

# **Peer School Methodology White Paper**

**New Jersey Department of Education  
Trenton, NJ 08625**

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## Introduction

New Jersey's creation of district factor groups (DFGs) in 1975 was precedent setting in establishing the opportunity for school districts across the state to compare themselves against other school districts on the basis of a wide variety of academic, financial, and operational metrics collected over time. DFGs have served New Jersey well over the preceding decades but, as it has been well documented, were limited in their original scope by both the currently available data and existing technology at the time.<sup>1</sup> Today, New Jersey aims to continue improving upon school-level comparisons by updating the metrics, method, and resulting peer groups.

In February 2012, New Jersey's flexibility request from existing regulations of the federal Elementary and Secondary Education Act (ESEA), also known as *No Child Left Behind*, was accepted by the U.S. Department of Education.<sup>2</sup> The state outlined in the request how it would proceed in updating and releasing public reports of school academic, demographic, and climate information through the generation of performance reports. A departure from the existing school report cards, these performance reports are envisioned as the heart of the NJDOE's college and career ready school performance system and are an opportunity to provide significantly more value to schools and their local stakeholders by presenting data that both is meaningful for gauging progress of students as well as contextualizes that progress against valid comparisons such as state targets and peer groups.<sup>3</sup> Further, the annual presentation of these performance reports "enables the NJDOE to fairly and transparently categorize schools so schools receive the support and/or recognition they deserve and need" while also creating the chance to engage with others about ways in which the school can continue to improve upon prior practice and persistently engage in rich conversations that advance the health, effectiveness, and overall student outcomes goals of the school.<sup>4</sup> It is this process of looking critically at data in context (e.g., trend, peer comparisons), engaging in discussion about consistent improvements, and adopting effective practices from others consistently across both public and private sectors that time and again improves an organization, if done correctly.

The purpose of this working paper is to outline the methodology used for establishing the peer groups that each eligible school would be compared with on data contained in the performance reports.

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<sup>1</sup> New Jersey Department of Education. *New Jersey Department of Education District Factor Groups (DFGs) for School Districts*. <http://www.state.nj.us/education/finance/sf/dfg.shtml>. Accessed October 2012.

<sup>2</sup> New Jersey Department of Education. November 2011. *ESEA Waiver Request from New Jersey*. [www.ed.gov](http://www.ed.gov)

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

## Peer Methodology in Brief

Each school (“eligible school”) that receives a performance report with valid student outcome data will also be paired with a list of approximately 30 other, similar peer schools. The underlying premise of the selection of these peer schools is based on the demographic characteristics of the students assigned to the school building.

This peer methodology builds on this premise by incorporating reliable and available data that helps to describe the students in the school as well as other factors such as the grade span of the school. These factors indicators include:

- Percent of students that are free or reduced price lunch (%)
- Percent of students that are limited English proficient (%)
- Percent of students that are in special education (%)
- Grade span of the school (elementary, middle, high).

The peer methodology will use propensity score matching to establish the peer groups for each eligible school. Propensity score matching is an established statistical technique that helps to construct comparison groups from data observed outside of an experiment. This method identifies the best available control group (or comparison group) for each eligible school. In this case, propensity score matching will identify up to 30 peers on the basis of the indicators noted above.

## Background

The preparation and release of new performance reports for each school within New Jersey is part of an overall agenda to increase the number of New Jersey students that graduate from high school truly ready for college and career. One of the key principles behind these change efforts is the continued pursuit of improvement through the effective use of data-driven or informed decision-making.<sup>5</sup> These improvements are sought in both a frame that calls for appropriate support to schools to make demonstrable gains for students and having clear accountability when progress is not obtained. Every school in New Jersey has some area that needs improvement. The performance reports and the data contained in them will assist every school in taking the next step for improvement.

The state’s flexibility request from the Elementary and Secondary Education Act (ESEA) is explicit in identifying the performance reports as a core element of the new accountability system that “provides clear, meaningful information on student performance and college and career-readiness.”<sup>6</sup> One of the key elements of the performance reports that help to create value and opportunity for benchmarking is the peer groups.

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<sup>5</sup> New Jersey Department of Education. November 2011. *ESEA Waiver Request from New Jersey*. [www.ed.gov](http://www.ed.gov)

<sup>6</sup> Ibid.

