



# Launch Michigan

Dashboard Data & Methods



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## Data Sources

We draw on public-use data from several sources collected by the US Department of Education as a part of the Common Core of Data (CCD) and *EDFacts* data collections for the 2018-19 school year.<sup>1</sup> The Common Core of Data is the Department of Education's primary database on public elementary and secondary education in the United States. CCD is a comprehensive, annual, and national database of all public elementary and secondary schools and their school districts. *EDFacts* is a U.S. Department of Education initiative to centralize performance data provided by state education agencies (SEAs) to inform policy development, planning, and management at the federal, state, and local levels. We utilize data from multiple sources, what CCD and *EDFacts* calls file specifications (FS). We also draw on aggregated school poverty measures created by the Urban Institute called Model Estimates of Poverty in Schools or MEPS. These data contain information across all 50 states, DC, Puerto Rico, and outlying U.S. territories.

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<sup>1</sup> We use the 2018-19 school year given the impacts of COVID-19 on enrollment and other data points. *EDFacts* recommends that assessment files from 2020-21 be used with caution due to waived requirements regarding assessments during the COVID-19 pandemic. Data from the 2021-22 or 2022-23 school years are not yet available through *EDFacts*. Missing data are present in the source data files. We use related information from other data points (e.g., For example, LEAs that do not offer grade 8, that do not report grade 8 enrollment). See

Table 1 for information on missing data by covariate.

**Table 4** provides a summary of these data files and the measures used from each.

## Data Sample

There are a combined 19,840 LEAs across 10 files. We restrict the base sample to include LEAs that meet five conditions. First, we limit our analysis to LEAs that are indicated to be *active* (i.e., open, new, added, or changed boundary/agency), excluding 330 LEAs.<sup>2</sup> Second, we exclude an additional 1,060 LEAs that do not report any operational schools.<sup>3</sup> Third, we further remove 628 LEAs that are reported to be either a *service agency*, a *state agency*, a *federal agency*, or a *supervisory union administrative center*.<sup>4</sup> Fourth, we remove an additional 256 districts that did not report student enrollment. Lastly, we further remove 688 LEAs that did not have reported values for graduation rate, reading proficiency, and math proficiency. After considering these sample restrictions, the base sample includes 16,098 LEAs, of which 822 are Michigan LEAs.<sup>5</sup>

## District Matching Sample

Ideally, Michigan LEAs would be matched to LEAs that are high achieving across indicators of student success. We determined the states to be included in our match sample by taking an aggregate of 4<sup>th</sup> grade reading scores and 8<sup>th</sup> grade math scores from the 2022 Nation’s Report Card and the Kids Count 2022 Education rankings. See [Education rank | KIDS COUNT Data Center \(aecf.org\)](#), [State Profiles \(nationsreportcard.gov\)](#), [State Profiles \(nationsreportcard.gov\)](#) for additional information. Using these indicators, nineteen<sup>6</sup> other states were chosen as high-achieving comparisons for Michigan. The nineteen other states included Colorado,<sup>7</sup> (list other states) Connecticut, Florida, Iowa, Illinois, Indiana, Massachusetts, Minnesota, Montana, New Jersey, Nebraska, New Hampshire, Ohio, Pennsylvania, South Dakota, Utah, Virginia, Wisconsin, and Wyoming. We also investigated comparing Vermont against Michigan; however, they did not submit data for our outcome measures. Limiting the comparison group to these states, gave Michigan districts a potential match pool of 2,763 LEAs with a total sample of 3,585 LEAs.

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<sup>2</sup> Indicator is “UPDATED\_STATUS” and “UPDATED\_STATUS\_TEXT.” This excludes LEAs that are reported to be inactive, future, or closed in the “Directory” file, referred to FS029. See Table 4 for additional detail.

<sup>3</sup> Indicator is “OPERATIONAL\_SCHOOLS” in FS029

<sup>4</sup> Indicator is “LEA\_TYPE” and “LEA\_TYPE\_TEXT” in FS029.

<sup>5</sup> In total, we exclude 89 Michigan LEAs.

<sup>6</sup> We also tested the analyses using nine comparison states, including Connecticut, Florida, Massachusetts, Minnesota, New Jersey, New Hampshire, Utah, Virginia, and Wisconsin. However, this limited the geographic variability and match quality required to satisfy client requirements for face validity. For more information, see the section on State-Stratified Iterative District Matching.

