NORTH CAROLINA
State Board of Education
Department of Public Instruction

One Year Later: A Recovery Analysis of Student Learning During the COVID-19 Pandemic for NC Charter Schools

Findings from the third-party entity contract to collect, analyze, and report data related to overall impacts of COVID-19 on public school units.

DPI Chronological Schedule, 2022-2023

Submitted by the North Carolina Department of Public Instruction and State Board of Education, in conjunction with the EVAAS Team at SAS

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1 Executive Summary

Last year, the North Carolina Department of Public Instruction (NCDPI) and SAS Institute Inc. (SAS) collaborated to leverage existing student assessment data and yield insight into how the pandemic disrupted student learning. The focus of the Impact Analysis was to identify the overall impact to the state as well as the subjects, grades, and student groups most affected by lost instructional time.

One year later, NCDPI and SAS revisited the Impact Analysis to understand students' recovery through the 2021-22 school year. Similar to last year's report, this report assesses student performance and disrupted instructional time by comparing students' pre-pandemic expected performance with their post-pandemic actual performance. Last year's report used 2020-21 assessment data to define students' post-pandemic actual performance, and this year's report uses 2021-22 assessment data as well.

By comparing the results from 2020-21 and 2021-22, the state can understand to what extent, on average, students regained ground lost during the pandemic.

This report focuses on two key questions at the state-level.

- **Question 1:** To what extent do students' pre-pandemic trajectories and their actual performance results from 2021-22 vary by subgroup and contextual factors?
- **Question 2:** How do any observed differences compare to 2020-21 as well as pre-pandemic historical trends?

Last year's Impact Analysis found that the extent of lost instructional time varied – and in some cases significantly – across different student groups. This year's Impact Analysis again incorporates additional data variables to investigate student performance and learning across targeted areas of exploration to assess differences patterns in learning:

- Across subjects and grades
- Across geographic regions and urbanicity indicators
- Across different student groups such as those in a specific demographic category or socioeconomic status
- According to students' entering achievement
- According to students' education delivery during the 2020-21 school year such as in person, virtual, etc.

More specifically, this analysis uses student projections to the 2021-22 school year, which represents their pre-pandemic expected performance based on the average schooling experience and then compares these projections to students' actual performance on the 2021-22 statewide assessments. A negative difference indicates that students did not perform as expected based on their pre-pandemic learning trajectories, and this information is disaggregated by subject, grade, district, school, and/or different demographic characteristics to identify whether certain student groups experienced bigger changes in expected performance than other student groups.

As mentioned above, this information is compared to results based on projections to the 2020-21 school year to assess recovery as well as pre-pandemic historical data (projections to the 2018 school year) to understand any pre-existing gaps.

This approach uses available all statewide assessment data at the student level so that the analysis represents a population study rather than a sample. Using these strategies offers NCDPI empirical results to monitor students' recovery during the 2021-22 school year.

The analysis presented below used the state's summative assessment data from end-of-grade (EOG), end-of-course (EOC), early grades (mCLASS), and college readiness (ACT) assessments. Where available, the analysis used data from prior years through the 2021-22 school years.

An overview of the findings from this analysis include:

- On average, at the state level, students showed signs of rebound for every subject, except English II which held constant. This was especially true for grades 3 and 4 in Reading, grades 6 and 8 in Math, as well as grade 8 and Biology in Science.
- Overall NC public school students showed greatest gains from 2021 to 2022 in middle and high school math.
- Overall, student distributions of effect sizes show a general trend from 2021 to 2022 of an increase in the proportion of students with positive effect size estimates for differences between predicted and actual scores on standardized assessments.
- In 2021-22, on average, students identified as economically disadvantaged underperformed projected scores compared to the general student population for all tested subjects except Reading in Grade 8. However, the magnitude of recovery for students identified as economically disadvantaged was greater for Reading Grades 3, 4, and 5 compared to the general student population.
- On average, Students with Disabilities' actual scores for 2022 were closer to predicted than the general student population.
- On average, Multilingual Learners actual scores for 2022 were closer to predicted than the general student population.
- On average, North Carolina students identified as chronically absent (22.6% of the tested student population in 2020-21 and 28.5% in 2021-22) showed academic recovery from the pandemic in Reading Grade 3, 4 and 5 but fell further behind the general student population in 2021-22, especially in Science Grade 8 and Biology; and Math in Grades 5, 6, 7, 8, and NC Math 1 and 3.
- On average, at the state level, students across all races/ethnicity (American Indian/Alaskan Native, Asian/Pacific Islander, Black, Hispanic, Two or More, White) showed signs of academic recovery for every subject, with the exception of Asian students in Reading Grades 3, 4, and 5; Black students in Reading Grades 6 and 7 and English II; Hispanic students in Reading Grade 7; and White students in English II.

The following sections provide more detail about the data used, methods of analysis, results, and interpretation of the results for the Impact Analysis. State-level student and aggregated files are provided separately to NCDPI and to individual LEAs via secure file transfer protocol accounts.

2 Data

2.1 Data Received

The analysis in this report leveraged student-level assessment data, where available, from 2007-2008 through the 2021-22 school year in order to compile a longitudinal data set based on the following assessments:

- EOG Mathematics in grades 3–8 (Note: grades 3-4 were used as predictors only; no projections were made to these assessments for 2020-21 or 2021-22. Grade 5 scores were only used as predictors for 2021-22 projections)
- BOG Reading in grade 3 (Note: These scores were used as predictors only; no projections were made to this assessment)
- EOG Reading in grades 3–8
- EOG Science in grades 5 and 8
- EOC Biology, English II, Math 1 and Math 3
- mCLASS in grades K-2 (used as predictors only)
- ACT assessments in English, Math, Reading, and Science

The state EOG tests are administered in the spring semester whereas the EOC assessments are typically given at the end of the fall and spring semesters with the occasional summer administration. The BOG Reading in grade 3 assessment is given at the start of the fall semester. The mCLASS assessments are administered in equal intervals three times throughout the year.

For each administration, SAS used the following student identifiers, assessment data, and district/school/student flags; definitions of these identifiers and flags are available in Appendix A:

- Student Identifiers
  - Student Last Name
  - Student First Name
  - Student Middle Initial
  - Student Date of Birth
  - Student Identification Number
- Assessment Information
  - Scale Score
  - Test Taken
  - Tested Grade
  - Test Semester
  - School Number
  - District Number
  - Administration Window
- Student Flags
  - Academically or Intellectually Gifted (Y, N)
  - Gender (M, F)
  - English Learners (EL) (Y, N)
  - Economically Disadvantaged Students (Y, N)

- Students with Disabilities (SWD) (Y, N)
- Student Experiencing Homelessness (Y, N)
- Military Connected (Y, N)
- Chronically Absent (Y, N)
- Foster Student (Y,N)
- Migrant Student (Y, N)
- Education Delivery in the 2020-21 School Year
  - In-Person/Remote Delivery
  - Number of Days Absent
- Race
  - American Indian/Alaskan Native
  - Asian/Pacific Islander
  - Black (not Hispanic)
  - Hispanic
  - Two or More Races
  - White (not Hispanic)
  - Other

- District/School Flags
  - School A-F Performance Grades in the 2018-19 School Year
  - School Designation (Public, Charter, Laboratory, Regional)
  - School Percentage Connectivity in the 2020-21 School Year
  - State Board Region
  - Urbanicity (City, City School, Rural, Suburb and Town)
  - Education Delivery in the 2020-21 School Year
    - Number of Days Hybrid/Blended
    - Number of Days In-Person
    - Number of Days Remote

SAS merged the individual student records over time using an algorithm that incorporated all student identifiers to create a longitudinal database that tracks individual students' performance across grade levels on state assessments each year. As explained in Section 3, student flags were not included in the analysis for determining students' projected performance but were used to aggregate students into different student groups for comparison. Furthermore, some student flags are used to generate school-level variables that indicate the school's concentration of student composition in the form of quartiles. For example, the student-level Economically Disadvantaged flag was used to create quartiles based on the percentage of the school's students who are considered Economically Disadvantaged.