Outside of individual school districts or schools informally constructing their own peer comparisons, New Jersey's benchmarking methodology was best captured in the construction of the District Factor Groups (DFGs). First developed in 1975 for the purpose of comparing students' performance on statewide assessments across demographically similar school districts, this methodology has long served to help contextualize performance of school districts across the state. Further, DFGs have also played an important functional role in identifying initial groups of school districts that were classified as Abbott districts.<sup>7</sup> DFG groupings are recalculated approximately every ten years once new information becomes available from the decennial census administered by the federal government. The methodology uses six variables that are closely related to socio-economic status. They include: (1) percent of adults with no high school diploma, (2) percent of adults with some college education, (3) occupational status of adults, (4) unemployment rate, (5) percent of individuals in poverty, and (6) median family income. The methodology has several distinct advantages. First, the data used to construct the DFGs are an accurate reflection of the community and neighborhoods in which the school district resides. Second, the data is highly reliable as it comes from the decennial census data.

Despite the advantages of this approach, there are also disadvantages to this approach. First and perhaps most important is that the indicators do not necessarily reflect the student population that a school district serves. That is, indicators used in establishing DFGs relate primarily to the adults in the local community, not necessarily the students in those schools. Second, DFGs are only created at the school district level, creating broad categories that may not be appropriate for comparison at the school level. For example, a smaller school district's DFG variables are more likely to have less variance than a larger school district by virtue of the fact that its boundaries are smaller and therefore less variable. Third, DFG groupings miss vital differences among schools within school districts that may generate inappropriate comparisons. For example, schools districts may have variance in student populations within a district that lead schools within the same district to have different types of students. Finally, the span of time between updates to the DFGs is too long and does not account for changes that occur throughout the course of a decade.

It is for these reasons that the pursuit of a new peer methodology that not only goes to the school level but also uses variables more highly related to the students in the school will help in bringing about increased value to schools in New Jersey when using the performance reports.

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<sup>7</sup> New Jersey Department of Education. 2004. *New Jersey District Factor Groups: Calculation of Groups from 2000*. Executive Summary. <http://www.state.nj.us/education/finance/sf/dfg.shtml>. Accessed October 2012.

## Methodology

The peer school methodology builds upon the strengths of the district factor groups (DFGs) while improving upon the disadvantages noted above about DFGs. More specifically, this methodology continues to retain a very similar purpose to the DFGs – comparing students’ performance on statewide assessments across demographically similar entities.<sup>8</sup> In order to generate school-level peer schools, however, this analysis takes advantage of data now available at the student-level that can be aggregated to the school level.

The statistical method used to formulate the schools that are part of a peer group is determined using a well-regarded research strategy known as propensity score matching. Propensity score matching allows a researcher to construct comparison groups from data observed outside the control of the experiment. For example, if you want to know the effect of a medical treatment on a specific population, you need to compare participants in the medical treatment to non-participants to be confident that the differences between the two populations are really attributable to the medical treatment and not another variable. Details of the method and the variables used in the analysis are explained in additional detail below.

The result of this methodology will be the establishment of a comparison group of up to 30 peer schools that are the most similar to the eligible school based upon a set of data indicators. A school that is eligible is one that produces standardized academic outcome data identified in the performance reports. This peer group will be unique to each eligible school. That is, unlike the DFGs, the schools that are identified in an eligible school’s peer group will be different from any other eligible school’s peer group. From this unique peer group several data points in the performance report will be created including the peer average and peer percentile rank.

The peer average for a given standardized academic outcome will be calculated based upon those 30 peer schools’ available academic data that are selected for that eligible school. In some cases, data for one of the peer schools in the group may not be available. In that case, the peer average for that indicator will be made by excluding the school without any available data. This will present a more accurate picture of the peer average for that outcome indicator. The peer percentile rank will be the rank of the eligible school in comparison to its peers.

It is intended that these peer groups and subsequently the peer average be updated annually to reflect any changes that had occurred in the prior year both in regards to the demographic make-up of the school as well as other structural changes, e.g., a school is consolidated and adds several grades. Given these annual shifts, it is possible that the peer groups for each school will change on a year-to-year basis.

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<sup>8</sup> New Jersey Department of Education. 2004. *New Jersey District Factor Groups: Calculation of Groups from 2000*. Executive Summary. <http://www.state.nj.us/education/finance/sf/dfg.shtml>. Accessed October 2012.