<sup>7</sup> Colorado does not appear in the final sample. No districts’ match quality with Michigan districts were satisfactory. Of note, many districts were also missing outcome data.

**Table 1** outlines indicators used to determine matched comparisons with Michigan LEAs.

**Table 1.** Covariates included in the District Match

| Indicator   | Mean    | Range       | Number of Districts with observations | Number of Districts with missing values |
|---|---------|-------------|---------------------------------------|---|
| <b>Total LEA or District Enrollment</b>                                   | 2500.76 | 4 – 359476  | 7845                                  | 3                                       |
| <b>Percent of Enrollment for</b>  |         |             |                                       |   |
| American Indian or Alaska native female students                          | 0.78    | 0 – 61.7    | 7831                                  | 17                                      |
| American Indian or Alaska native male students                            | 0.82    | 0 – 63.24   | 7829                                  | 19                                      |
| Asian female students   | 1.22    | 0 – 49.55   | 7843                                  | 5                                       |
| Asian male students   | 1.24    | 0 – 52.98   | 7843                                  | 5                                       |
| Black female students   | 5.85    | 0 – 76.03   | 7843                                  | 5                                       |
| Black male students   | 6.03    | 0 – 99.01   | 7843                                  | 5                                       |
| Hispanic female students  | 5.24    | 0 – 54.71   | 7844                                  | 4                                       |
| Hispanic male students  | 5.49    | 0 – 61.76   | 7844                                  | 4                                       |
| Native Hawaiian or other Pacific female students                          | 0.06    | 0 – 27.06   | 7820                                  | 28                                      |
| Native Hawaiian or other Pacific male students                            | 0.07    | 0 – 28.05   | 7815                                  | 33                                      |
| Two or more races female students   | 1.76    | 0 – 20      | 7844                                  | 4                                       |
| Two or more races male students   | 1.83    | 0 – 28.57   | 7844                                  | 4                                       |
| White female students   | 33.5    | 0 – 73.39   | 7844                                  | 4                                       |
| White male students   | 36.12   | 0 – 80      | 7844                                  | 4                                       |
| Percent IDEA students   | 16.26   | .09 – 100   | 7493                                  | 355                                     |
| Percent EL students   | 5.65    | .07 – 97.28 | 5817                                  | 2031                                    |
| <b>Student-to-teacher ratio</b>   | 14.51   | 0 – 505     | 7841                                  | 7                                       |
| <b>Students in Poverty</b>  |         |             |                                       |   |
| Low   | 0.2     | 0 – 1       | 3547                                  | 4301                                    |
| Below average   | 0.2     | 0 – 1       | 3547                                  | 4301                                    |
| Average   | 0.2     | 0 – 1       | 3547                                  | 4301                                    |
| Above Average   | 0.2     | 0 – 1       | 3547                                  | 4301                                    |
| High  | 0.2     | 0 – 1       | 3547                                  | 4301                                    |
| <b>Urbanicity</b>   |         |             |                                       |   |
| City  | 0.14    | 0 – 1       | 7848                                  | 0                                       |
| Suburban  | 0.31    | 0 – 1       | 7848                                  | 0                                       |
| Town  | 0.15    | 0 – 1       | 7848                                  | 0                                       |
| Rural   | 0.41    | 0 – 1       | 7848                                  | 0                                       |
| <b>LEA type</b>   |         |             |                                       |   |
| Regular public school district not a component of a supervisory union     | 0.79    | 0 – 1       | 7848                                  | 0                                       |
| Regular public school district that is a component of a supervisory union | 0.02    | 0 – 1       | 7848                                  | 0                                       |
| Specialized public school district  | 0.02    | 0 – 1       | 7848                                  | 0                                       |
| Independent charter district  | 0.18    | 0 – 1       | 7848                                  | 0                                       |

| Indicator                    | Mean | Range | Number of Districts with observations | Number of Districts with missing values |
|------------------------------|------|-------|---------------------------------------|---|
| Other local education agency | 0    | 0 – 1 | 7848                                  | 0                                       |
| <b>LEA level</b>             |      |       |                                       |   |
| Other                        | 0.01 | 0 – 1 | 7848                                  | 0                                       |
| Elementary district          | 0.23 | 0 – 1 | 7848                                  | 0                                       |
| Middle district              | 0.01 | 0 – 1 | 7848                                  | 0                                       |
| Secondary school district    | 0    | 0 – 1 | 7848                                  | 0                                       |
| High school district         | 0.1  | 0 – 1 | 7848                                  | 0                                       |
| K-12 school district         | 0.66 | 0 – 1 | 7848                                  | 0                                       |
| 1-12 school district         | 0    | 0 – 1 | 7848                                  | 0                                       |