2.2 Business Rules

In creating the longitudinal database, the following business rules were applied regarding student scores.

2.2.1 Missing Grade

In North Carolina, the grade used in the analyses and reporting is the tested grade, not the enrolled grade. If a grade is missing on an early grade or end-of-grade test record, then that record will be excluded from all analyses. The grade is required to include a student's score in the appropriate part of the models.

2.2.2 Duplicate (Same) Scores

If a student has a duplicate score for a particular subject and tested grade in a given testing period in a given school, then the extra score will be excluded from the analysis.

2.2.3 Students with Missing Districts or Schools for Some Scores but Not Others

If a student has a duplicate score with a missing district or school for a particular subject and grade or course in a given testing period, then the duplicate score that has a district and/or school will be included over the duplicate score that has the missing data.

2.2.4 Students with Multiple (Different) Scores in the Same Testing Administration

If a student has multiple scores in the same period for a particular subject and grade or course and the test scores are not the same, then those scores will be excluded from the analysis. If duplicate scores for a particular subject and tested grade in a given testing period are at different schools, then both scores will be excluded from the analysis. The highest composite combination of ACT subjects is used for ACT value-added and student college readiness projections. Note that if multiple scores are received for grade 3 Reading or Math across years, only the most recent score is used.

2.2.5 Students with Multiple Grade Levels in the Same Subject in the Same Year

A student should not have different tested grade levels in the same subject in the same year. If that is the case, then the student's records are checked to see whether the data for two separate students were inadvertently combined. If this is the case, then the student data are adjusted so that each unique student is associated with only the appropriate scores. If the scores appear to all be associated with a single unique student, then scores that appear inconsistent are excluded from the analysis. For the historical data based on K-2 scores, the analysis excludes K-2 students with a grade change.

2.2.6 Students with Records That Have Unexpected Grade Level Changes

If a student skips more than one grade level (e.g., moves from sixth in 2018 to ninth in 2019) or is moved back by one grade or more (i.e., moves from fourth in 2018 to third in 2019) in the same subject, then the student's records are examined to determine whether two separate students were inadvertently combined. If this is the case, then the student data is adjusted so that each unique student is associated with only the appropriate scores. These scores are removed from the analysis if it is the same student. Per NCDPI's decision, the analysis does not remove students with scores that appear to be associated with inconsistent grades. The analysis leaves students in the analysis at the tested grade that EVAAS receives from NCDPI.

2.2.7 Students with Records at Multiple Schools in the Same Test Period

If a student is tested at two different schools in a given testing period, then the student's records are examined to determine whether two separate students were inadvertently combined. If this is the case, then the student data is adjusted so that each unique student is associated with only the appropriate scores. When students have valid scores at multiple schools in different subjects, all valid scores are used at the appropriate school.

2.2.8 Outliers

Student assessment scores are checked each year to determine whether they are outliers in context with all the other scores in a reference group of scores from the individual student. These reference scores are weighted differently depending on proximity in time to the score in question. Scores are checked for outliers using related subjects as the reference group. For example, when searching for outliers for EOC Math test scores, all EOG and EOC Math subjects are examined simultaneously, and any scores that appear inconsistent, given the other scores for the student, are flagged. Outlier identification for college readiness assessments use all available college readiness data alongside state assessments in the respective subject area (e.g., Math subjects with EOC, EOG, and PSAT tests might be used to identify outliers with ACT). Lastly, K-2 data are used solely for outlier identification with K-2.

Scores are flagged in a conservative way to avoid excluding any student scores that should not be excluded. Scores can be flagged as either high or low outliers. It should also be noted that test scores within a year, subject and grade are normalized before checking begins. This helps mitigate any unnecessary flagging of outliers due to a year of assessments shifting across the state as might happen in 2021.

This process is part of a data quality procedure to ensure that no scores are used if they were, in fact, errors in the data, and the approach for flagging a student score as an outlier is fairly conservative. Again, students were expected to score lower in 2021 due to the pandemic, and this process is more about flagging data that might be erroneous.

Considerations included in outlier detection are:

- Is the score in the tails of the distribution of scores? Is the score very high or low achieving?
- Is the score “significantly different” from the other scores as indicated by a statistical analysis that compares each score to the other scores?
- Is the score also “practically different” from the other scores? Statistical significance can sometimes be associated with numerical differences that are too small to be meaningful.
- Are there enough scores to make a meaningful decision?

To decide whether student scores are considered outliers, all student scores are first converted into a standardized normal Z-score. Then each individual score is compared to the weighted combination of all the reference scores described above. The difference of these two scores provides a t-value of each comparison. Using this t-value, the models can flag individual scores as outliers.

There are different business rules for the low outliers and the high outliers, and this approach is more conservative when removing a very high-achieving score.

For low-end outliers, the rules are:

- The percentile of the score must be below 50.
- The t-value must be below -3.5 for EOGs in Math and Reading when determining the difference between the score in question and the weighted combination of reference scores (otherwise known as the comparison score). In other words, the score in question must be at least 3.5 standard deviations below the comparison score. For EOC and EOG Science assessments, the t-value must be below -4.0.

- The percentile of the comparison score must be above a certain value. This value depends on the position of the individual score in question but will range from 10 to 90 with the ranges of the individual percentile score.

For high-end outliers, the rules are:

- The percentile of the score must be above 50.
- The t-value must be above 4.5 for EOGs in Math and Reading when determining the difference between the score in question and the reference group of scores. In other words, the score in question must be at least 4.5 standard deviations above the comparison score. For EOC and EOG Science assessments, the t-value must be above 5.0.
- The percentile of the comparison score must be below a certain value. This value depends on the position of the individual score in question but will need to be at least 30 to 50 percentiles below the individual percentile score.
- There must be at least three scores in the comparison score average.

2.2.9 Membership

To include as many students as possible and given the research purpose of the analysis, students were not excluded based on membership, a designation based on student enrollment at a school and used for accountability purposes.

2.2.10 First Year English Learner

Given the research purpose of the analysis and need for historical data to calculate a pre-pandemic projection, students were excluded based on first year English Learner designation. Students who were flagged as English Learner after their first year were included in the analysis.

2.3 Characteristics of the Dataset Used for Analysis

Based on the business rules in this section and the analytic criteria outlined in the next section (such as the three-predictor minimum), 3,500,694 test records from 2021-22 out of a total 3,552,629 were included in this analysis, which is about 98.5%.

The table below provides a comparison of the student composition for students used in the analysis for the 2017-18 historical comparison as well as the 2020-21 and 2021-22 analyses. The percentages of students according to demographic/socioeconomic characteristics by year were calculated using subjects and grades that received measures in all three years (2018, 2021, and 2022).

