OPPORTUNITY AND EQUITY INDEX

Direct Application to The Martinez–Yazzie Ruling
A More Equitable Way to Distribute At-Risk Funding

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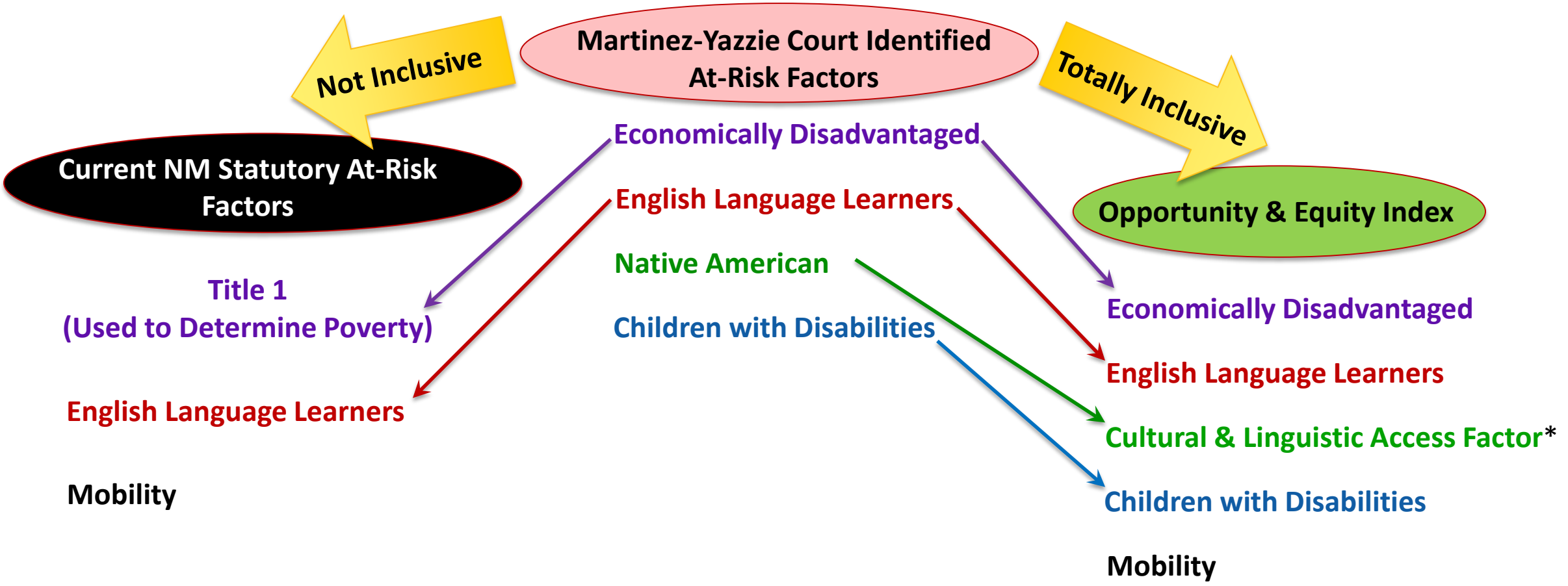
HOW DOES THE OPPORTUNITY AND EQUITY INDEX DIRECTLY APPLY TO THE MARTINEZ-YAZZIE RULING?

- **The OEI allows us to direct resources to those schools with student populations covered by the Martinez-Yazzie ruling. It also allows us to better target all New Mexico at-risk students.**
- **The OEI corrects the current New Mexico school "At-Risk" funding formula so that the funding is objectively distributed based on Achievement-Gap metrics as explained by Martinez-Yazzie factors.**
- **The application of the OEI is not intended to be a total fix for achieving Native American education equity. Rather, it should be considered as one piece that helps with the process of reforming current practices with the goal of creating that equity.**

WHAT ARE THE DEMOGRAPHIC FACTORS SINGLED OUT BY THE MARTINEZ-YAZZIE RULING, THOSE USED IN THE CURRENT RISK FORMULA, AND THOSE USED TO CALCULATE THE OEI?



* Demographic subgroups that demonstrate significant achievement gaps

WHY DO WE USE THESE INCLUSIVE DEMOGRAPHIC FACTORS?