### Measures and Covariates

For the purposes of these analyses, we conceptualize data as being a matching comparison covariate, matching stratification covariate (i.e., District Level), or an outcome measure (i.e., graduation rate, percent RLA proficient, and percent math proficient). Matching comparison covariates are the variables used to match Michigan districts and their comparison counterparts. Michigan and comparison districts do not need to be identical on these measures for a successful match, but the more similar they are to each other, the better the match value assigned. Our matching stratification covariate, District Level, must be identical for Michigan districts and any of their comparison district matches. This ensures that only districts of similar administrative types are being matched to each other. Outcome measures are not included matching methods but are included in the dashboard. Our outcome measures assess students’ educational achievement across 3 mediums: graduation rate, math proficiency, and reading proficiency.

### Matching Comparison Measures

#### Total LEA or District Enrollment

Total LEA enrollment is captured using a derived student count or education unit total excluding adult education enrollment.<sup>8</sup>

#### Percent of Enrollment by Race/Ethnicity and Sex

The percent of student enrollment by race/ethnicity and sex was calculated from student enrollment reported in the LEA membership data file over total LEA enrollment.<sup>9</sup>

<sup>8</sup> Indicator is “STUDENT\_COUNT” in FS052, where “TOTAL\_INDICATOR” is “Derived - Education Unit Total minus Adult Education Count.”

<sup>9</sup> Indicator is “STUDENT\_COUNT” in FS052, where “TOTAL\_INDICATOR” is “Derived - Subtotal by Race/Ethnicity and Sex minus Adult Education Count.” We calculate male and female enrollment for “American Indian or Alaska Native,” “Asian,” “Black or African American,” “Hispanic/Latino,” “Native Hawaiian or Other Pacific Islander,” “Two or more races,” and “White.” Where reported LEA enrollment<sup>8</sup> is equal to the sum of students by race/ethnicity and sex, we replace any missing data with zero values.

### Percent of Enrollment by English Learner and IDEA status

We calculate the percent of students by English Learner (EL) and IDEA status by dividing the reported number of students by status over the total LEA enrollment.<sup>10</sup>

### Student to Teacher Ratio

We measure student to teacher ratio by dividing the total LEA enrollment by the number of reported teachers.<sup>11</sup> For LEAs with no reported students or teachers, we set the ratio to zero. For LEAs with at least one student, we set the minimum ratio to be 1.

### Measures of Students in Poverty

We estimate the share of students in poverty using Model Estimates of Poverty in Schools (MEPS) information created by the Urban Institute.<sup>12</sup> This measure estimates the school-level share of students residing in households that fall at or below the federal poverty level between fall 2013 and fall 2018.<sup>13</sup> Compared to other measures (e.g., Free and Reduced-Price Lunch), MEPS is standardized across states.<sup>14</sup> MEPS is calculated using several school-, district-, and state-level measures from several sources, including the CCD and the US Census. We aggregate school-level information to the district-level by taking the median of all schools in the district.<sup>15</sup>

### Urbanicity

Urbanicity is measured as a categorical variable based on the locale code of the school district, including, City (11 to 13), Suburban (21 to 23), Town (31 to 33), or Rural (41 to 43).<sup>16</sup>

### District Type

School districts are categorized as either (a) Regular public school district that is not a component of a supervisory union, (b) Regular public school district that is a

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<sup>10</sup> Indicators are "IDEA\_COUNT" and "LEP\_COUNT" in FS02 and FS141.

<sup>11</sup> Indicator is "STAFF\_COUNT" in FS059, where "STAFF" is "Teachers".

<sup>12</sup> The Urban Institute finds that the MEPS model underestimates school-level poverty for districts enrolling high shares of Black students. The Urban Institute recommends the use of modified MEPS, an additional measure that manually adjusts the estimate to align with geographic district poverty rates, for majority Black districts where more than 65,000 people reside in the geographic district. As a result, we use modified MEPS for Detroit Public Schools Community District and its matched comparison districts.