Table 1: Percentage of Students According to Demographic/Socioeconomic Characteristics by Year

Student Identifier	2017-18	2020-21	2021-22
Academically or Intellectually Gifted	15.5%	14.7%	14.7%
Gender - Male	50.9%	50.8%	50.9%
English Learners	9.4%	8.9%	9.7%
Economically Disadvantaged Students	44.2%	38.7%	38.6%

Student Identifier	2017-18	2020-21	2021-22
Students with Disabilities (SWD)	11.6%	11.5%	11.7%
Student Experiencing Homelessness	0.9%	1.1%	1.4%
Military Connected	*Not available*	6.2%	6.4%
Migrant	*Not available*	0.1%	0.1%
Chronically Absent	*Not available*	22.6%	28.5%
Foster Student	*Not available*	0.5%	0.4%
Race - American Indian/Alaskan Native	1.2%	1.2%	1.1%
Race - Asian/Pacific Islander	3.2%	3.5%	3.7%
Race - Black (not Hispanic)	25.3%	24.6%	25.2%
Race – Hispanic	17.2%	19.1%	19.6%
Race – Two or More Races	4.3%	4.9%	5.1%
Race – White (not Hispanic)	48.9%	46.7%	45.3%

3 Methods of Analysis

3.1 Overview

The recovery analysis focuses on a comparison between students' projected 2022 performance prior to the pandemic with their actual 2022 performance. In order to provide this comparison, this analysis engaged in five key steps:

1. **The most recent cohort of students from the 2018-19 school year is used to establish the pre-pandemic experience.** A model is constructed with this cohort of students where the response variables are each individual subject and grade on the 2018-19 school year regressed on the prior testing histories of that students. Establishing the relationships of past tests to this current 2018-19 test determines the pre-pandemic experience or, in other words, an expected score on the response given a specific set of prior testing data.
2. **Students' prior assessment data (2018-19 and earlier) is used to establish a projected or expected score on a future assessment (2021-22).** This projection is based on the students' own prior testing history as well as how the cohort of students who just took the assessment prior to the pandemic performed. In other words, the students with testing data in 2021-22 use their previous tests (2018-19 and earlier) as independent variables in the model established in the step above. For example, a student who last tested as a third grader in 2018-19 might have a projected score of 548 on their summative assessment as a sixth grader in 2021-22.
3. **Projected scores represent students' expected or average progress trajectories prior to the pandemic.** Each student receives a projected score based on their prior testing history, which assumes that each student had an "average" schooling experience. An average schooling experience in this study is determined by the observed progress of students who took the assessment prior to the pandemic. Although schooling experiences inevitably vary across the state in any given year, the analysis uses the average schooling experience to avoid assumptions that certain students will have more than or less than the average schooling experience during the pandemic year and to avoid assumptions that students at individual schools would have the same schooling experience during and after the pandemic as they had prior to the pandemic.
4. **With assessment data from the 2021-2022 school year, it is possible to compare a student's trajectory prior to the pandemic to the student's current performance.** The student's projected score is compared to the current score for the same tested content area. Although the projected score is based on the average pre-pandemic schooling experience, the 2021-22 school year might be different because of the lost instructional time observed during the pandemic, even with subsequent recovery. This comparison indicates the extent to which lost instructional time remains after the 2021-22 school year and the extent to which students continue to diverge from their projected trajectory established prior to the pandemic.
5. **The individual student scores can be aggregated among students to assess the pandemic's continued impact on specific student groups.** This aggregation might yield insights into patterns among student subpopulations, subjects, and grades.

This approach was conducted for the most recent year of assessment data (2021-22 school year), last year's assessment data (2020-21), and pre-pandemic historical years to provide context for interpreting results. The historical analysis made projections to the 2017-18 and 2018-19 school years using prior test scores from 2016-17 and earlier school years to define the average schooling experience. The historical analysis considered multiple years as a comparison due to changes in the assessments' content standards and state administration policies.

The sections below provide a more technical explanation of the analytic approach as well as business rules. The Results section summarizes these differences and provides a few ways to contextualize and interpret them.

3.2 Determining Students' Projected Scores

As part of the current EVAAS reporting for NCDPI, SAS provides student projections to future statewide assessments, such as the EOG and EOC. This information indicates students' likely performance on future tests based on their prior performance given an "average" schooling experience, and the projections are a resource for educators to plan for students' future success.

The analysis for this report uses a similar methodology to provide student projections to their 2021-22 state assessments. The model provides a projected score for each student based on that student's prior testing performance and assuming the average schooling experience of the most recent cohort of test takers, which was defined prior to the pandemic.

This modeling approach offers the following statistical advantages:

- Projected scores based on multiple scores are more reliable estimates of where students might perform than just a single prior test score. They include more predictive information about students' future performance than the prior year's single score by incorporating multiple subjects, grades, and years of data.[1] This mitigates challenges with measurement error.
- The model does not require students to have all predictors or the same set of predictors as long as a student has at least three prior test scores in any subject and grade. This flexibility is critical in avoiding selection bias as more students can be included in the model itself, even if they have missing data.

These advantages are important features for creating reasonable expectations of student performance for the purposes of this analysis.

It should be noted that, historically in North Carolina and in the other states that use the SAS projection model, it is not necessary to add demographic or socioeconomic indicators into the projection model because, to the extent that these factors influence student performance, they are captured indirectly in the students' prior test scores. Other researchers have reported similar findings in their assessments of value-added models (which are similar to the projection model in their construction and use of prior test scores).

1 See, for example, data and results from Ohio's Growth Model Application and Information available at: https://www2.ed.gov/admins/lead/account/growthmodel/oh/index.html.

As a 2004 Education Trust study stated, specifically with regards to the SAS EVAAS value-added modeling, which again has a similar use of prior test scores to the projection model in this analysis:

> [I]f a student's family background, aptitude, motivation, or any other possible factor has resulted in low achievement and minimal learning growth in the past, all that is taken into account when the system calculates the teacher's contribution to student growth in the present.[2]

UCLA researchers Kilchan Choi, Pete Goldschmidt, and Kyo Yamashiro reported:

> First, adding in an adjustment for student SES (as measured by eligibility for free- or reduced-price lunch) adds very little once a student's initial status is controlled...This indicates that student initial status captures many of the effects that SES is attempting to measure. In other words, by controlling for initial status, the model already captures the preceding effects that SES might have on students.[3]

For this analysis, there is indication that specific student groups had different experiences during the pandemic that are related to their student characteristics. To investigate these differences, the projection model in this analysis does not include demographic or socioeconomic indicators. However, the aggregation of student residuals based on student characteristics will indicate their potential impact or relationship to lost instructional time.

More specifically, the projection model is an analysis of covariance (ANCOVA) model. The model parameters are established using the most recent cohort of test takers of that assessment prior to the pandemic. The response variable (y) is the observed score of students from the 2018-19 year, the covariates (x terms) are scores on tests the student has already taken up to that point, and the categorical variable is the school at which the student received instruction in the subject, grade, and year of the response variable (y). Algebraically, the model can be represented as follows for the i^{th} student.

$$y_i = \mu_y + \alpha_j + \beta_1(x_{i1} - \mu_1) + \beta_2(x_{i2} - \mu_2) + \cdots + \epsilon_i \quad (1)$$

The μ terms are means for the response and the predictor variables. α_j is the school effect for the j^{th} school, the school attended by the i^{th} student. The β terms are regression coefficients. Projections to the future are made by using this equation with estimates for the unknown parameters (μ terms, β terms). The parameter estimates (denoted with carets or "hats," e.g., $\hat{\mu}$, $\hat{\beta}$) are obtained using the cohort of test takers in the 2018-19 school year with their observed tests as the response variables. These estimates are then used to establish a projection for students based on the experiences of students in a normal year (2018-19) prior to the pandemic. The resulting projection equation for the i^{th} student is as follows:

$$\hat{y}_i = \hat{\mu}_y + \hat{\beta}_1(x_{i1} - \hat{\mu}_1) + \hat{\beta}_2(x_{i2} - \hat{\mu}_2) + \cdots \quad (2)$$

The corresponding $\hat{\alpha}_j$term from equation (1) is omitted to assume the "average schooling experience" such that the average schooling experience equates to the average progress

2 Carey, Kevin. 2004. "The Real Value of Teachers: Using New Information About Teacher Effectiveness to Close the Achievement Gap." *Thinking K-16* 8(1):27.

