DELAWARE EARLY LEARNER SURVEY

KEY FINDINGS

Prepared for Delaware Department of Education

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In the following report, Hanover Research presents the results of our analysis of results from the Delaware Early Learner Survey (DE-ELS) in 2015-16 and 2016-17, examining trends in student "accomplishment" across six domains at kindergarten entry.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY AND KEY FINDINGS

INTRODUCTION

The Delaware Early Learner Survey (DE-ELS) is a customized "observational tool through which kindergarten teachers observe and record children's skills that lead to success in kindergarten" that was first implemented statewide in fall 2015. The survey is a developmentally-appropriate, strengths-based survey implemented in the first 30 days of regular classroom activity. Kindergarten teachers observe and collect information on children's knowledge, skills, and behaviors in six developmental domains: cognitive, language, literacy, mathematics, physical, and social-emotional. Children who meet a threshold, a "cut score" for widely held expectations of five-year-old children, may then be considered "accomplished" in each domain at kindergarten entry, respectively. Children who are still developing towards widely held expectations of five-year-old children may be considered "emerging" on those indicators within each domain.[1]

The Delaware Department of Education (DDOE) is interested in learning implementation lessons through an analysis of the DE-ELS results. Teachers have an opportunity to use the Delaware Early Learner Surveys' data results to:

- Promote the success of every child by observing and reflecting on students' development and learning over time
- Support, guide, and inform planning and instruction
- Assist in recognizing a need for additional resources or services for students
- Communicate with family members and others on students' growth and development

In this report, Hanover examines patterns in teacher input and presents a descriptive analysis of students' "accomplishment" in each domain at kindergarten entry across different demographic characteristics and geographic locations. Then, we conduct a cluster analysis of students with similar patterns of skills and examine each cluster. The report is organized as follows:

- **Section I: Data and Methodology** discusses the data and the methodology Hanover used in the analysis;
- **Section II: Patterns in Teacher Input** investigates potential patterns in teacher input between teachers who were implementing the survey for the first time and those who were in their second year with the survey;
- **Section III: Demographic Analysis** summarizes participating students' demographic characteristics, as well as trends in skills at kindergarten entry across these different demographic groups;

[1] "Delaware Early Learner Survey 2016-17 Fact Sheet.pdf." August 2, 2016. http://www.doe.k12.de.us/cms/lib09/DE01922744/Centricity/Domain/432/Delaware%20Early%20Learner%20Survey%202016-17%20Fact%20Sheet.pdf

- **Section IV: District/Charter and County Analysis** examines skills at kindergarten entry across school districts, charter schools, and counties; and
- **Section V: Cluster Analysis** creates profiles for students with similar domain scores at kindergarten entry and presents the demographic profiles of each identified student profile, along with potential support needs.

KEY FINDINGS

DESCRIPTIVE ANALYSIS

- **Teachers observe higher levels of skill in the literacy and physical domains, and as a result, more students are scored as "accomplished" in these two domains than in other domains. In contrast, teachers score fewer students as "accomplished" in mathematics.**
  - **Regardless of teachers' experience, they score a higher proportion of students as "accomplished" in the literacy and physical domains than in other domains in both years.** About 68 percent of students are scored as "accomplished" in literacy, and about 64 percent of students are scored as "accomplished" in the physical domain. The rate in other domains ranges from 26 to 62 percent.
  - **Teachers in 2016-17 report higher levels of skill in mathematics than teachers in 2015-16, regardless of their level of experience with the survey.** Teachers in 2015-16 (who are in their first year of survey implementation) score only a little over 20 percent of their students as "accomplished" in mathematics, while teachers in 2016-17 (regardless of whether they are in their first or second year with the survey) classify roughly twice that percentage of students as "accomplished" in mathematics.
  - In domains other than mathematics, there are only small differences across years in the percentage of students "accomplished" at kindergarten entry.
- **Student demographic and geographic distributions are similar in 2015-16 and 2016-17.**
  - Participating male students slightly outnumber female students. In 2015-16, male students are about 4 percentage points more than female students. The gap narrows to 2 percentage points in 2016-17.
  - White, black, and Hispanic/Latino students are the three most common major race/ethnicity groups among participating students. In both years, white students are the plurality group, making up over 40 percent of the population. Black students and Hispanic/Latino students are the largest and the second largest minority groups in the participating population.
  - English learners account for 16 to 19 percent of students. The percentage of English learners declines slightly from 2015-16 to 2016-17.
  - Students with disabilities account for 13 to 16 percent of the population, and social/emotional/intellectual is the larger disability category, compared to physical. The percentage of students with social/emotional/intellectual

disabilities, as a proportion of all students with disabilities, is 55.50 percent and 61.98 percent in 2015 and 2016, respectively.

