MICHIGAN
Department of Education

Top-to-Bottom
School Rankings
and Reward
School
Identification
Business Rules

2015-16

Summary of Changes

Version	Date	Author/Editor	Description	Managerial Sign-Off
Draft	10/24/2016	Matt Gleason	Initial Document Created/Updated	
Final	12/15/2016	Matt Gleason	Final Document	

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Top-to-Bottom School Ranking and Reward School Identification Business Rules

Overview

The Michigan School Accountability **School Ranking** is a list of schools rank ordered by a combined performance metric. The ranking is based on student achievement and student growth. All tested subjects are included, and for schools that graduate students, graduation rate is also included as a component.

All public schools that meet the selection criteria are rank ordered to create the School Ranking list. Schools must meet a minimum size restriction and certain schools that serve specialized populations of students will be excluded. Please see school eligibility rules below for more details.

School-level values are calculated by aggregating student performance on statewide tests, including general assessments and those based on alternate standards. All valid tests are included, provided that students are eligible for being included in accountability. Please see score eligibility rules below for more details.

Subjects are academic content areas that are tested on standardized state tests. For purposes of the School Ranking, subjects taught at the presecondary (elementary/middle school) and secondary (high school) levels are treated as distinct. The subjects tested in years prior to 2014-15 were reading, mathematics, science, social studies, and writing. The subjects tested beginning in 2014-15 are English Language Arts (ELA), mathematics, science, and social studies. A small school may have as few as two subjects (for instance, a K-3 school may have only math and ELA at the elementary/middle level) while a larger school may have up to 8 (e.g., a large K-12 building may have math, ELA, science, and social studies at both elementary/middle and high school level). For purposes of this document, the term *subject* is considered to refer to a given content area and the grade level at which it is taught. Thus, "EM Math" is a distinct subject from "HS Math."

Schools indicates as Reward Schools are schools that have either 1) been ranked in the top 5% (at or above the 94th percentile); 2) ranked in the top 5% of a composite student growth index; 3) scored at least 85% proficient in all applicable subjects and have a positive proficiency improvement rate. Reward schools will be identified for the 2015-16 school year.

Narrative Description

The School Ranking list is generated through a series of aggregations and rankings. First, subject test scores for all eligible students (see score eligibility rules below for more details) are converted into Z-Scores (Help with Z-scores[1]), so that all scaled scores (and points, for some tests) are transformed into a

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[1] Go to www.michigan.gov/ttb and click on the Help with Z-Scores under the Support and Documentation section

value indicating the distance from the statewide mean. These Z-Scores are then aggregated at the building level to create an achievement score for each applicable subject. At the same time, students who have a valid Student Growth Percentile (<u>What is a Student Growth Percentile?</u>[2]) are aggregated to create an overall growth score for each applicable subject.

Next, the aggregated subject achievement and growth scores are converted into Z-Scores and compared against all other eligible buildings to put each building's 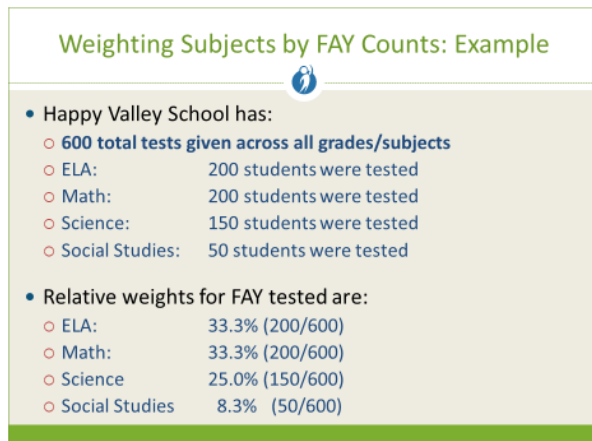score value on the same scale. These are then combined (with weights of 50% achievement and 50% growth; if growth is not available, then achievement alone will be used) to create a subject score. Subject scores are once again converted into Z-Scores against the statewide average, then combined into a building score. The number of students tested in each subject is used as a weighting factor for that subject when the building score is calculated (See Figure 1 – Example). For buildings that graduate students, a graduation rate index is also calculated, which counts for 10% of the overall building score, with the remaining 90% divided among the appropriate subjects.