3 Choi, Kilchan, Pete Goldschmidt, and Kyo Yamashiro. 2006. Exploring Models of School Performance: From Theory to Practice (CSE Report 673) Los Angeles, CA: National Center for Research on Evaluation, Standards, and Student Testing (CRESST), 24.

observed among the population of test-takers with the average school across the state from the 2018-19 school year for each tested content area.

To state again, parameter estimates (i.e., $\hat{\mu}$, $\hat{\beta}$) were derived using the 2018-19 cohort of test takers to create projections out to the 2021-2022 school year using data up through the 2018-19 data as predictors (x). For historical comparisons, parameter estimates (i.e., $\hat{\mu}$, $\hat{\beta}$) were derived using the 2016-17 cohort of test takers to create projections out to the 2017-18 school year using data up through the 2016-17 school year as predictors (x). They were also used to create projections out to the 2018-19 school year using data up through the 2017-18 school year.

Two difficulties must be addressed to implement the estimation and use of this model. First, not all students will have the same set of predictor variables due to missing test scores. Second, because this is an ANCOVA model with school as a random effect, the regression coefficients must be "pooled-within-school" regression coefficients. The strategy for dealing with missing predictors is to estimate the joint covariance matrix (C) of the response and the predictors. Let C be partitioned into response (y) and predictor (x) partitions, that is,

$$C = \begin{bmatrix} c_{yy} & c_{yx} \\ c_{xy} & C_{xx} \end{bmatrix} \quad (3)$$

This matrix is estimated using the Expectation Maximization algorithm for estimating covariance matrices in the presence of missing data provided by the Multiple Imputation procedure in SAS/STAT® (although no imputation is actually used). It should also be noted that, because this model is an ANCOVA model, *C* is a pooled-within school covariance matrix. This is accomplished by providing scores to the EM algorithm that are centered around group means (i.e., the group means are subtracted from the scores) rather than around grand means. Obtaining *C* is an iterative process since group means are estimated within the EM algorithm to accommodate missing data. Once new group means are obtained, another set of scores is fed into the EM algorithm again until *C* converges. This overall iterative EM algorithm is what accommodates the two difficulties mentioned above. The estimation only includes students who had a test score for the response variable in the most recent administration ***and*** who had at least three predictor variables. Given such a matrix, the vector of estimated regression coefficients for the projection equation (2) can be obtained as:

$$\hat{\beta} = C_{xx}^{-1} c_{xy} \quad (4)$$

This allows one to use whichever predictors a student has to get that student's projected y-value ($\hat{y}_i$). Specifically, the C_{xx} matrix used to obtain the regression coefficients ***for a particular student*** is that subset of the overall C matrix that corresponds to the set of predictors for which this student has scores. Once the parameter estimates for the projection equation have been obtained, projections can be made for any student with any set of predictor values. Again, to protect against bias due to measurement error in the predictors, projections are typically made only for students who have at least three available predictor scores.

The table below summarizes the data used to generate projections representing a pre-pandemic average schooling experience.

Table 2: Data Used to Determine Students' Projected Score in 2021-22

Projected score in SY21-22 on…	Prior years' data through SY18-19 used to calculate projected score
EOG Reading for grades 3–5	MCLASS K-2*
EOG Reading and Math for grades 6–8	EOG Reading and Math in grades 3–5** EOG Science in grade 5
EOG Science for grade 8	EOG Reading and Math in grades 3–5** EOG Science in grade 5
EOC Biology, English II, NC Math 1 and NC Math 3	EOG Reading and Math in grades 3–8*** EOG Science in grades 5 and 8***
ACT assessments in English, Math, Reading, and Science	EOG Reading and Math for grades 3–8 EOG Science in grades 5 and 8 EOC Biology, English II, Math 1 and Math 3

*Note: Projections were not made to EOG Math in grades 3–5 and EOG Science in grade 5 due to the available predictors of students who could receive projections in the 2018-19 school year.

**Note: Due to suspended assessments in the SY19-20, EOG Reading and Math scores were not available from grade 6 to make projections to SY21-22 EOG Reading, Math and Science in grade 8.

***Note: Due to suspended assessments in the SY19-20, EOG Math and Reading scores from grade 7 are not available to use as predictors for students who were enrolled in grade 7 in SY19-20 and took an EOC test in SY21-22. Students who take EOC Biology as sophomores do not include grade 8 predictors.

Table 3: Data Used to Determine Students' Projected Scores in 2020-21

Projected score in SY20-21 on…	Prior years' data through SY18-19 used to calculate projected score
EOG Reading for grades 3 and 4*	mCLASS in grades K-2 BOG Reading in grade 3
EOG Reading and Math for grades 5–8	EOG Reading and Math in grades 3–6** EOG Science in grade 5
EOG Science for grade 8	EOG Reading and Math in grades 3–6** EOG Science in grade 5
EOC Biology, English II, NC Math 1 and NC Math 3	EOG Reading and Math in grades 3–8*** EOG Science in grades 5 and 8***
ACT assessments in English, Math, Reading, and Science	EOG Reading and Math for grades 3–8 EOG Science in grades 5 and 8 EOC Biology, English II, Math 1 and Math 3

*Note: Projections were not made to EOG Math in grades 3 and 4 because the available predictors for the 2020-21

cohort of students were based solely in the Reading content area and were much lower in those subject/grades than they were for other subject/grades. More specifically, the correlation between predictors and actual scores for EOG Math in grades 3 and 4 was about 0.60 compared to 0.80 for most subjects and grades.

**Note: Due to suspended assessments in the SY19-20, EOG Reading and Math scores were not available from grade 7 to make projections to SY20-21 EOG Reading, Math and Science in grade 8.

***Note: Due to suspended assessments in the SY19-20, EOG Reading, Math and Science scores from grade 8 are not available to use as predictors for students who were enrolled in grade 8 in SY19-20 and took an EOC test in SY20-21.

In this analysis, student scores from the 2018-19 school year were used as the response to create the underlying parameter estimates in the projection equations. These parameter estimates define the relationships between prior tests or predictors and the response subject and grade. In other words, these relationships indicate how one test can provide information about where students are likely to score on another test. The set of predictors that were considered in each of these models are listed above in Tables 2 and 3. Once these parameter estimates were obtained, these models were used to create projected scores for the 2021-22 and 2020-21 school years using predictor test scores up through the 2018-19 school year. This creates a projected score for students who tested during the 2021-22 or 2020-21 school year that was based on experiences or relationships defined prior to the pandemic and their own individual set of prior testing history.

Based on empirical data, there are observed differences in the projection model for NC Math 1 depending on whether the student took that assessment in middle school or high school. As a result, there are two separate pools to establish the projections and parameters for NC Math 1: one based on middle school test takers and the other based on high school test takers.