<sup>13</sup> Gutierrez, E., Blagg, K., & Chingos, M. M. (2022). Model Estimates of Poverty in Schools: A New School-Level Measure of Economic Need. Research Report. *Urban Institute*.

<sup>14</sup> Researchers and others widely use shares of students receiving Free and Reduced-Price Lunch to estimate poverty.

<sup>15</sup> Though not used in analyses, we also considered (a) the US Census Bureau's Small Area Income and Poverty Estimates (SAIPE), and (b) the percent of students receiving free and reduced-price lunch (FRPL) and direct certification (DC). We did not pursue the SAIPE as the data only have connections for about two-thirds of school districts (i.e., 13,207 LEAs, including 543 Michigan districts). Percent of students receiving FRPL or DC was measured by dividing receiving students over the total enrollment using data from FS033.

<sup>16</sup> Indicator is "LOCALE" in the NCES Education Demographic and Geographic Estimate (EDGE) geocode data file for the 2018-19 school year (<https://nces.ed.gov/programs/edge/Geographic/SchoolLocations>).



component of a supervisory union, (c) Specialized public school district, (d) Independent charter district, or (e) Other local education agency.<sup>17</sup>

### Matching Stratification Covariate

#### District Level

School districts are categorized as either a (a) ungraded district, (b) pre-kindergarten district, (c) kindergarten district, (d) elementary school district, (e) middle school district, (f) secondary school district, (g) high school district, (h) K-12 school district, (i) 1-12 school district, and (j) other district.<sup>18</sup>

### Outcome Measures

We include three indicators that are used as outcomes to compare matched LEAs against.<sup>19</sup>

#### Graduation Rate

The adjusted-cohort graduation rate.<sup>20</sup>

#### Reading Proficiency

The percent of students that scored at or above proficient for Reading/Language Arts in all grades.<sup>21</sup>

#### Math Proficiency

The percent of students that scored at or above proficient for mathematics in all grades.<sup>22</sup>

## State-Stratified Iterative District Matching

### Overview

We use *mahapick*,<sup>23</sup> a Stata installable user-created program, to match Michigan LEAs with five similar districts based on the covariates discussed above. *Mahapick* is used to estimate the Mahalanobis distance<sup>24</sup> between each Michigan LEA against all

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<sup>17</sup> Indicator is “LEA\_TYPE” and “LEA\_TYPE\_TXT” in FS029. LEAs include public agencies or organizations that provide education (e.g., hospitals, residential treatment centers, justice facilities) and postsecondary schools or agencies (e.g., community colleges or technical institutes). Note, as noted above, we exclude LEAs that are either a *service agency*, a *state agency*, a *federal agency*, or a *supervisory union administrative center*.

<sup>18</sup> See [https://nces.ed.gov/ccd/doc/11\\_Changes\\_SCH\\_LEA\\_Level\\_Assignments\\_3.4.2020.docx](https://nces.ed.gov/ccd/doc/11_Changes_SCH_LEA_Level_Assignments_3.4.2020.docx) for additional details. We make the following changes: we pull out *K-12 school district* and *1-12 school district* from other based on grades. Remaining *other districts* offer K-8 grades. Michigan districts are matched only to comparison districts who share the same district level to ensure that appropriate comparisons are being made.

<sup>19</sup> See section “Role of perturbed data” for additional detail.

<sup>20</sup> Indicator is “ALL\_RATE\_1819” from Adjusted Cohort Graduation Rate file, which is calculated as  $(\text{Number of cohort members who earned a regular high school diploma by the end of SY 2018 – 19}) / (\text{Number of first – time 9th graders in Fall 2015 (starting cohort) plus students who transferred in, minus students who transferred out, emigrated, or died during SY 2015 – 16, 2016 – 17, 2017 – 18, and 2018 – 19})$ .

<sup>21</sup> Indicator is “ALL\_RLA00PCTPROF\_1819” from Achievement Results for State Assessments in Reading/Language Arts file.

<sup>22</sup> Indicator is “ALL\_MTH00PCTPROF\_1819” from Achievement Results for State Assessments in Mathematics file.

<sup>23</sup> Kantor, D. (2012). MAHAPICK: Stata module to select matching observations based on a Mahalanobis distance measure.

