Supplement to
This School Works for Me:
Creating Choices to Boost Achievement

A Guide for
Data Analysts

January 2010
INITIAL STEPS

Creating a Project Timeline

**Sample Timeline**

**Launch Project**
- Identify district and/or external partner working team and develop project plan
- Compile district performance overview

**Conduct Analysis**
- Gather necessary data
- Complete analysis
- Review results and iterate as necessary

**Engage Stakeholders**
- Communicate purpose of analysis and seek support
- Communicate findings and ongoing strategy

**Implement recommendations (detailed in Portfolio Development Guide)**

* Ongoing implementation

The whole process—from analysis to implementation—takes significant time and effort to complete so expectations need to be managed accordingly.

* Actual time may vary depending on working team composition, personnel dedicated to project, and complexity of analysis and implementation.
DEVELOPING BASELINE DISTRICT FACTS:
Cross-Sectional Analysis

Key Steps
1. Create list of metrics that need to be agreed upon
2. Calculate these metrics based on the previously defined cohorts
3. Compare calculated metrics to those that already exist for the district (e.g., graduation rates) to ensure accuracy of methodology and cohort definition

Key Decisions/Questions
1. What facts are already known/calculated by the district?
2. What common beliefs about the district need to be validated/refuted?

Cross-sectional analyses use data at a specific point in time or for a specific time period (e.g., the high school graduation rate in a given year).

**District High School Five-Year Dropout Rates, 2000–06**

- 2000: 49%
- 2001: 49%
- 2002: 48%
- 2003: 47%
- 2004: 45%
- 2005: 44%
- 2006: 44%

**Percent Free and Reduced Lunch**

- Sample District: 85%

**Student Ethnicity**

- White
- Asian
- Hispanic
- African American

**Sample District**

- White: 45%
- Asian: 15%
- Hispanic: 30%
- African American: 10%
IDENTIFYING EFFECTIVE OPTIONS: Geographical Concentrations of Student Need

Key Steps
1. Decide what student need indicator is of interest
2. Use cross-sectional population definition similar to that in “sizing the off-track population”
3. Link students to home ZIP codes
4. Calculate percentage of students in total population that display indicator of need
5. Map high schools or programs focusing on this population against student need to assess whether need is being addressed

Key Decisions/Questions
1. What indicators of student need are of greatest interest?
2. What schools and programs currently exist that serve specific populations?
Key Steps
1. Use either cross-sectional or longitudinal student population, depending on questions to be answered
2. Determine what student characteristic will be controlled for (e.g., 8th grade test performance) and what school models are to be compared
3. Link students to schools based on previously established rule for when students link to schools
4. Calculate outcomes for each distinct student-school grouping

Key Decisions/Questions
1. Does analyzing school outcomes in this way sufficiently account for student-level differences?

Key Learning
Controlling for specific student characteristics and comparing outcomes can provide a more nuanced view of performance without greatly increasing the difficulty of the analysis.
IDENTIFYING EFFECTIVE OPTIONS: PREVENTATIVE
Developing Basic Predictive Models

Key Steps
1. Use a longitudinal student population representing a single cohort of students
2. For each student, determine the number of credits earned each year and the enrollment status at the end of the year (e.g., still enrolled, graduate, drop out, transfer)
3. Calculate the graduation rate for each credits-earned group for each year in time

Key Decisions/Questions
1. When should total credits earned be calculated for a year? Including summer school credits?
2. Which graduation rate should be used—4 year, 5 year, 7 year?
Predicted Graduation Rates for Small Schools vs. Comprehensive High Schools First-Time Freshmen, Class of 2010

- **Small Schools**: 67%
- **Comprehensive Schools**: 62%

**Key Steps**
1. Use historical relationship between credits earned and graduation rates (slide 6) to roughly project graduation rates of upcoming classes.
2. For each student, calculate the number of credits. Based on student’s credit accumulation and the historical graduation rate of students who have earned that credit level, assign student a graduation rate.
3. Take a weighted average of each student to calculate total graduation rate.