Source: SY 2018/2019 PED Assessment Data (Webfiles-2019-Proficiencies-All-by-State-by-District-by-School.xlsx)

		ELA	Math	Science	Performance Gap (Percentage Proficient Compared to Caucasions)			
State Percentage of Students		Proficient & Above %	Proficient & Above %	Proficient & Above %	ELA	Math	Science	Achievement Gap Yes or No
295,171	Total Students	34%	20%	35%				
48.9%	Female	39%	20%	34%				
51.1%	Male	29%	21%	37%				
23.3%	Caucasian	48%	34%	57%	0.0%	0.0%	0.0%	
3.7%	African American	30%	15%	31%	-37.5%	-55.9%	-45.6%	Yes
58.8%	Hispanic	30%	16%	30%	-37.5%	-52.9%	-47.4%	Yes
2.2%	Asian	52%	42%	54%	8.3%	23.5%	-5.3%	No
12.0%	American Indian	25%	12%	20%	-47.9%	-64.7%	-64.9%	Yes
74.0%	Economically Disadvantaged	28%	15%	28%	-41.7%	-55.9%	-50.9%	Yes
15.3%	Students with Disabilities	12%	8%	14%	-75.0%	-76.5%	-75.4%	Yes
16.8%	English Language learners	15%	8%	12%	-68.8%	-76.5%	-78.9%	Yes
0.3%	Migrant	23%	13%	23%	-52.1%	-61.8%	-59.6%	Inconsitent Tracking
2.6%	Homeless	18%	9%	18%	-62.5%	-73.5%	-68.4%	Inconsitent Tracking
1.1%	Military	51%	39%	61%	6.3%	14.7%	7.0%	Inconsitent Tracking
0.7%	Foster	22%	12%	23%	-54.2%	-64.7%	-59.6%	Inconsitent Tracking

Not used—Irregular Tracking

Because they are the best indictors of where equitable resources are required* to help close the Achievement Gap

* We include mobility, tracked but not published by the PED, because it also correlates with student performance.

MATHEMATICALLY HOW IS OEI DETERMINED?

Canonical Correlation

As the name suggests, canonical correlation analysis is based on the correlations between two sets of variables which we call **Y** and **X**.
The correlation matrix of all the variables is divided into four parts:

1.R_{xx}. The correlations among the **X** variables.
2.R_{yy}. The correlations among the **Y** variables.
3.R_{xy}. The correlations between the **X** and **Y** variables.
4.R_{yx}. The correlations between the **Y** and **X** variables.

Canonical correlation analysis may be defined using the singular value decomposition of a matrix ***C*** where: $C=$ $^{-1}$ $^{-1}$
Define the singular value decomposition of ***C*** as:
$C=U'\Lambda B$

MATHEMATICALLY HOW IS OEI DETERMINED (CONCL.)?

The diagonal matrix Λ of the singular values of ***C*** is made up of the eigenvalues of ***C***. The i^{th} eigenvalue λ_i of the matrix ***C*** is equal to the square of the i^{th} canonical correlation which is called r^2_{ci}. Hence, the i_{th} canonical correlation is the square root of the i_{th} eigenvalue of ***C***.

Two sets of canonical coefficients (like regression coefficients) are used for each canonical correlation: one for

the **X** variables and another for the **Y** variables. These coefficients are defined as follows:

$$B_y R_{yy} = \Lambda^{-1}$$
$$B_x R_{xx} R_{xy} B_y$$

The canonical scores for **X** and **Y** (denoted $X\square$ and $Y\square$) are calculated by multiplying the standardized data (subtract the mean and divide by the standard deviation) by these coefficient matrices. Thus we have:

$$\hat{X} = Z_x B_x$$

and

$$\hat{Y} = Z_y B_y$$ where Z_x and Z_y represent the standardized versions of **X** and **Y**.

To aid in the interpretation of the canonical variates, loading matrices are computed. These are the correlations between the original variables and the constructed variates. They are computed as follows:

$$A_x = R_{xx} B_x \; A_y = R_{yy} B_y$$

The *average squared loadings* are given by

$$pv_{yc} = 100 \sum pv_{yc}$$

The *redundancy indices* are given by:

$$rd = (pv)(r^2_c)$$

ETC
ETC
ETC

“But Wait!” Maybe we can make the outcome little easier to understand?

HOW IS THE OPPORTUNITY AND EQUITY INDEX DETERMINED?