<sup>24</sup> The Mahalanobis distance measure is a statistical measure of how similar school districts are to each other based on their matched covariate characteristics. The smaller the distance measure between two districts, the more similar the districts are to

other LEAs in the match pool. We select the top two matches from each comparison state in the sample (i.e., matches with the lowest Mahalanobis distance score).<sup>25</sup> We use these matches to compare our outcome measures between Michigan LEAs and their similarly matched comparison LEAs.

Matching covariates (see

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each other. It is measured as:  $d = \sqrt{(y - \mu)' \Sigma^{-1} (y - \mu)}$ , where  $d$  is the distance between a vector  $y$  to a distribution with mean  $\mu$  and covariance  $\Sigma$ . The measure  $d$  represents how far a district is from our treatment distribution in terms of standard deviations.

<sup>25</sup> We match Michigan districts with other districts individually by state. Michigan districts may share matched districts.

**Table 1** for the full list) are added to the model sequentially to address problems of missing data.<sup>26</sup> Matches are clustered by district level, meaning that Michigan LEAs can only be matched to comparison districts that share the same level type. For example, Michigan K-12 districts were only matched to fellow comparison K-12 districts.

Initially, our matching process just identified the top 5 matches regardless of state. However, due to client feedback we modified our approach to ensure that at least 3 unique states were present across the 5 matches. By generating a maximum of two matches for each state in the sample, and then combining all matches together across states and selecting the top 5, we guarantee that there will be at least 3 states represented among the matches for each Michigan district. Some Michigan districts experienced meaningful decreases in match quality with some of their matched districts as a result of this modification; it was at this point in the process that we expanded the comparison sample from 9 states to 19.

### **Addressing missing data**

Some missing data are present in the district matching covariates.<sup>27</sup> Given *mahapick* uses list-wise deletion, the default behavior would kick out LEAs without all the covariates in the model. To maximize available data, we employ an iterative matching process. All Michigan districts are included in a full matching model. Then, a single matching covariate is iteratively removed in a sequence of least to most missing data until all Michigan districts have the necessary number of matches. We give preference to matches with the most covariates.<sup>28</sup>

### **Additional evaluation of match quality**

Matches were reviewed for match quality and face-validity. Upon review, we created additional benchmarks that matches must meet to be included. An additional six LEAs did not meet the designated match score for match quality.<sup>29</sup> In total, we found quality matches for all 822 Michigan districts in the sample.

Additionally, given the uniqueness of Detroit Public Schools Community District and to ensure face-validity, we manually matched the district to five other school districts

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<sup>26</sup> Process is discussed in “Addressing missing data.”

<sup>27</sup> We explored other mechanisms for addressing missing data, including multiple imputation methods utilizing a chained equation approach (MICE) in Stata. Given the project’s intended audience, we opted to utilize true observations.

<sup>28</sup> 97.1% (810) of Michigan districts were able to find matches across all covariates. Of the remaining Michigan districts, 2 were able to find matches excluding EL students, and 23 were able to find matches excluding percent IDEA and EL students. We also explored other methods including multiple imputation by chained equations. After reviewing match quality and considering the public nature of these matches, it was decided to utilize non-imputation methods.

<sup>29</sup> LEAs with a distance measure larger than 100 were manually reviewed.

based on their percent of students living in poverty as well as their racial demographic characteristics.<sup>30</sup>

### **Evaluating sample selection bias**

To determine whether matching methods have introduced bias, Heckman two-step models (Heckman, 1979) are used. This method is applied in two stages. First, models estimate the probability of being included in the matching sample. Second, from these analyses, a corrective factor is estimated<sup>31</sup> and inserted into subsequent OLS regression models estimating the effects of covariates on outcomes. A likelihood ratio (LR) test indicates if the selection and subsequent OLS regression models are independent and therefore selection effects would not be a significant concern. LR tests for graduation rate ( $X^2 = 575.75, p > X^2 = 0$ ), math proficiency ( $X^2 = 26.05, p > X^2 = 0$ ), and RLA proficiency ( $X^2 = 0.12, p > X^2 = 0.725$ ) indicates that selection effects do not appear to be a concern for graduation rates and math proficiency but do for RLA proficiency. Given that the goal was to compare Michigan districts to top performers, some selections are anticipated.

