
<th>Classification Based on Prior CCSS-Similarity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>0-7 (7 = highest rigor)</td>
<td>1-5 (1=least like CCSS, 5=most like CCSS)</td>
</tr>
<tr>
<td>T states</td>
<td>States with a value of 0-3</td>
<td>States with a value of 1 or 2</td>
</tr>
<tr>
<td>C states</td>
<td>States with a value of 5-7</td>
<td>States with a value of 4 or 5</td>
</tr>
<tr>
<td>N of states in reading analyses*</td>
<td>17 T states; 12 C states</td>
<td>NA</td>
</tr>
<tr>
<td>N states in math analyses*</td>
<td>20 T states; 14 C states</td>
<td>14 T states; 12 C states</td>
</tr>
</tbody>
</table>

*Analysis samples were restricted to states that adopted CCR standards in 2010.*
CITS Model

• **Model Specification:**
  - State-year-level regression, controlling for state and year fixed effects and time-varying covariates
  - Baseline slopes allowed to differ for T and C states

• **Estimates From CITS Model:**
  - Effects of CCR standards on student achievement 1, 3, 5, and 7 years after the 2010 adoption of the standards, representing effects at different time points as states were transitioning from initial adoption to full implementation.
NAEP Trajectories by States: Grade 4 Math

Year

Grade 4 math scores

CA MA KY OH TX
NAEP Trajectories by States: Grade 8 Math

- Grade 8 math scores
- States: CA, MA, KY, OH, TX

- Graph shows trends in math scores over time for these states.
Observed NAEP Grade 4 Reading Achievement Trends for T and C States Based on the Prior Rigor Index
Effects of CCR Standards: Grade 4 Reading

NAEP Scores for T States Identified Based on *Prior Rigor Index*

ES: 1-year effect = -0.07** (p < .01); 3-year effect = -0.09* (p < .05); 5-year effect = -0.10* (p < .05); 7-year effect = -0.11* (p < .05)
Effects of CCR Standards: Grade 8 Reading

NAEP Scores for T States Identified Based on *Prior Rigor Index*

ES: 1-year effect = 0.01; 3-year effect = -0.04; 5-year effect = -0.05; 7-year effect = -0.06
Effects of CCR Standards: Grade 4 Math

NAEP Scores for T States Identified Based on Prior Rigor Index

ES: 1-year effect = 0.01; 3-year effect = -0.04; 5-year effect = -0.06; 7-year effect = -0.09
Effects of CCR Standards: Grade 4 Math

NAEP Scores for T States Identified Based on Prior CCSS-Similarity Index

ES: 1-year effect = 0.06; 3-year effect = 0.01; 5-year effect = -0.02; 7-year effect = -0.04
Effects of CCR Standards: Grade 8 Math

NAEP Scores for T States Identified Based on Prior Rigor Index

ES: 1-year effect = 0.00; 3-year effect = -0.04; 5-year effect = -0.07; 7-year effect = -0.11* (p< .05)
Effects of CCR Standards: Grade 8 Math

NAEP Scores for T States Identified Based on Prior CCSS-Similarity Index

ES: 1-year effect = 0.02; 3-year effect = 0.00; 5-year effect = -0.02; 7-year effect = -0.07
Effects of CCR Standards: NAEP Subscales

• Results for the two NAEP reading subscales and five math subscales are generally consistent with the results for the NAEP composite scores.
# Effects of CCR Standards: SWDs

<table>
<thead>
<tr>
<th>Timing of effect</th>
<th>Grade 4 reading</th>
<th>Grade 8 reading</th>
<th>Grade 4 math</th>
<th>Grade 8 math</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-yr effect</td>
<td>-0.03</td>
<td>-0.05</td>
<td>0.10*</td>
<td>0.00</td>
</tr>
<tr>
<td>3-yr effect</td>
<td>0.00</td>
<td>-0.11</td>
<td>0.02</td>
<td>-0.11</td>
</tr>
<tr>
<td>5-yr effect</td>
<td>-0.04</td>
<td>-0.14</td>
<td>0.00</td>
<td>-0.15</td>
</tr>
<tr>
<td>7-yr effect</td>
<td>-0.03</td>
<td>-0.21</td>
<td>0.00</td>
<td>-0.23</td>
</tr>
</tbody>
</table>

Notes: Results are based on T and C states defined by the *Prior Rigor Index*.  
* p < .05
Potential Reasons for Lack of Significant Positive Effects of CCR Standards

• CCR standards **may not have been well implemented.**
  
  • Most of the results reflect early effects given the extended implementation timeline (typically 3-5 years to reach full implementation)
  
  • Challenges in implementing CCR standards
  
• CCR standards **may be no more effective** at improving student achievement than prior standards.
Potential Reasons for Lack of Significant Positive Effects of CCR Standards (cont.)

- Results need to be interpreted with caution given study limitations.
  - Lack of a true “no-treatment” comparison group given the timing of CCR adoption across states
  - Less-than-perfect alignment between NAEP and CCR standards