Last, while last year's Impact Analysis could provide projections for EOG Reading starting in grade 3 and EOG Math starting in grade 5, this year's Impact Analysis provides projections starting in EOG grade 6 for Math and Reading. This is because the 2021-22 sixth graders are the first cohort of students to have sufficient prior testing history to receive projections based on their available test scores through the 2018-19 school year.

3.3 Students' Actual Scores

A student's actual score is the scale score that they obtained on the state summative assessment in the 2021-22 school year for the recovery analysis; last year's lost instructional time analysis used the scale scores from the 2020-21 school year, and the pre-pandemic historical analysis was based on the scale scores from the 2017-18 school year.

In EOG Reading, the standards were modified for the 2020-21 school year's assessment. Although that year's scale scores look different compared to prior years', it is our understanding that there were minimal changes to the EOG Reading content standards in the 2020-21 school year compared to previous years. Given this, the projected scores to the 2020-21 and 2021-22 school years were modified to be on the same scale as the 2020-21 and 2021-22 actual scores by subtracting 100 from the student's actual scale score. The hundreds place in the prior version was a 400, and it is a 500 in the new version. This place defines the version of the assessment.

3.4 Difference Between Students' Projected and Actual Scores

Because the projected scores and actual scores are in the same scaling units, the difference between them is a simple subtraction problem. *For each student, the difference is calculated as the actual score minus the projected score.*

A difference of zero indicates that a student scored where they were projected to score. A positive difference indicates that a student exceeded their projected score or, in other words, that the student made more progress than the average pre-pandemic schooling experience given their set of prior testing data. A negative difference indicates that a student fell short of their projected score or, in other words, that the student made less progress than the average pre-pandemic schooling experience given their set of prior testing data. The average schooling experience was defined by the most recent cohort of test-takers who took the test prior to the pandemic in the 2018-19 school year.

No conclusions should be drawn for individual students, but an aggregation of student results does provide a more robust indicator of how students' observed performance differed from their pre-pandemic projected scores. Typically and in non-pandemic years, the average schooling experience does not vary significantly from one year to the next. As a result, in a "normal" school year, the students in a state will, on average, score close to where they were projected to score, although this might not hold true for students in specific schools or student groups.

However, in this analysis the projected scores were based on the pre-pandemic average schooling experience. Thus, it is possible that some students fell short of their projected scores due to lost instructional time and to the pandemic's impact on student learning.

As noted above, some student flags are used to generate school-level variables that indicate the school's concentration of student composition in the form of quartiles. For example, the student-level Economically Disadvantaged flag was used to create quartiles based on the percentage of the school's students who are considered Economically Disadvantaged.

3.5 Conversion of Differences to Effect Sizes

In order to standardize the differences across grades and provide a more meaningful interpretation, the residual that is in the scaling units of the test is then divided by the standard deviation of the student-level achievement distribution based on the statewide distribution of student scores in a specific tested content area (like 2018-19 EOG Math in grade 7) to create an effect size. This effect size or "standardized residual" is helpful in interpreting results across grades.

With this standardized residual, it is possible to assess whether certain grades, schools, or student groups were disproportionately impacted. All of the results are expressed in terms of the effect size.

The effect size can be classified as small, medium, or large to assist with interpretation and whether any differences in student performance are meaningful. Various researchers have offered thoughts on what defines a small, medium, and large effect size.

- Cohen describes 0.20 as small, 0.50 as medium, and 0.80 as large (Cohen, Jacob. *Statistical Power Analysis for the Behavioral Sciences.* 2nd ed. Mahwah, NJ: Lawrence Erlbaum, 1988).

- Hattie describes an effect size of 0.40 as the average seen across all interventions, and 0.40 as the "hinge point" (Hattie, John, *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement.* London: Routledge, 2008).
- Kraft suggested < 0.05 as small, 0.05 to 0.20 as medium, and > 0.20 as large based on the distributions of effect sizes and changes in achievement (Kraft MA. "Interpreting Effect Sizes of Education Interventions." *Educational Researcher*. 2020; 49 (4):241-253).

All of the researchers agree that it is important to interpret results within the distribution of actual results. In other words, what constitutes a small, medium, or large effect size is determined by what is observed in the actual results.

For a comparison, the table below provides school-level effect sizes based on a "typical" pre-pandemic school year for the state assessments (the 2018-19 school year). For example, an effect size of -0.11 in EOC Biology corresponds to the 30th percentile in a "typical" year while an effect size of -.30 corresponds to the 10th percentile in a "typical" year.

Table 4: Pre-Pandemic *School*-Level Effect Size Percentiles

	Percentile										
Assessment	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**95**
EOC Biology	-0.40	-0.30	-0.17	-0.11	-0.05	0.00	0.05	0.11	0.17	0.26	0.34
EOC English II	-0.33	-0.18	-0.10	-0.06	-0.02	0.01	0.05	0.07	0.11	0.16	0.24
EOC NC Math 1	-0.36	-0.27	-0.17	-0.11	-0.06	-0.01	0.04	0.10	0.16	0.28	0.38
EOC NC Math 3	-0.33	-0.26	-0.18	-0.13	-0.07	-0.01	0.04	0.11	0.17	0.28	0.40
EOG Math 4	-0.36	-0.28	-0.18	-0.10	-0.04	0.01	0.07	0.12	0.18	0.26	0.32
EOG Math 5	-0.30	-0.24	-0.16	-0.11	-0.05	0.00	0.04	0.09	0.15	0.24	0.32
EOG Math 6	-0.33	-0.25	-0.18	-0.11	-0.06	-0.01	0.04	0.09	0.16	0.26	0.35
EOG Math 7	-0.31	-0.22	-0.15	-0.10	-0.04	0.00	0.04	0.09	0.14	0.21	0.28
EOG Math 8	-0.49	-0.37	-0.24	-0.17	-0.09	0.00	0.07	0.14	0.21	0.35	0.48
EOG Reading 4	-0.22	-0.16	-0.10	-0.06	-0.03	0.00	0.03	0.07	0.11	0.17	0.22
EOG Reading 5	-0.20	-0.15	-0.10	-0.06	-0.03	0.00	0.03	0.07	0.10	0.15	0.19
EOG Reading 6	-0.23	-0.16	-0.10	-0.06	-0.03	0.00	0.03	0.06	0.11	0.17	0.20
EOG Reading 7	-0.22	-0.15	-0.09	-0.05	-0.03	0.00	0.03	0.06	0.10	0.15	0.21
EOG Reading 8	-0.22	-0.16	-0.10	-0.06	-0.02	0.01	0.03	0.06	0.09	0.14	0.19

This information can also be put into context of pre-pandemic student-level effect sizes. Table 5 below provides the average student-level effect size based on the 2018-19 school year. For example, an effect size of -0.23 in EOC Biology corresponds to the 30th percentile in a "typical" year while an effect size of -.60 corresponds to the 10th percentile in a "typical" year. Note that the student-level effect sizes have a broader range of values than the school-level effect sizes since the school effect sizes are averaged values.