- **Students' "accomplishment" in each of the six domains at kindergarten entry varies by county and by district or charter.**
  - Sussex County has the lowest percentage of students who are "accomplished" in each domain at kindergarten entry, while New Castle and Kent County have more similar percentages of "accomplished" students.
  - "Accomplishment" across all domains at kindergarten entry varies greatly across districts and charters within each county.
  - While overall the average "accomplishment" rate is higher for charters, the variation in students' "accomplishment" rates across individual charters is large. No consistent trend appears in "accomplishment" at kindergarten entry when comparing charters to public school districts.
- **Key patterns between student demographic characteristics and "accomplishment" on each domain at kindergarten entry emerge as follows:**
  - A lower proportion of age five students are "accomplished" in each domain compared with age four students (who only enter kindergarten as a result of being tested for giftedness). Differences between age five and age six students are less consistent across domains and years.
  - Asian students have the highest rate of "accomplishment" at kindergarten entry across most domains in both years, while Hispanic/Latino students have the lowest. Levels of "accomplishment" is most similar across demographic groups on the physical domain.
  - Female students are more likely to be "accomplished" in each domain than male students, with the largest gaps in physical and social-emotional and the smallest gap in mathematics.
  - English learners are less likely than their peers to be "accomplished" in each domain at kindergarten entry, with the largest gaps in language and literacy.
  - Students with high needs are less "accomplished" at kindergarten entry than their peers. As with most other demographic characteristics, the smallest gap is in the physical domain.
  - "Accomplishment" at kindergarten entry in each domain is lower for students with disabilities, but the different in levels between students without disabilities is much smaller for students with physical disabilities than for those with social/emotional/intellectual disabilities**.**

CLUSTER ANALYSIS

- **Based on students' skills at kindergarten entry in each domain, we identify the following five student profiles, with potential support strategies for each profile:**
  - **Profile A: No additional support** – High levels of "accomplishment" across all domains; retain the current level of support.
  - **Profile B: Targeted mathematics support** – Most students "accomplished" in all domains except mathematics; targeted mathematics support with focused support for the other five domains.
  - **Profile C**: **Targeted support for all domains except for literacy** – Most students below widely held expectations cut score in every domain except literacy; focused literacy support with targeted support for the other five domains.
  - **Profile D**: **Intensive mathematics support and targeted support in other domains** – Most students below widely held expectations cut scores at kindergarten entry in all domains, though to a lesser extent in the physical and social-emotional domains. Intensive mathematics support, targeted support in cognitive, language, and literacy, and focused-to-targeted invention in physical and social-emotional.
  - **Profile E**: **Intensive support for all domains** – Intensive support is required on all domains for this small group.
- When comparing all Profiles A-E, Profile D and E in general have the following demographic and geographic characteristics:
  - **Hispanic/Latino and black students, male students, high need students, English learners, and students with disabilities (especially those with social/emotional/intellectual disabilities) are more concentrated in Profiles D and E**. For example, 28.91 percent of Profile E students are English learners, while only 8.89 percent of Profile A students are English learners.
  - **At the county level, a larger proportion of students in Sussex County are concentrated in Profiles D and E.** In Sussex County, 38.22 percent of students are in Profiles D and E at kindergarten entry, while the percentages are 29.91 and 27.32 for Kent and New Castle Counties, respectively. Within Sussex County, D and E students are more concentrated on the west part.

SECTION I: DATA AND METHODOLOGY

This first section summarizes the data and methodology that Hanover used for this analysis of student "accomplishment" at kindergarten entry as measured by the Delaware Early Learner Survey (DE-ELS).

DATA OVERVIEW

To support the analysis, DDOE provided Hanover with DE-ELS results for the 2015-16 and 2016-17 academic years as well as student participants' demographic and geographic information. Students' data is not linked to identifiers such as student names and we suppress any results for small groups of students (less than 10) to protect student's confidentiality.

SURVEY VARIABLES

Figure 1.1 summarizes the survey variables we used for this analysis. For each student, the dataset contains a numeric level assigned by the teacher in the classroom and a corresponding proficiency level for each of the six domains (cognitive, language, literacy, mathematics, physical, and social-emotional). The proficiency level is either "emerging" or "accomplished". DDOE also provided Hanover with a state cut score for each of the six domains. These cut scores in each domain, which correspond to a level (between 1 and 9) on a progression of widely held expectations for five-year-old children, define the point where students are identified as "accomplished" as opposed to "emerging".[2]

The state cut scores were determined by DDOE based on the five-year-old widely held expectation (WHE) bands provided by Teaching Strategies, LLC for each objective (corresponding to the purple color band on the Teaching Strategies GOLD indicators). Since DE-ELS is administered at the beginning of kindergarten, the state cut score thresholds for each objective are generally set one level below the bottom of the five-year-old WHE band,[3] because students are not expected to meet the WHE at the start of the year. The domain-level cut scores are calculated by summing the objective-level state cut scores for all of the objectives within each domain.[4]

Figure 1.1 shows the cut score used to identify students as "accomplished" in each domain, along with a summary of the equivalent average numeric level this corresponds to for each individual objective within the domain. For domains where different objectives have different cut scores (resulting in an average level that is not a whole number), the figure also summarizes the range of objective-by-objective cut scores within the domain.

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[2] See the attachment for progressions and WHE for each objective.