### **Role of perturbed data**

Given our use of public-use data, privacy protection methods have been applied to indicators of graduation rates, reading proficiency, and math proficiency. Privacy protections shield sensitive data either by providing a range of possible values (e.g., “Greater than 50” or “Less than 10”) or suppressing the data outright. Overall, about two-thirds of Michigan districts are impacted, to some degree, by the privacy protection of our outcome measures (553/834). This is consistent with other non-Michigan districts in the sample (

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<sup>30</sup> Detroit was matched to Cincinnati Public Schools, Milwaukee School District, Newport News City Public Schools, Cleveland Municipal, and Norfolk City Public Schools.

<sup>31</sup> Inverse Mills ratio.

**Table 2).**

**Table 2.** Number of outcomes with any privacy protection

| All sample districts |                      |                        |
|----------------------|----------------------|------------------------|
|                      | <i>Distinct LEAs</i> | <i>Percent of LEAs</i> |
| <b>None</b>          | 2,940                | 37%                    |
| <b>1</b>             | 2,695                | 34%                    |
| <b>2</b>             | 1,179                | 15%                    |
| <b>3</b>             | 1,034                | 13%                    |
| Michigan districts   |                      |                        |
| <b>None</b>          | 281                  | 34%                    |
| <b>1</b>             | 328                  | 39%                    |
| <b>2</b>             | 100                  | 12%                    |
| <b>3</b>             | 125                  | 15%                    |

We further examine the impact scope of privacy perturbation on our outcome measures. We create a privacy protection range measure that captures the distance between the lower and upper bounds of the privacy protection range. For ranges utilizing a less than (or greater than), we use a lower (or upper) bound of 0 (or 100).

**Table 3** shows the privacy protection ranges for our three outcome measures.<sup>32</sup> We find that most districts that have privacy protection have a privacy protection range of 1 to 5 percent. Given this, we use the mid-point of the privacy protection range as the value for analyses.

**Table 3.** Number of districts by privacy protection range by outcome

|                              | Graduation Rate | Reading | Math |
|------------------------------|-----------------|---------|------|
| <b>Missing</b>               | 200             | 6       | 6    |
| <b>No Privacy Protection</b> | 180             | 604     | 603  |
| <b>1</b>                     | 1               | 0       | 1    |
| <b>3</b>                     | 0               | 10      | 16   |
| <b>4</b>                     | 222             | 127     | 111  |
| <b>5</b>                     | 34              | 2       | 12   |
| <b>8</b>                     | 7               | 5       | 4    |
| <b>9</b>                     | 59              | 22      | 11   |
| <b>10</b>                    | 42              | 4       | 16   |
| <b>18</b>                    | 3               | 11      | 6    |
| <b>19</b>                    | 16              | 6       | 3    |
| <b>20</b>                    | 38              | 7       | 15   |
| <b>50</b>                    | 28              | 20      | 20   |
| <b>Completely Shielded</b>   | 4               | 10      | 10   |

<sup>32</sup>Of note, about a quarter of Michigan districts do not have any data for graduation rates. This is not totally unexpected given that graduation rates would necessitate having students that are applicable for graduation.

## Multivariate Regression Analyses

To determine whether Michigan school districts, overall, fare better or worse, compared to school districts in other states, we conducted a series of ordinary least squares (OLS) regression analyses predicting graduation rates and reading and math proficiency.<sup>33</sup>

We find that Michigan districts underperform in terms of graduation rates, math proficiency, and RLA proficiency. We find, that overall, this holds true after accounting for common student and district characteristics. When comparing Michigan districts against non-Michigan districts within the same poverty rate band, we find that, on average, Michigan districts underperform. Note, we did not find a significant difference between Michigan and non-Michigan districts for graduation rate for districts with the lowest rates of poverty.

Additional detail for regression analyses can be found in the “Regression analyses” addendum.