Table 5: Pre-Pandemic Student-Level Effect Size Percentiles

	Percentile										
Assessment	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**95**
EOC Biology	-0.80	-0.60	-0.38	-0.23	-0.10	0.02	0.15	0.28	0.43	0.66	0.86
EOC English II	-0.83	-0.62	-0.39	-0.23	-0.10	0.02	0.14	0.27	0.41	0.61	0.78
EOC NC Math 1	-0.76	-0.59	-0.38	-0.23	-0.11	0.00	0.12	0.24	0.38	0.57	0.73
EOC NC Math 3	-0.96	-0.75	-0.50	-0.31	-0.16	-0.01	0.13	0.28	0.45	0.68	0.86
EOG Math 4	-0.81	-0.62	-0.40	-0.25	-0.11	0.01	0.13	0.26	0.41	0.62	0.80
EOG Math 5	-0.81	-0.62	-0.40	-0.24	-0.11	0.01	0.13	0.26	0.41	0.61	0.79
EOG Math 6	-0.78	-0.59	-0.38	-0.23	-0.10	0.01	0.13	0.25	0.38	0.58	0.75
EOG Math 7	-1.04	-0.80	-0.53	-0.32	-0.15	0.01	0.17	0.34	0.54	0.81	1.02
EOG Math 8	-0.84	-0.64	-0.42	-0.26	-0.12	0.00	0.13	0.26	0.42	0.65	0.83
EOG Reading 4	-0.80	-0.62	-0.40	-0.25	-0.12	0.00	0.12	0.25	0.40	0.61	0.79
EOG Reading 5	-0.80	-0.60	-0.39	-0.23	-0.11	0.01	0.12	0.24	0.38	0.58	0.75
EOG Reading 6	-0.81	-0.61	-0.39	-0.24	-0.11	0.01	0.12	0.24	0.39	0.59	0.76
EOG Reading 7	-0.81	-0.61	-0.39	-0.23	-0.10	0.01	0.13	0.26	0.40	0.60	0.77
EOG Reading 8	-0.92	-0.71	-0.47	-0.29	-0.14	0.00	0.15	0.30	0.47	0.72	0.93

The analysis does not report statistical significance. This is a common statistical metric used to establish a confidence band around the likely range of values for an effect size. It is related to the number of students included in the analysis as well as other factors. Given the number of students included in the analysis, almost all differences in student performance are classified as statistically significant. Given the purpose of this research, the effect size is a more useful measure for determining the relevance of any differences in student performance.

3.6 Historical Comparisons

The analysis compares students' projected performance to their actual performance for four cohorts of students:

- 2021-22 actual performance based on predictors through the 2018-19 school year
- 2020-21 actual performance based on predictors through the 2018-19 school year
- 2018-19 actual performance based on predictors through the 2016-17 school year
- 2017-18 actual performance based on predictors through the 2016-17 school year

The method of analysis for the historical comparisons (2018-19 and 2017-18) is similar to what is described for the 2021-22 and 2020-21 comparisons above. However, there are some important differences for interpretation.

First, when interpreting the 2018-19 results as historical context, it is important to understand that Math standards changed. When standards change, there is often a one-year dip in state

achievement levels as educators and students adjust to the new standards. This is typically true in North Carolina as well as other states. In subsequent years, the achievement stays fairly consistent from year-to-year. In the 2018-19 comparison, students typically perform lower than projected across the EOG Math and Math 1 assessments, and this gap is likely due to the change in standards. These results should be interpreted as gaps in projected achievement for a year when standards changed in Math. For this reason, the 2018-19 results are not a focus of the 2022 report, and the 2017-18 results are used for historical comparison purposes.

In the 2017-18 school year, standards did not change, and the gap between projected and actual performance is fairly small across the EOG Math and Math 1 assessments. This year might be more comparable to the typical year of schooling where standard did not change than the more recent 2018-19 school year as standards did not change in the 2020-21 school year either.

Note that, historically, when standards change in Reading, there are fewer differences in student performance compared to Math. Given the smaller shift in content this year in Reading, there are not analytic concerns about the Reading comparison.

As a second difference to note for interpretation, there was a change in the policy for eighth-grade Math students in the 2017-18 school year. Prior to this year, eighth-grade students who were enrolled in NC Math 1 took both the EOG Math 8 test and the NC Math 1 test. Starting in the 2017-18 school year, eighth-grade students who were enrolled in NC Math 1 did not take the EOG Math 8 test, only the NC Math 1 test. For this reason, the 2018-19 comparison analysis removed these students from the projection model for EOG Math 8. In other words, these students' prior test scores were not used to establish parameters and the average schooling experience for the 2018-19 performance because those students did not actually take EOG Math 8 in the 2018-19 school year. These students tend to be relatively high achieving, so including them in the model when none of them took the test introduces a gap when comparing students' projected and actual performance.

Last, it should be noted that EOC NC Math 3 was fully implemented in 2019 (as opposed to NCFE Math 3), so there are no historical comparisons available, only the 2020-21 and 2021-22 results.

4 Results

A brief description of the information provided in the results is below, and results are provided in a separate document. This description will assist with interpretation. With the exception of correlations, actual results based on effect sizes are provided separately.

4.1 Effect Size by Subject Grade

The “Effect Size by Subject Grade” bar charts provide the average state-level effect size by assessed content area for the following years, where available:

- 2021-22 school year, on the *right* side of the page
- 2020-21 school year, on the *left* side of the page
- 2017-18 school year, the pre-pandemic historical comparison indicated on *both* the 2021-22 and 2020-21 bar charts with an open diamond circle

For context in interpretation, the 2022 and 2021 results are shown alongside the 2018 results. This enables users to assess whether there were pre-existing gaps prior to the 2021-22 and 2020-21 school years.

The **Y axis lists the available subjects and grades** as well as an overall “All Subjects” category.

The **X axis shows the average effect size** based on all student residuals for that subject/grade. As a reminder, the effect size is the standardized residual between students’ actual and projected score for a specific assessment. Each bar chart shows the average standardized residual for all students who took the assessment in the 2021-22 or 2020-21 school year. The X axis ranges from -0.8 to +0.6 since more of the data was negative due to the pandemic’s impact on student learning.

The **open diamond outlined in black shows the average effect size based on all student residuals for that subject/grade in the 2017-18 school year**. This open diamond is the pre-pandemic historical comparison, and it is on both the 2021-22 and 2020-21 bar charts to assess how results compare to pre-existing gaps. Note that this diamond is not available for some student groups, such as chronic absenteeism, military connected, foster students, migrant students, and remote quintiles.

In addition to the average effect size, the analysis presents the distribution of student-level effect sizes within each subject and grade or course. This distribution shows the proportion of students who have positive and negative effect sizes as well as whether those effect sizes are small, medium, or large. These categories are defined as follows:

- **Large negative:** the student effect size is less than -0.20
- **Medium negative:** the student effect size is -0.20 or greater and less than -0.05
- **Small negative:** the student effect size is -0.05 or greater but less than 0.0
- **Small positive:** the student effect size is between 0.0 or greater but less than +0.05
- **Medium positive:** the student effect size is +0.05 or greater but less than +0.20
- **Large positive:** the student effect size is +0.20 or greater

Every assessment includes students in every category, but the proportion of students within each category varies by assessment.

Similar information is provided in tables, with the addition of student counts. In these tables, the Count column represents the number of student records that were used in the analysis, i.e., the scores met all analytic criteria for inclusion, and there was sufficient data for an individual student to calculate the difference between the student's actual and projected score. The count and effect size were not displayed if there were fewer than 10 student records included in that specific result. In "All Subjects," an individual student can be included more than once if that student has records in multiple assessments, such as grade 5 EOG Math and grade 5 EOG Reading.

4.2 Effect Size by Subject Grade for Specific Groups

The "Effect Size by Subject Grade" bar charts are also provided based on whether a student has a specific student, school, or district flag. The interpretation is similar to what is described above; however, rather than present one bar chart per assessment, these graphics have two or more bar charts per assessment. For example, for a given assessment, there is an effect size based on all students who are considered English Learners next to an effect size based on all students who are not considered English Learners. Similar data is available for other student-level flags.