Weighting Subjects by FAY Counts: Example

- Happy Valley School has:
  - **600 total tests given across all grades/subjects**
  - ELA: 200 students were tested
  - Math: 200 students were tested
  - Science: 150 students were tested
  - Social Studies: 50 students were tested

- Relative weights for FAY tested are:
  - ELA: 33.3% (200/600)
  - Math: 33.3% (200/600)
  - Science: 25.0% (150/600)
  - Social Studies: 8.3% (50/600)

Figure 1 - Example

Buildings are then ranked by their overall building score. The ranking is converted into a percentile rank, which is the final School Ranking value reported.

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[2] Go to <u>www.michigan.gov/baa-accountability</u> and click on the <u>What is Student Growth Percentile</u> under the <u>Resources for Educators</u>.

Eligibility Rules

Score eligibility rules

In order to be included in the overall School Ranking calculation, a score must meet several requirements:

- It must be from a general or alternate summative assessment. English Language Proficiency assessments, while valid for participation credit in certain circumstances, do not count toward achievement on the School Ranking. MEAP, MI-Access, MEAP-Access, MME, and M-STEP have all counted for School Ranking purposes.
- The score must be valid (i.e., all rules for completing a test must be met; there must be no prohibited behavior, misadministration of test, etc.).
- The test must have been completed by a public school/public school academy student. No scores from private school or home schooled students are included.
- The test must have been completed by a student who has attended the school for a Full Academic Year (FAY). Scores from students who were enrolled for less than FAY will not be assigned to the school.
- The test must have been completed by a student who is not primarily educated by a Shared Educational Entity (SEE). Scores from SEE students are not included.
- The rules used for determining whether a score is eligible for inclusion are the same as those used for the Accountability Scorecard.

Scores are attributed to the school designated as the Feeder school. In general terms, this is the school where the student was enrolled and the school responsible for teaching the content standards being assessed on the test. (Business rules for the Full Academic Year Students[3])

Subject eligibility rules

In order to be included in a school's overall School Ranking, at least 30 FAY students must have been tested in the subject.

In order to be included in the growth component of the subject index score, at least 20 FAY students must have SGP values.

School eligibility rules

In order to be included in the ranking, a school must meet the following eligibility requirements:

- Must have at least 30 FAY students, in two subjects, for the two most recent school years. The subjects need not necessarily be the same in both years, but there must be at least two.
- Must not be identified as a Center-Based Program serving exclusively special education populations. CBP's (buildings with 100% SE enrollment) are not eligible for ranking.

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[3] http://www.michigan.gov/documents/mde

- Must be open as of September 30th of the accountability year. If the building closes in the interim, an active flag in the School Ranking results indicates this, although the building does get a ranking.

Graduation Rate eligibility rules

In order to be included as part of a building's overall score

- The building must graduate students
- Has graduated 10 or more students in each the two most recent years.

Calculation Steps

This procedure assumes that student Z-Scores have been generated and are available for use. When used for School Ranking purposes, student Z-Scores are 1) calculated for FAY students only; 2) have a van der Waerdens transformation applied to put them into a more nearly normal distribution; 3) are capped at a maximum of +2 and a minimum of -2.

This procedure assumes that student SGPs have been generated and are available for use.