**Key Decisions/Questions**
1. What variables can be known early in a student’s career that increase power of simple model?
2. What factors (i.e., promotion policy changes) may compromise the predictive power of the model?
**Key Steps**

1. Determine outcome variable (e.g., on-track status, graduation)
2. Decide point in time to associate students to schools [suggested: freshman year school]
3. Assess variables that are known about students at entry (student-level) and are to be tested
4. Calculate size and concentration variables (school-level) that are to be tested

**Key Decisions/Questions**

1. Does the district have the internal expertise to develop a complex predictive model? If not, with whom can the district partner?

---

**Student-Level Factors**

- Gender
- Ethnicity (White/Asian vs. African-American/Hispanic)
- Average 8th ELA and math proficiency level
- Age at entry to high school
- 8th grade attendance rate
- ELL status (Y/N)
- Special education (SPED) status (LRE vs. self-contained vs. non-SPED)
- Lack of 8th grade attendance or 8th grade test scores

**School-Level Factors**

- School enrollment
- A series of concentration variables:
  - Percent of students with a Low Level 2 or below on either ELA or Math
  - Percent of students entering 9th grade overage
  - Percent of students with 8th grade attendance below 90 percent
- Tested but not significant: avg. teacher tenure, principal tenure, general education class size, SPED class size, facilities capacity utilization

---

**Key Learning**

Not all regressions have significant school-level effects, as these effects may take several years to emerge. Regressions using early outcomes like on-track may have negligible school-level factors.
IDENTIFYING EFFECTIVE OPTIONS: PREVENTATIVE
Using Multivariate Regression Analysis to Calculate Over- and Underperformance

Key Steps
1. Use advanced predictive model methodology (slide 8)
2. Sum the individual student-level over/underperformance (actual – predicted) to determine school-level performance
3. Identify outcomes associated with different school models to determine whether school model produces systematic performance
4. Determine level of over/underperformance that warrants further investigation

Key Decisions/Questions
1. Should over/underperformance be based on a single cohort’s outcomes or the combination of multiple?
IDENTIFYING EFFECTIVE OPTIONS: PREVENTATIVE
Identifying More Effective School Models

**Key Steps**
1. Use advanced predictive model methodology (slide 8)
2. Group schools by model type
3. Average school-level residuals by model type to identify models that demonstrate consistently strong or weak performance
4. Developing profiles of school models may help provide context for the outcomes

**Key Decisions/Questions**
1. How do different school models support target student populations?

---

### On-Track Overperformance by School Type, 2005–06 Freshman Cohort

<table>
<thead>
<tr>
<th>School Type</th>
<th>Average Overperformance</th>
<th>Enrollment</th>
<th>% FRL</th>
<th>% Overage</th>
<th>% SPED</th>
<th>% ELL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam</td>
<td>0.12</td>
<td>2.7K</td>
<td>60%</td>
<td>5%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>9th Grade Transition</td>
<td>0.07</td>
<td>1.0K</td>
<td>92%</td>
<td>80%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Military</td>
<td>0.06</td>
<td>0.4K</td>
<td>86%</td>
<td>23%</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>Small</td>
<td>0.06</td>
<td>2.5K</td>
<td>92%</td>
<td>34%</td>
<td>21%</td>
<td>3%</td>
</tr>
<tr>
<td>Magnet</td>
<td>0.02</td>
<td>2.4K</td>
<td>87%</td>
<td>20%</td>
<td>13%</td>
<td>2%</td>
</tr>
<tr>
<td>General</td>
<td>-0.03</td>
<td>14.9K</td>
<td>89%</td>
<td>29%</td>
<td>17%</td>
<td>6%</td>
</tr>
<tr>
<td>SLCs</td>
<td>-0.03</td>
<td>5.0K</td>
<td>92%</td>
<td>33%</td>
<td>19%</td>
<td>3%</td>
</tr>
</tbody>
</table>