Peer groups for an eligible New Jersey school begins with determining which schools are eligible to generate a peer group. That is, not all schools that operate in New Jersey are eligible to receive a peer group, as not all schools produce standardized academic outcomes for their students – which are the primary basis upon which a comparison can be made to other peer schools. Therefore, schools that do not report on standardized academic outcomes annually are excluded from the calculation of peer groups. The reasons these schools do not have standardized academic outcomes are numerous. However primarily, these schools serve students that do not participate in annual statewide testing, e.g., NJASK, HSPA, etc. Examples of such school are schools that are configured to serve Kindergarten to 2<sup>nd</sup> grade students.

Data drawn from the New Jersey school directory<sup>9</sup> list the total number of schools as 2,527. Based upon the criteria above, not all schools are eligible to have a propensity score match. Of the 2,527 schools there were 332 schools that were excluded for one or more reasons cited above. Those 332 schools account for 13% of the total schools in the New Jersey school directory. This results in a total of 2,195 schools determined to be eligible for propensity score matching. Table One below provides a summary of the school type, the number of schools, and whether that school type received a propensity score match. Those school types that were designated ‘Y’ under propensity score match received a peer group.

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<sup>9</sup> New Jersey Department of Education. *School Directory Download: Public Schools*. <http://education.state.nj.us/directory/>. Accessed November 2012.

**Table One: New Jersey School Type, Eligibility for Propensity Score Match**

School Type	Number of Schools	Propensity Score Matched?
<b>Elementary Schools</b>	1,112	Y
<b>Middle Schools<sup>10</sup></b>	698	Y
<b>High Schools<sup>11</sup></b>	346	Y
<b>Vocational High Schools</b>	39	Y
<b>Early Elementary Schools<sup>12</sup></b>	164	N
<b>Special Schools for the Handicapped</b>		
<b>Elementary</b>	17	N
<b>Secondary</b>	14	N
<b>Elementary/Secondary</b>	37	N
<b>Adult Education School</b>		
<b>General</b>	16	N
<b>Evening Schools</b>	6	N
<b>Vocational Technical</b>	6	N
<b>Alternative Education School</b>	4	N
<b>Non-Tested Grades<sup>13</sup></b>	68	N

In order for peer school comparisons to be drawn, each school needs a control or comparison group. However, because no school in this analysis was either a “treatment” or “control” school, propensity score matching provides a way in which to stratify the schools to make the comparison. In this analysis, the remaining 2,195 schools were stratified based upon two characteristics. The first strata were done by school type. These schools were stratified into elementary, middle, high school and vocational high school. It stands to reason that one of the most common characteristics among these schools would be across the grade levels and age of students that they serve. Grade levels, as reported to the National Center for Education Statistics at the U.S. Department of Education, were used to sort each school into one of these four school types. Grade levels in the elementary, middle, and high school types can be found in the Appendix.

<sup>10</sup> Includes school types labeled as approved junior high schools.

<sup>11</sup> Includes school types labeled as four-year high school, six-year high school, other high schools, three-year high school, and county-vocational high school.

<sup>12</sup> Includes school types labeled as nursery/preschool and Kindergarten school. Also, grade levels included in this school type are Pre-Kindergarten (Pre-K), Pre-K – Kindergarten (K), Pre-K – 1<sup>st</sup> grade, Pre-K – 2<sup>nd</sup> grade, Kindergarten, K – 1<sup>st</sup> grade, and K – 2<sup>nd</sup> grade

<sup>13</sup> This category refers to schools that are new and do not have performance data in order to qualify them for comparison to peer groups.

The second strata were done by range of free- and/or reduced-price lunch. During the methodological development, an attempt to use school locale – urban, suburban, towns or rural – as the second strata was made but ultimately failed, as the school locale data from the National Center for Education Statistics was founded to be too badly flawed to generate fair comparisons. For example, Atlantic City HS is classified by NCEES as existing in a suburb rather than a city, as it is built on a peninsula-like piece of land off of the Atlantic City Expressway and not in the city – where all other schools in the district are located. Additionally, barrier island school districts were often considered suburbs rather than towns because as ‘the crow flies’ (across the bay) they were near suburban populations.

Table Two below provides a summary of the of the percentage of free or reduced price lunch, the school configuration, and a count of schools in each category. The highest count of schools exists in the very low economic disadvantaged group in elementary school (n=347) while the lowest count of schools exists in the very high economic disadvantaged group in vocation high schools (n=7).