I.   Initial student score aggregation.

Using the score eligibility rules outlined above, calculate the following aggregates, split out by year, school, and subject:
   a. The number of FAY students with valid test scores
   b. The mean of the Z-Scores of those students
   c. The mean SGP (MGP)
   d. The percent proficient

II.   Subject-level records

   a. Create a row for each building and subject indicating (including each value for the current and previous year)
      i.   The number of FAY tested
      ii. The mean Z-Score
      iii. The MGP
      iv. The percent proficient

III.   Subject-level calculations

   a. Determine subject eligibility for achievement using the subject eligibility rules outlined above (i.e., the value calculated in II.a.i above is >= 30 in each of the last two years)
   b. Calculate the total number of FAY tested for both years by summing both years of the number calculated in II.a.i above
   c. Calculate the weighted two-year averages for II.a.ii, iii, and iv
      i. Each calculation will take the form of:

$$\frac{(Val_{Current} * FAY_{Current}) + (Val_{Prior} * FAY_{Prior})}{(FAY_{Current} + FAY_{Prior})}$$

      Where Val is the value of interest, FAY is the count of FAY tested students, and Current and Prior refer to each of the two years of interest leading up to the running of the ranking
   d. Calculate the Z-Score for each of the two-year averages
      i. Find the statewide average and standard deviation for mean achievement and MGP, using only eligible subjects as described above.

ii. Calculate the achievement and growth Z-Scores for each subject using the following formula:

$$\frac{\left(\hat{\mu}_{zj} - \hat{\mu}_z\right)}{\hat{\sigma}_z}$$

Where $\hat{\mu}_{zj}$ is the two-year weighted average of the value of interest for school j, $\hat{\mu}_z$ is the statewide average, and $\hat{\sigma}_z$ is the standard deviation.

e. Combine the achievement and growth Z-Scores into the subject index.
1. If the two-year weighted percent proficient is >= 90%, or if growth is not available, use only the achievement score.
2. Otherwise, compute a value using half achievement and half growth.

f. Calculate the weighting of each subject in the final score.
1. Sum the total number of tests taken by eligible students in eligible subjects
2. The subject weight is:

$$\frac{n_j}{n_t}$$

Where n_j is the count of tests taken by eligible students in the subject and n_t is the total number of tests taken by eligible students across all subjects.

g. Calculate the subject index Z-Score for each eligible subject
i. Find the statewide average and standard deviation for the subject index, using only eligible subjects as described above.

ii. Calculate the subject Z-Score for each subject using the following formula:

$$\frac{\left(\hat{\mu}_{zj} - \hat{\mu}_z\right)}{\hat{\sigma}_z}$$

Where $\hat{\mu}_{zj}$ is the two-year weighted average of the subject index for school j, $\hat{\mu}_z$ is the statewide average, and $\hat{\sigma}_z$ is the standard deviation.

h. Apply the subject weight by multiplying the subject Z-Score by the subject weight.

IV. Graduation rate calculations

a. Determine graduation rate eligibility using the graduation rate eligibility rules outlined above.

b. Retrieve the graduation rates for a building
i. For each building, retrieve the grad rate for years (n-1) to (n-5) where n is the current school year. Because grad rate is offset by a year, the most recent rate will be from the year prior to the current School Ranking run.
ii. In cases where a building has multiple grad rate records (schools that have changed districts), use only the one that matches the district code as recorded in the master Entity table.
iii. Use only grad rate records for the All Students group.

iv.   Retrieve grad rates for the 4-, 5-, and 6-year cohorts, where data is available.
        v.   Only include grad rates that have 10 or more students.
    c. For each set of cohorts records in each building, calculate the following (these means
        are unweighted):
        i.   The mean of the grad rates for four years
        ii.   The mean of the "academic year id" value for four years
        iii. The mean of the grad rates for three years
        iv.   The mean of the "academic year id" value for three years
        v.   The mean of the grad rates for two years
        vi.   The change in grad rate between year (n-2) to (n-1)
    d. Calculate improvement slopes for IV.b.i and IV.b.iii above. The improvement slope
        formula is:

$$\frac{\sum((x - \bar{x}) * (y - \bar{y}))}{\sum(x - \bar{x})^2}$$

        Where x is the academic year id value, y is the grad rate value, and $\bar{x}$ and $\bar{y}$ are the
        multi-year means of each, respectively.
    e. Calculate the Z-Score for each grad rate metric, for all cohorts, for eligible buildings
        i.   Find the statewide average and standard deviation for 1) the four-year
              improvement slope; 2) the three-year improvement slope; 3) the two-year
              change; 4) the two-year mean grad rate 5) the most recent grad rate

        ii.   Calculate the Z-Score for each metric using the following formula:

$$\frac{\left(\hat{\mu}_{zj} - \hat{\mu}_z{}^{4y}\right)}{\hat{\sigma}_z{}^{4y}}$$

              Where $\hat{\mu}_{zj}$ is the two-year weighted average of the metric of interest for school
              j, $\hat{\mu}_z{}^{4y}$ is the statewide average of the four-year cohort, and $\hat{\mu}_z{}^{4y}$ is the
              standard deviation of the four-year cohort.
        iii. NOTE: Z-Scores for five- and six-year cohorts are calculated using the mean and
              standard deviation from the four-year cohort.
    f. Determine the best cohort graduation rate
        i.   Determine which of the three cohorts (four-, five-, or six-year) has the highest
              two-year mean graduation rate.
        ii.   The graduation rate index calculated in IV.f that corresponds to this cohort will
              be the index used in the overall School Ranking.
        iii. Likewise, the graduation rate improvement index calculated in IV.e that
              corresponds to this cohort will used in the overall School Ranking. That is, the
              graduation rate improvement rate used will correspond with the graduation
              rate (4-, 5-, or 6-year cohort) used.

iv. Note that the value that corresponds to the highest two-year mean graduation rate will be used, even if the overall index is not the highest value among the cohorts.

g. Calculate the graduation rate index

 i. If the two-year mean graduation rate is >= 90%, use the Z-Score of the two-year mean graduation rate calculated above.

 ii. Otherwise, calculate a composite metric using the Z-Scores calculated above, composed of:

 1. 2/3 of the two-year mean graduation rate
 2. 1/3 of the graduation rate improvement metric – preferentially use the four-year improvement slope; the three-year improvement slope; the two-year change, as available.

h. Calculate the Z-Score for the final grad rate index for eligible buildings

 i. Find the statewide average and standard deviation for the grad rate index

 ii. Calculate the Z-Score for each metric using the following formula:

$$\frac{\left(\hat{\mu}_{zj} - \hat{\mu}_z{}^{4y}\right)}{\hat{\sigma}_z{}^{4y}}$$

Where $\hat{\mu}_{zj}$ is the grad rate index for school j, $\hat{\mu}_z{}^{4y}$ is the statewide average grad rate index, and $\hat{\mu}_z{}^{4y}$ is the standard deviation of the grad rate index.

V.   Building-level calculations

a. Determine building eligibility using the building eligibility rules outlined above.

b. Calculate the overall combined performance index

 i. Sum the weighted values of each eligible subject performance index for each eligible building

 ii. For buildings that have a grad rate z-score calculated in IV.i, include the grad rate index as 10% of the combined performance index, with the weighted subjects making up the remaining 90%.

c. Rank the buildings on the combined performance index, with a rank of 1 corresponding to the highest index value.

d. Convert the ranking into a percentile rank using the following function:

$$100 * \frac{R - r_j}{R}$$

Where R is the maximum rank value obtained in V.c and r_j is the ranking of school j.

e. Discard any decimals, leaving only the whole number. Note that this is not a rounding function; truncate any decimals.

VI.   Auxiliary calculations

a. For each eligible building, calculate the number of valid subjects that have a growth index and the sum of the eligible indices. This is used to identify Reward schools that fall under the High Improvement category.

b. Set the persistently low graduation rate flag.

i. Use the single-year graduation rate values for the four-year cohort for the most recent year and the year immediately prior. If both values are below 60%, set the flag.