The Martinez-Yazzie factors plus mobility are mathematically combined to provide the best explanatory prediction of schools' measured performance in state tested subjects (reading, math, and science). Each demographic factor contributes its own unique, mathematically-determined weighting to explain all schools' combined test performance. Using the combination of each school's unique demographic factors and unique test scores we use the canonical correlation to calculate the red elements:

$$[(\text{Demographic Factor})_1 \text{ X } (\text{Unique Weighting})_1] + [(\text{Demographic Factor})_2 \text{ X } (\text{Unique Weighting})_2] + \ldots +$$

$$[(\text{Demographic Factor})_N \text{ X } (\text{Unique Weighting})_N] = \text{Combined Measured Performances}$$

$(\text{Demographic Factor})_n$ is unique to each school

$(\text{Unique Weighting})_n$ is the same for all schools

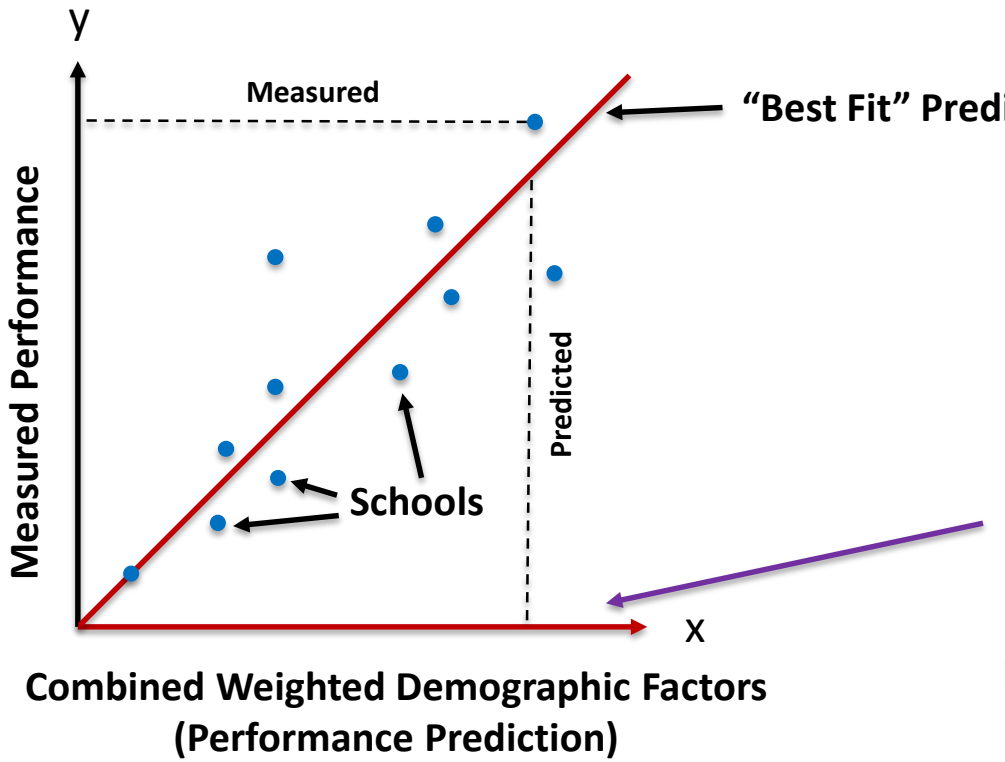
This provides a prediction of any given school's performance based on all schools' performance and demographic factors.

THIS RESULTS IN …

DF = Demographic Factor, and UW = Unique Weighting (from previous slide)

$$(DF_1 \times UW_1) + (DF_2 \times UW_2) + \ldots + (DF_N \times UW_N) = \text{Combined Measured Performances}$$