There are also results available for school- or district-level groupings, such as different designations for districts in tiered counties. For ease of interpretation, some school or district groupings are sometimes placed into quintiles or quartiles based on the percentage, with 1 representing the lowest percentage and 5 representing the highest percentage.

4.3 Effect Size by Subject Grade based on the Percentage of Remote Instruction

In contrast to the bar charts provided in Section 4.1, this set of graphs provided effect size by subject grade based on 20 (rather than five) categories based on students' reported percentage of remote instruction. There were twenty different categories, each spanning 5%. In other words, the first category represents students whose percentage of remote instruction spanned 0 to 5%, the second category represents students who percentage of remote instruction spanned 5 to 10%, etc. Each graph has a dot that represents the average effect size for the students in a specific category, and there is a trend line across all 20 categories.

The X axis indicates the 20 categories of students' reported percentage of remote instruction. Each category spans 5%.

The Y axis indicates the student-level effect size and ranges from -0.75 to +0.15.

When the Y axis equals zero, it means that the student-level effect size is zero and students' actual scores were the same as their projected scores. When a dot is below zero on the Y axis, it means that students' actual scores were, on average, lower than their expected score for that group. When a dot is above zero on the Y axis, it means that students' actual scores were, on average, higher than their expected scores for that group. In 2021, the distribution tends to be shifted below zero on the Y axis in most subjects and grades. The distribution also tends to be lower the greater the percentage of remote instruction, although the strength of that relationship varies by subject and grade.

The graph includes a trend line, which was weighted according to the number of student scores includes in the percentage group.

The analysis only included students whose total days ranged from 145 to 225.

4.4 Correlations Between Observed and Projected Scores

The correlation table below reports the correlation value between students' observed and projected scores for a given school year. For example, in the column "Correlation 2018," the correlation is based on students' actual scores from the 2017-18 school year and their projected scores to the 2017-18 school year. As a reminder, the projected score is based on the individual student's previous test scores prior to the 2017-18 school year and assumes the average schooling experience of students who tested in the 2016-17 school year.

The purpose of this information is to provide context about the predictive relationship between students' projected and observed scores in a given year. Correlations in 2018 were made one year out using the experience of the 2016-17 school year's test takers. Correlations for 2019 and 2021 are made two years out using the experience of the 2016-17 and 2018-19 school years' test takers respectively. Correlations for 2022 are made three years out using the experience of the 2018-19 school year's test takers. In some subjects, the correlation is slightly lower in 2021 and 2022 compared to 2018 and 2019. This is not only due to the projections being two or three years out but due to the experience during and before the pandemic being different as well as more volatility in individual student scores during the pandemic. Regardless, the correlations tend to be very strong across all years and subjects.

Table 6: Correlations between Students' Projected and Actual Scores in 2018, 2021, and 2022

Subject	Correlation 2018	Correlation 2021	Correlation 2022
Biology	0.86142	0.85611	0.82865
English II	0.86813	0.86481	0.84839
NC Math 1	0.86869	0.81108	0.80081
NC Math 3	.	0.81555	0.79116
Math Grade 5	0.86657	0.78619	.
Math Grade 6	0.87336	0.80623	0.78174
Math Grade 7	0.89681	0.81629	0.80449
Math Grade 8	0.80725	0.67042	0.67405
Reading Grade 3	0.73320	0.67861	0.75687
Reading Grade 4	0.85698	0.70192	0.81961
Reading Grade 5	0.86606	0.82272	0.84648
Reading Grade 6	0.87780	0.82419	0.80101
Reading Grade 7	0.87550	0.83668	0.80919

Subject	Correlation 2018	Correlation 2021	Correlation 2022
Reading Grade 8	0.87329	0.84262	0.82012
Science Grade 8	0.86010	0.84527	0.83042

5 Appendix A: Definitions of Student Identifiers and District/School Flags

NCDPI provided the following definitions of student identifiers and district/school flags.

5.1 A-F Performance Grades from 2018-19 School Year

This flag is defined by the state and is as follows:

“Every district and charter school receives an A-F letter grade based 80 percent on the school's achievement score (calculated using a composite method based on the sum of points earned by a school on all of the indicators measured for that school), and 20 percent on students' academic growth (compares the actual performance of the school's students to their expected performance based on a statewide statistical model). The letter grades are computed on a 15-point scale (85-100=A; 70-84=B; etc.).”

Source: Frequently Asked Questions | NC DPI

5.2 Academically or Intellectually Gifted

This flag is defined by state but identified by a Public School Unit (PSU), and there is one flag per student, regardless of subject, in the data received by SAS. The flag is defined as follows:

“Academically or Intellectually Gifted (AIG) students perform or show the potential to perform at substantially high levels of accomplishment when compared with others of their age, experiences or environment. Academically or Intellectually Gifted students exhibit high-performance capability in intellectual areas, specific academic fields, or in both the intellectual areas and specific academic fields. Academically or Intellectually Gifted students require differentiated educational services beyond those ordinarily provided by the regular educational program. Outstanding abilities are present in students from all cultural groups, across all economic strata, and in all areas of human endeavor.”

Source: Article 9B (N.C.G.S. § 115C-150.5) Article_9B.pdf (ncleg.net)

5.3 Chronically Absent

This flag is defined by the North Carolina State Board of Education and is as follows:

“‘Student Chronic Absentee’ is a student who is enrolled in a North Carolina public school for at least 10 school days at any time during the school year, and whose total number of absences is equal to or greater than 10 percent of the total number of days that such student has been enrolled at such school during such school year.”

Source: View Policy ATND-004: Definition of Student Chronic Absenteeism Rate (eboardsolutions.com)

5.4 Economically Disadvantaged Students

This flag is defined as follows by the state:

“Any student identified by a PSU, meeting the criteria of Directly Certified, Categorically Eligible, or a method consistent with State or Federal guidance for financial assistance regardless of participation or eligibility in the National School Lunch Program.”

Source: Economically_Disadvantaged-Student_Guidance_20210630 V4.3 Final.pdf (govdelivery.com)

5.5 English Learners (EL)

This definition is given by the U.S. Department of Education, and the flag is defined as follows:

“The term English Learner (EL), when used with respect to an individual, means an individual — (A) who is aged 3 through 21; (B) who is enrolled or preparing to enroll in an elementary school or secondary school; (C)(i) who was not born in the United States or whose native language is a language other than English; (ii)(I) who is a Native American or Alaska Native, or a native resident of the outlying areas; and (II) who comes from an environment where a language other than English has had a significant impact on the individual's level of English language proficiency; or (iii) who is migratory, whose native language is a language other than English, and who comes from an environment where a language other than English is dominant; and (D) whose difficulties in speaking, reading, writing, or understanding the English language may be sufficient to deny the individual — (i) the ability to meet the challenging State academic standards; (ii) the ability to successfully achieve in classrooms where the language of instruction is English; or (iii) the opportunity to participate fully in society (ESEA Section 8101(20)) (“Non-Regulatory Guidance” 43).”

Source: ESL/Title III Program and ELD Standards Glossary - Google Docs

5.6 Entering Achievement by Quintile

Students are placed into one of five approximately evenly sized groups defined by students' projected score. Graph displays the average student-level effect size across all students in each quintile.

5.7 Foster Student

This flag is defined by the state and include students who are identified as being in the care of the foster system by the Department of Health and Human Services.

5.8 Homeless

This flag is based on the federal definition and is defined as follows.