**Table Two: New Jersey Eligible Schools by Free/Reduced Lunch and Type**

Free/Reduced Lunch	Elementary	Middle	High	Vocational High
<b>0 – 9.9%</b>	347	157	102	14
<b>10 – 29.9%</b>	309	164	97	10
<b>30 – 69.9%</b>	294	173	100	8
<b>70 – 100%</b>	162	204	47	7

Each subgroup noted above, e.g., elementary and 0 – 9.9%, were assigned to a treatment group and a probit regression model was used to calculate the corresponding propensity scores. The covariates used in this analysis for each eligible school were collected from the most recent school year, 2011-12. This set of data is the closest match from available data sources to the make-up of the student group that is listed in the performance reports. Therefore, it is reasonable to presume that these variables well describe the make-up of students assigned to the school building and for which the school is held accountable to educate.<sup>14</sup> The covariates used in this analysis include:

- Percent of students that are economically disadvantaged (receiving free or reduced-price lunch) (FRPL)
- Percent of students that are limited English proficient (LEP),
- Percent of students that are in special education (SpEd)

<sup>14</sup> More information about accountability provisions under NCLB, including the requirement to include the scores of students who are not necessarily in attendance in the school can be found here: <http://www.state.nj.us/education/title1/accountability/>

It is important to understand the definition for these variables including how this data is collected and calculated. The data are drawn from the NJSMART State Core submission from October 2011 collected at a student-level and aggregated to create the following measures at the school level:

- a. Percent (%) of students that are economically disadvantaged: The most common indicator used within schools to determine the proportion of the student population that is economically disadvantaged is the free or reduced price lunch (FRPL) status which indicates if a student is eligible for FRPL. One difficulty with this indicator is that it is not as robust at the secondary level as it is at the elementary level. That is, fewer students report their FRPL at the secondary level than those that do at the elementary level. However, this is the best proxy currently available short of knowing the precise family income and status. The indicator is constructed by dividing the total number of FRPL students at the school divided by the total number of students enrolled.
- b. Percent (%) of students that are limited English proficient (LEP): This indicator is the percent of students that identified by districts as receiving limited English proficiency program supports. The indicator is constructed by dividing the total number of LEP students at the school by the total number of students enrolled.
- c. Percent (%) of students that are in Special Education: This shows the percentage of students with an Individualized Education Program (IEP), including speech, regardless of placement and programs. This categorization includes all special education students including those with mild to severe disabilities. The indicator is constructed by dividing the total number of special education students at the school divided by the total number of students enrolled.

These covariates were applied to the analysis and helped to generate the propensity scores for each eligible school. Then, looking at the distribution of the scores, it was determined that any school that was within two standard deviations of the eligible school would be included as a peer school. Table Three below provides the descriptive statistics for each of the first strata on school type – elementary, middle, high school and vocational high school.

**Table Three: Descriptive Statistics for Propensity Score Matching by Stratum**

	Observations	Mean	Standard Deviation	Maximum	Minimum
<i>Elementary Schools</i>					
<b>Enrollment</b>	1,112	428	175	1,529	43
<b>Economically Disadvantaged</b>	1,112	31.1%	28.5%	99.8%	0.0%
<b>Limited English Proficient</b>	1,112	4.6%	7.6%	54.7%	0.0%
<b>Special Education</b>	1,112	13.2%	5.3%	39.7%	0.0%
<i>Middle Schools</i>					
<b>Enrollment</b>	698	581	304	1,905	39
<b>Economically Disadvantaged</b>	698	42.3%	33.2%	100%	0.0%
<b>Limited English Proficient</b>	698	3.8%	6.6%	40.2%	0.0%
<b>Special Education</b>	698	13.9%	5.4%	40.7%	0.0%
<i>High Schools</i>					
<b>Enrollment</b>	346	1,106	595	3,364	68
<b>Economically Disadvantaged</b>	346	31.6%	27.2%	93.5%	0.0%
<b>Limited English Proficient</b>	346	2.5%	4.6%	33.6%	0.0%
<b>Special Education</b>	346	14.5%	4.8%	38.1%	0.3%
<i>Vocational High Schools</i>					
<b>Enrollment</b>	39	561	529	3,212	61
<b>Economically Disadvantaged</b>	39	30.2%	29.1%	86.3%	0.0%
<b>Limited English Proficient</b>	39	0.4%	1.7%	9.2%	0.0%
<b>Special Education</b>	39	11.2%	13.7%	57.9%	0.0%

## Appendix: Grade Spans

Table Four below provides a list of the schools and their grade spans that fall into each of the school type buckets: elementary, middle, and high school.