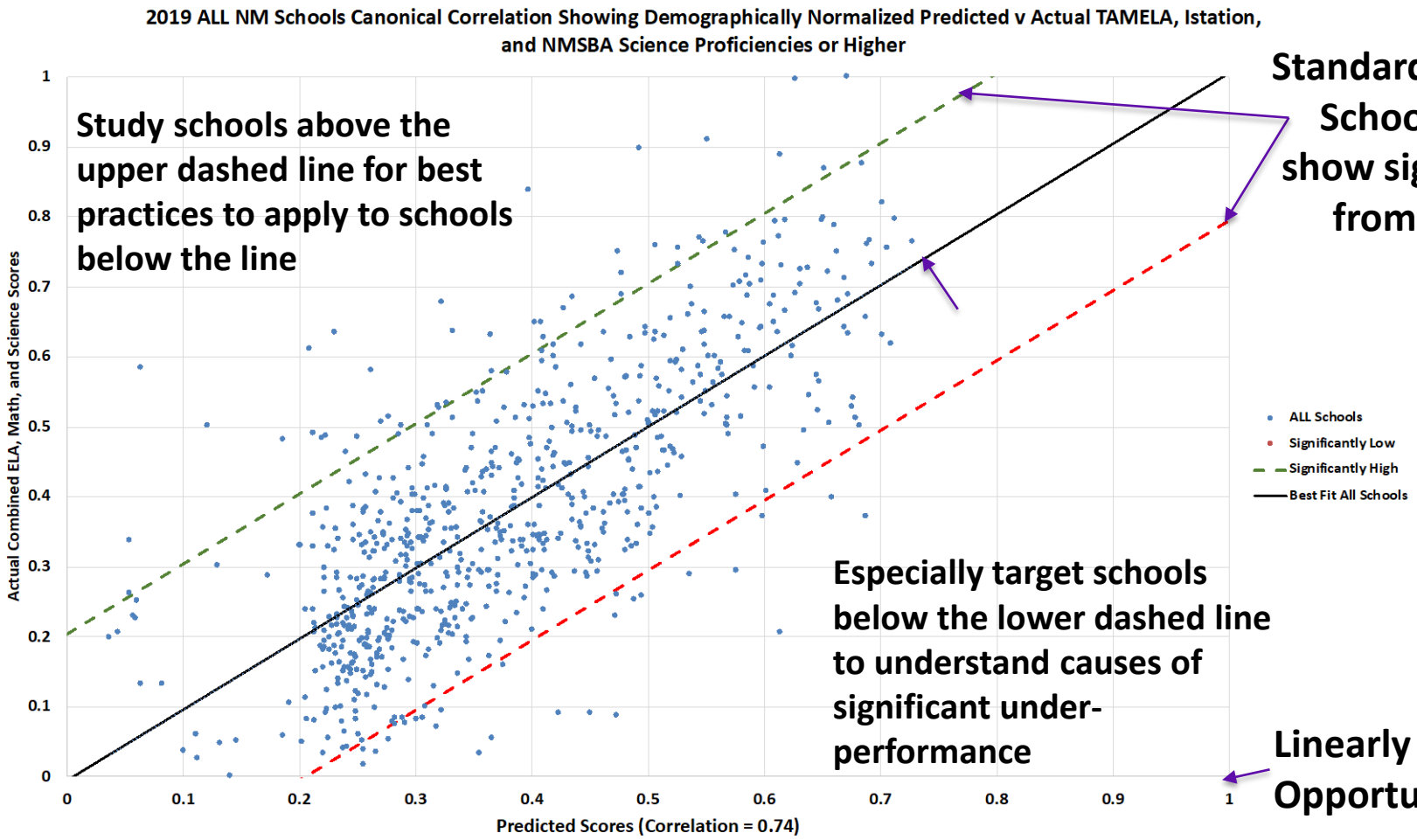
X (predicted) | Y (Measured)



<u>X-Values</u> are directly proportional to the Opportunity and Equity Index

If one school changes its performance, its OEI does NOT change—it takes MULTIPLE schools' performance changes to significantly impact the OEI

THE REAL THING



Study schools above the upper dashed line for best practices to apply to schools below the line

Standard Error Boundaries- Schools outside these show significant deviation from the prediction.

Especially target schools below the lower dashed line to understand causes of significant under-performance

Linearly proportional to the Opportunity and Equity Index

OEI is proportional to 1 minus the x-axis values

HOW IS THIS DIFFERENT THAN THE CURRENT AT RISK INDEX?

The current statutory at-risk index *subjectively* assumes that *only* Economically Disadvantaged, English Language Learners, and High Mobility factors contribute *equally weighted amounts* to the at-risk index. Additionally, it includes no provision for the contribution of the Cultural and Linguistic factor—all demographic subgroups that demonstrate significant achievement gaps. In fact, *the current formula specifically excludes using Native American percentages*. In New Mexico, Economically Disadvantaged student percentage is not an adequate proxy for Native Americans, et al.

The OEI includes Native Americans plus all subgroups showing significant achievement gaps. We do not believe that the ruling in the Martinez-Yazzie case intended the exclusion of all other at-risk student populations simply because they are not Native Americans. All New Mexico at-risk students deserve equitable educational resources according to their needs. The OEI addresses Native Americans plus other at-risk students.

WHAT DOES THE OEI NOT DO?

The OEI does NOT:

- **Show root causes for demographic subgroup achievement gaps**
- **Cover all possible contributions contributing to at-risk student performances (20% to 40% of performance differences cannot be predicted with the methodology used to determine OEI or any other known mathematical method)**
- **Provide answers as to how to use the extra resources at-risk schools/students will receive**
- **Cure the common cold**

WHAT IS THE CURRENT STATUS?

- **The OEI has been formulated to replace current statutory language used to define at-risk funding distribution.**
- **This formulation causes individual schools to be targeted with at-risk funding, not districts, though districts will be responsible for fund administration and accounting.**
- **The bill is in draft and hopefully has been pre-filed by the time of this presentation.**