“The term ‘homeless children and youths’--

A. means individuals who lack a fixed, regular, and adequate nighttime residence (within the meaning of section 103(a)(1)); and

B. includes—

   (i) children and youths who are sharing the housing of other persons due to loss of housing, economic hardship, or a similar reason; are living in motels, hotels, trailer parks, or camping grounds due to the lack of alternative adequate accommodations; are living in emergency or transitional shelters; or are abandoned in hospitals;*

   (ii) children and youths who have a primary nighttime residence that is a public or private place not designed for or ordinarily used as a regular sleeping accommodation for human beings (within the meaning of section 103(a)(2)(C));

(iii) children and youths who are living in cars, parks, public spaces, abandoned buildings, substandard housing, bus or train stations, or similar settings; and

(iv) migratory children (as such term is defined in section 1309 of the Elementary and Secondary Education Act of 1965) who qualify as homeless for the purposes of this subtitle because the children are living in circumstances described in clauses (i) through (iii).

*Per Title IX, Part A of the Every Student Succeeds Act, 'awaiting foster care placement' was removed from the definition of homeless on December 10, 2016; the only exception to his removal is that 'covered states' have until December 10, 2017 to remove 'awaiting foster care placement' from their definition of homeless."

Source: McKinney-Vento Definition – National Center for Homeless Education

5.9 Migrant Student

This flag is based on the federal definition and is as follows:

"MIGRATORY CHILD.—The term ''migratory child'' means a child or youth who made a qualifying move in the preceding 36 months— (A) as a migratory agricultural worker or a migratory fisher; or (B) with, or to join, a parent or spouse who is a migratory agricultural worker or a migratory fisher"

Source: Section 1309 of ESEA 1965 F:\COMP\EDII\EASEAO1.bel

5.10 Military Connected

This flag is defined by the state and is as follows:

- Parent serving on active duty
- Parent In the National Guard
- Parent In the U.S. Reserve
- A surviving dependent of a deceased service member

5.11 Percentage of Economically Disadvantaged Students by Quintile

Students are placed into one of five equally sized groups defined by the percentage of students identified as Economically Disadvantaged within each school or LEA. EDS is defined as, "Any student identified by a PSU, meeting the criteria of Directly Certified, Categorically Eligible, or a method consistent with State or Federal guidance for financial assistance regardless of participation or eligibility in the National School Lunch Program."

5.12 Percentage Connectivity

Schools are placed into one of five groups defined by the percent of students within each school that had home internet connectivity in 2020-2021: 0-20%, 20-40%, 40-60%, 60-80%, and 80-100%. Graph displays the average student-level effect size across students within schools in each range.

5.13 Percentage Remote in 2020-21 by Group

Students are placed into one of 20 groups defined by the number of days spent in remote instruction divided by the number of days the student was not absent in 2020-21 (0-5%, 5-10%, 10-15%, etc.). Note that there was not an equal number of students within each group. Graph displays the average student-level effect size across students within each group. The percentage of remote instruction was an annual metric provided by NCDPI, and the analysis only included students whose total days ranged from 145 to 225.

5.14 Public School Designation – Traditional and Charter

This flag is defined by the state and is as follows:

“Charter schools are public schools of choice that are authorized by the State Board of Education and operated by independent non-profit boards of directors. State and local tax dollars are the primary funding sources for charter schools, which have open enrollment and cannot discriminate in admissions, associate with any religion or religious group, or charge-tuition. Charter schools operate with freedom from many of the regulations that govern district schools, but charter schools are held accountable through the State assessment and accountability system.” Info by Role | NC DPI

5.15 Race/Ethnicity

This flag is based on the federal definition and is defined as follows.

“Categories developed in 1997 by the Office of Management and Budget (OMB) that are used to describe groups to which individuals belong, identify with, or belong in the eyes of the community. The categories do not denote scientific definitions of anthropological origins.” The Integrated Postsecondary Education Data System

5.16 Sex

This flag is based on the federal definition and is defined as follows:

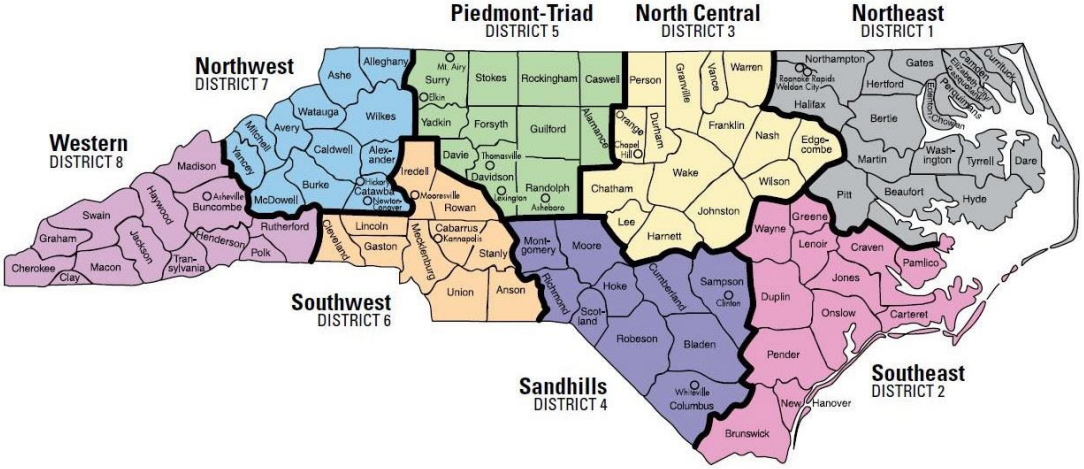
An indication that students are either female or male. fs052-17-3.docx (live.com)

5.17 State Board of Education Region

Geographically defined, set by the General Assembly, to create a “unified system of statewide support to North Carolina Local School Administrative Units.”

Regional Directors | NC DPI

State Board of Education | NC DPI



5.18 Students with Disabilities

This flag is based on the federal definition and is defined as follows.

“Those children evaluated as having any of the following impairments and who, by reason thereof, receive special education and related services under the Individuals with Disabilities Education Act (IDEA) according to an Individualized Education Program (IEP), Individualized Family Service Plan (IFSP), or a services plan. There are local variations in the determination of disability conditions, and not all states use all reporting categories.”

Source: COE - Students With Disabilities (ed.gov)

5.19 Urbanicity

This flag is based on the federal definition and is defined as follows.

City: Territory inside an Urbanized Area and inside a Principal City

City School: 15 of the 115 NC school districts are administered through city instead of county governance structures.

Rural: Census-defined rural territory that is outside of an Urbanized Area, as well as rural territory that is outside of an Urban Cluster.

Suburb: Territory outside a Principal City and inside an Urbanized Area

Town: territory inside an Urban Cluster that is outside of an Urbanized area

For more guidance and specific definitions of phrases like “Urbanized area:” Locale Boundaries File Documentation

6 Appendix B: Charts and Tables for the Statewide Charter School Results

Charters and tables are presented for the following:

By Student Group

- Summary of All Tested Subjects
- Sex
- Race/Ethnicity
- Economically Disadvantaged Students
- Chronically Absent
- Academically or Intellectually Gifted
- Students with Disabilities
- Multilingual Learners
- Student Experiencing Homelessness
- Military Connected Students
- Foster Students
- Migrant Students
- Entering Achievement by Quintile

By School

- Urbanicity
- Percentage Connectivity
- 2021 Remote Days by Quintile
- School Designation
- State Board of Education Region
- A-F Grade

Interactions

- Race/Ethnicity Split by Sex
- Race/Ethnicity Split by EDS