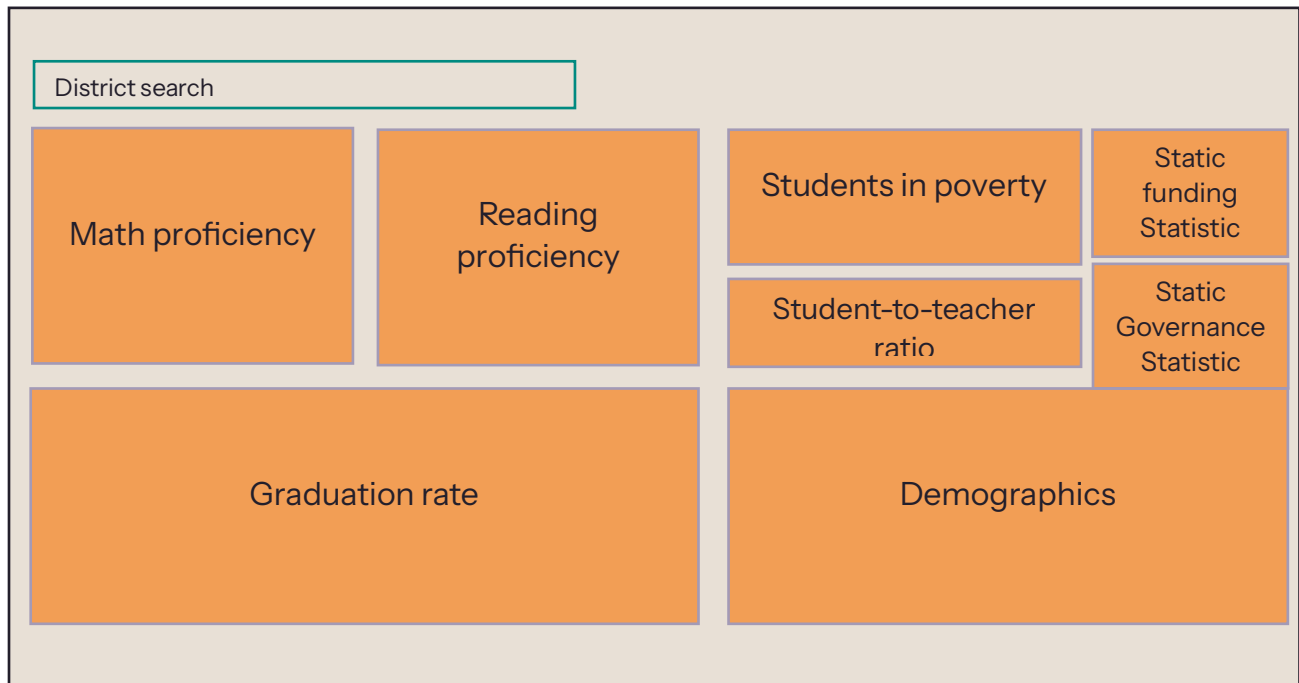
## Dashboard and Visualization Analyses

To design the dashboard, we first gathered requirements from the client. Together with client, we developed a dashboard concept that consisted of one primary view and several drill-down views. The primary view contains the main navigation of the dashboard, where users can use a search bar and drop-down menu to select the Michigan district of their choice. The dashboard then displays the characteristics and outcome measures of the selected Michigan district, compared with a composite measure of the five matched districts.

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<sup>33</sup> We compare estimates from robust models against the standard OLS estimates and find little differences in significance and magnitude of relationships.

Figure 1. Dashboard layout



**Figure 1** shows the dashboard layout. The left side of the dashboard displays the following outcome measures: math proficiency, reading proficiency, and graduation rate.

- Math proficiency is the average proficiency of all tested students in the district. The comparison bar is the average math proficiency of the five comparison districts.
- Reading proficiency is the average of all tested students in the district. The comparison bar is the average reading proficiency of the five comparison districts.
- Graduation rate is the total graduation rate. The comparison chart is the average graduation rate of the five comparison districts.

The right side of the dashboard displays students in poverty, demographics, student-to-teacher ratio, demographics, and two static statistics<sup>34</sup> about funding and governance provided by the client.

To drill down on an outcome measure or district characteristic, users can click on the heading for a given measure/characteristic. This will navigate them to the drill-down sheet for that measure/characteristic, where they can view the Michigan district's data against each individual matched district.

To build the dashboard in Power BI, we first conducted some light formatting and reshaping of the data. Using Stata, we reshaped the individual race/ethnicity variables

<sup>34</sup> These statistics do not stem from the data described above, and are cited in the dashboard.



from wide to long, resulting in a single categorical race/ethnicity variable that was better suited for demographic visualizations in Power BI. We then loaded the primary data file and a secondary data file containing the reshaped race/ethnicity data into Power BI as Excel spreadsheets.