(Average Overperformance: Higher Positive is Better)
IDENTIFYING EFFECTIVE OPTIONS: PREVENTATIVE
Understanding Model Variables under District Control

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>What change would move the predicted graduation rate by 2 percentage points?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total HS Enrollment</td>
<td>A high school’s official grade 9–12 enrollment for the 2006–07 school year</td>
<td>A <strong>500-student increase</strong> (system avg=−1,500) in the total enrollment of a school will cause a decrease in graduation rate by 2 percentage points</td>
</tr>
<tr>
<td>Low 8th Grade Achievement</td>
<td>Percentage of students in a high school’s 2007 cohort who scored Level 1 or Low Level 2 on at least one 8th grade exam (of students who took one or both 8th grade exams)</td>
<td>A <strong>5 percentage point increase</strong> (system avg=55%) in the number of “low 8th grade achievement” students in a school will cause a decrease in graduation rate by 2 percentage points</td>
</tr>
<tr>
<td>Overage at Entry</td>
<td>Percentage of students in a high school’s 2007 cohort who turn 15 on or before 12/31/2003</td>
<td>A <strong>5 percentage point increase</strong> (system avg=31%) in the number of students in a school who were “overage at entry” will cause a decrease in graduation rate by 2 percentage points</td>
</tr>
<tr>
<td>Self-Contained (SC) Special Education (SPED) Proportion</td>
<td>Percentage of students in a high school’s 2007 cohort who were ever SC SPED during grades 9–12</td>
<td>A <strong>6 percentage point increase</strong> (system avg=10%) in the number of SC SPED students in a school will cause a decrease in graduation rate by 2 percentage points</td>
</tr>
</tbody>
</table>

**Key Steps**
1. Separate schools from regression analysis into overperformers and underperformers
2. Select a performance level change to test (e.g., 2 percentage point change in graduation rate)
3. Identify variables that are substantially under district control—likely school size and student concentrations
4. Hold all other model variables constant while varying (solving for) a single variable to understand change

**Key Decisions/Questions**
1. What variables in the predictive model are substantially within district control of schools?
2. How does this analysis relate to schools that are “structured to fail”?
Identifying Effective Options: Preventative
Understanding the Effect of Size and Concentration on Individual Students

Key Steps

1. Select a representative student—in the example, the student has the median characteristics of all students—and determine the graduation rate independent of school structure.

2. Choose several school structures that are representative of the variety of schools in the district, with different size and concentrations.

3. Adjust model size and concentration parameters to calculate student graduation rate given different school structures.

Key Decisions/Questions

1. For representative student, how much of a performance gain is possible with just structural changes?

School 1
- 400 students
- Concentrations of challenged students 15 percentage points below system average

School 2
- 800 students
- Concentrations of challenged students 5 percentage points below system average

School 3
- 1,500 students
- Concentrations of challenged students 5 percentage points above system average

School 4
- 3,000 students
- Concentrations of challenged students 15 percentage points below system average

"The Median Student"
- Female
- African-American/Hispanic
- Avg. 8th Grade Test Scores (2.7)
- Avg. 8th Grade Attendance (92%)
- On-Age at Entry to HS (14 yo)
- Neither ELL nor SPED

83% Graduation Rate

78% Graduation Rate

70% Predicted Graduation Rate

55% Graduation Rate
Key Steps

1. Use either cross-sectional or longitudinal student population, depending on questions to be answered.

2. Determine what student characteristic will be controlled for (e.g., 8th grade test performance) and what school models are to be compared.

3. Link students to schools based on previously established rule for when students link to schools.

4. Calculate outcomes for each distinct student-school grouping.

Key Decisions/Questions

1. How does student performance across key metrics vary by school type?
Information for this report is drawn from Atlanta, Boston, Charlotte-Mecklenburg, Chicago, Dallas, Portland, and New York City and their partnerships with the Bridgespan Group, Boston Consulting Group, McKinsey & Company, Education Resource Strategies, and The Parthenon Group.