**Table Four: New Jersey School Type, Grade Span by School Type**

Elementary	Middle	High
Pre-K – 3 <sup>rd</sup> grade	Pre-K – 7 <sup>th</sup> grade	Pre-K – 12 <sup>th</sup> grade
Pre-K – 4 <sup>th</sup> grade	Pre-K – 8 <sup>th</sup> grade	K – 11 <sup>th</sup> grade
Pre-K – 5 <sup>th</sup> grade	Pre-K – 9 <sup>th</sup> grade	K – 12 <sup>th</sup> grade
K – 3 <sup>rd</sup> grade	K – 7 <sup>th</sup> grade	6 <sup>th</sup> – 12 <sup>th</sup> grade
K – 4 <sup>th</sup> grade	K – 8 <sup>th</sup> grade	7 <sup>th</sup> – 11 <sup>th</sup> grade
K – 5 <sup>th</sup> grade	K – 9 <sup>th</sup> grade	7 <sup>th</sup> – 12 <sup>th</sup> grade
K – 6 <sup>th</sup> grade	1 <sup>st</sup> – 7 <sup>th</sup> grade	8 <sup>th</sup> – 12 <sup>th</sup> grade
1 <sup>st</sup> – 3 <sup>rd</sup> grade	1 <sup>st</sup> – 8 <sup>th</sup> grade	9 <sup>th</sup> – 12 <sup>th</sup> grade
1 <sup>st</sup> – 4 <sup>th</sup> grade	2 <sup>nd</sup> – 7 <sup>th</sup> grade	10 <sup>th</sup> – 12 <sup>th</sup> grade
1 <sup>st</sup> – 5 <sup>th</sup> grade	2 <sup>nd</sup> – 8 <sup>th</sup> grade	11 <sup>th</sup> – 12 <sup>th</sup> grade
1 <sup>st</sup> – 6 <sup>th</sup> grade	3 <sup>rd</sup> – 7 <sup>th</sup> grade	
2 <sup>nd</sup> – 3 <sup>rd</sup> grade	3 <sup>rd</sup> – 8 <sup>th</sup> grade	
2 <sup>nd</sup> – 4 <sup>th</sup> grade	4 <sup>th</sup> – 8 <sup>th</sup> grade	
2 <sup>nd</sup> – 5 <sup>th</sup> grade	5 <sup>th</sup> – 8 <sup>th</sup> grade	
2 <sup>nd</sup> – 6 <sup>th</sup> grade	5 <sup>th</sup> – 10 <sup>th</sup> grade	
3 <sup>rd</sup> – 4 <sup>th</sup> grade	6 <sup>th</sup> – 7 <sup>th</sup> grade	
3 <sup>rd</sup> – 5 <sup>th</sup> grade	6 <sup>th</sup> – 8 <sup>th</sup> grade	
3 <sup>rd</sup> – 6 <sup>th</sup> grade	6 <sup>th</sup> – 9 <sup>th</sup> grade	
4 <sup>th</sup> – 5 <sup>th</sup> grade	6 <sup>th</sup> – 10 <sup>th</sup> grade	
4 <sup>th</sup> – 6 <sup>th</sup> grade	7 <sup>th</sup> grade	
5 <sup>th</sup> – 6 <sup>th</sup> grade	7 <sup>th</sup> – 8 <sup>th</sup> grade	
5 <sup>th</sup> grade	7 <sup>th</sup> – 9 <sup>th</sup> grade	
6 <sup>th</sup> grade	7 <sup>th</sup> – 10 <sup>th</sup> grade	
	8 <sup>th</sup> grade	
	8 <sup>th</sup> – 9 <sup>th</sup> grade	

K = Kindergarten

Pre-K = Pre-Kindergarten

The grade spans that were excluded from the eligible schools included: ungraded, Pre-K – 2<sup>nd</sup> grade, K – 2<sup>nd</sup> grade, Pre-K – 1<sup>st</sup> grade, 1<sup>st</sup> – 2<sup>nd</sup> grade, Pre-K, K – 1<sup>st</sup> grade, K, Pre-K – K, 2<sup>nd</sup> grade, and no students reported.