In Power BI, we designed an initial dashboard according to the requirements gathered from the client prior to development. In the initial absence of color or font preferences from the client, we chose a relatively neutral primary color scheme with a bright but clean secondary color scheme. The design and look-and-feel of the dashboard were refined iteratively as a result of client meetings and feedback sessions. The final design was provided by another firm working with the client, and was implemented by AEM.

In response to client feedback, we added a static comparison point to the dashboard that displays a “best-in-the-nation” data point. This enables users to compare both Michigan and the match districts with outcomes for the top district in the nation.

We identified a “best in the nation” district for graduation rate, percent math proficiency, and percent ELA proficiency. We limited eligible districts to those that were classified as regular public-school districts. In the event of a tie score, the districts’ other achievement metrics were used to break the tie. For graduation rate, the top performer was Mequon-Thiensville School District (LEA ID: 5509130) with a graduation rate of 99.5 percent. For percent math proficiency, the top performer was Scott County Public Schools in Virginia (LEA ID: 5103480) with a proficiency rate of 92 percent. For percent reading proficiency, the top performer was Englewood Cliffs School District in New Jersey (LEA ID: 3404770) with a proficiency rate of 93 percent.

Table 4. Sample file sources

| File Name   | Level  | FS  | Website/URL   | Distinct LEAs |
|---|--------|-----|---|---------------|
| <b>Children with disabilities (IDEA) school age</b>                       | LEA    | 002 | <a href="https://nces.ed.gov/ccd/data/zip/ccd_lea_2_89_1819_l_1a_091019.zip">https://nces.ed.gov/ccd/data/zip/ccd_lea_2_89_1819_l_1a_091019.zip</a>   | 18,705        |
| <b>Directory</b>  | LEA    | 029 | <a href="https://nces.ed.gov/ccd/Data/zip/ccd_lea_029_1819_l_1a_091019.zip">https://nces.ed.gov/ccd/Data/zip/ccd_lea_029_1819_l_1a_091019.zip</a>   | 19,840        |
| <b>Free and reduced-price lunch</b>                                       | School | 033 | <a href="https://nces.ed.gov/ccd/data/zip/ccd_sch_033_1819_l_1a_091019.zip">https://nces.ed.gov/ccd/data/zip/ccd_sch_033_1819_l_1a_091019.zip</a>   | 18,393        |
| <b>Membership</b>   | LEA    | 052 | <a href="https://nces.ed.gov/ccd/data/zip/ccd_lea_052_1819_l_1a_091019.zip">https://nces.ed.gov/ccd/data/zip/ccd_lea_052_1819_l_1a_091019.zip</a>   | 18,790        |
| <b>Staff</b>  | LEA    | 059 | <a href="https://nces.ed.gov/ccd/data/zip/ccd_lea_059_1819_l_1a_091019.zip">https://nces.ed.gov/ccd/data/zip/ccd_lea_059_1819_l_1a_091019.zip</a>   | 19,511        |
| <b>English Learners</b>   | LEA    | 141 | <a href="https://nces.ed.gov/ccd/data/zip/ccd_lea_141_1819_l_1a_091019.zip">https://nces.ed.gov/ccd/data/zip/ccd_lea_141_1819_l_1a_091019.zip</a>   | 18,524        |
| <b>Achievement Results for State Assessments in Mathematics</b>           | LEA    | NA  | <a href="https://www2.ed.gov/about/inits/ed/edfacts/data-files/math-achievement-lea-sy2018-19-wide.csv">https://www2.ed.gov/about/inits/ed/edfacts/data-files/math-achievement-lea-sy2018-19-wide.csv</a> | 17,401        |
| <b>Achievement Results for State Assessments in Reading/Language Arts</b> | LEA    | NA  | <a href="https://www2.ed.gov/about/inits/ed/edfacts/data-files/rla-achievement-lea-sy2018-19-wide.csv">https://www2.ed.gov/about/inits/ed/edfacts/data-files/rla-achievement-lea-sy2018-19-wide.csv</a>   | 17,396        |
| <b>Adjusted Cohort Graduation Rate</b>                                    | LEA    | NA  | <a href="https://www2.ed.gov/about/inits/ed/edfacts/data-files/acgr-lea-sy2018-19-wide.csv">https://www2.ed.gov/about/inits/ed/edfacts/data-files/acgr-lea-sy2018-19-wide.csv</a>                         | 11,832        |

## Note

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