[3] There are two exceptions to this rule:
[1] Language Objective 9b (Speaks clearly): the cut score is set at Level 6, which is also the bottom of the kindergarten WHE band for the objective.
[2] Literacy Objective 16b (Uses letter-sound knowledge): the cut score is set at Level 2, which is also the bottom of the kindergarten WHE band for the objective.

[4] "ELS Proficiencies.pdf." Document provided to Hanover Research by DDOE. Attached.

Figure 1.1: Variable Summary – Survey Variables

DOMAINS	MEASUREMENTS
Cognitive	▪ **Survey Domain Score:** numeric scores ▪ **Cut Score/Proficiency Level:** o "Accomplished": 30 or higher o Equivalent to average rating of Level 5 on each objective o "Emerging": lower than 30
Language	▪ **Survey Domain Score:** numeric scores ▪ **Cut Score/Proficiency Level:** o "Accomplished": 24 or higher o Equivalent to average rating of Level 6 on each objective o "Emerging": lower than 24
Literacy	▪ **Survey Domain Score**: numeric scores ▪ **Cut Score/Proficiency Level:** o "Accomplished": 34 or higher o Equivalent to average rating of Level 3.4 on each objective, based on objective-by-objective cut scores set at Levels 2 to 5 for each objective o "Emerging": lower than 34
Mathematics	▪ **Survey Domain Score:** numeric scores ▪ **Cut Score/Proficiency Level:** o "Accomplished": 30 or higher o Equivalent to average rating of Level 5 on each objective o "Emerging": lower than 30
Physical	▪ **Survey Domain Score:** numeric scores ▪ **Cut Score/Proficiency Level:** o "Accomplished": 18 or higher o Equivalent to average rating of Level 6 on each objective o "Emerging": lower than 18
Social-Emotional	▪ **Survey Domain Score:** numeric scores ▪ **Cut Score/Proficiency Level:** o "Accomplished": 26 or higher o Equivalent to average rating of Level 5.2 on each objective, based on objective-by-objective cut scores of Level 5 on four objectives and Level 6 on one objective o "Emerging": lower than 26

TEACHER PARTICIPATION

To examine any potential patterns in teacher input based on teachers' levels of experience with the survey, we linked student scores with years of teachers' experience. In each year, a student is either taught by a teacher with one year of experience with the survey or a teacher with two years of experience. If a student is co-taught by two teachers, we link the student to the maximum teaching experience of the two teachers in our analysis. For example, if a student is co-taught by a one-year experience and a two-year experience teacher, the student's scores are considered to be assigned by the teacher with two-year experience.

Teachers who conducted the survey in both years are only classified as two-year experience teachers in the second year of administration (i.e., 2016-17), since their 2015-16 observations were made without the benefit of a second year of experience. Figure 1.2 specifies the detailed criteria we use for the classification of teachers' experience.

Figure 1.2: Variable Summary – Teacher Participation

VARIABLE	CATEGORY/NOTES
Teacher Names	▪ We linked teacher information in 2015-16 and 2016-17 by teacher names. ▪ For cases where schools used different names to represent the same teacher, we manually standardized their names. Note that we treat two teachers with similar names as the same person only if they are at the same school; we did not attempt to match records for teachers who changed schools. This method may have missed some potential matches if any teachers changed their name between years (e.g., due to marriage).
Teacher Experience	▪ **One-year experience:** o Teachers who taught in either 2015-16 or 2016-17 but not both. o The first year (i.e., 2015-16) for teachers who taught both years. ▪ **Two-year experience:** o The second year (i.e., 2016-17) for teachers who taught both years. ▪ Note that for students who are co-taught by any teachers with two-year experience, we treat the students' domain scores as being assigned by the two-year experience teacher.

STUDENT DEMOGRAPHIC AND GEOGRAPHIC INFORMATION

Figure 1.3, Figure 1.4, and Figure 1.5 present the demographic and geographic segmentations we use for this analysis. For demographic characteristics, we have data on student age, race/ethnicity, gender, English proficiency, high need status, and disability category. Note that the data contains two measures of students' English proficiency (LEP and ESOL status) because districts and charter schools do not use the same acronyms. Therefore, we have created a single combined English learner indicator that classifies any student who is classified in the data as *either* LEP or ESOL as an English learner. High need status is an aggregated measurement of economically disadvantaged, homeless, direct certification, foster, and migrant statuses. Students with any of these statuses are classified as high need.

For geographic variables, we use data on the district and county where each student's school is located. Based on DDOE business rules, we group districts within counties based on elementary schools. For districts spanning more than one county, we use the county in which the district has the most elementary schools. We also present aggregated results for charter schools and school districts both statewide and within counties.

Figure 1.3: Variable Summary – Student Demographic Variables

VARIABLES	CATEGORIES/NOTES
Age	▪ We calculate student age as of August 31st in a given year. For example, for 2016, we considered students born September 1st of 2010 through August 31st of 2011 to be five years of age. ▪ Student age ranges from four to seven. Only five students are age seven; they are excluded because they likely represent retained students who are not comparable to students entering kindergarten.
Race/Ethnicity	▪ Students who classify themselves as Hispanic/Latino are included in this category regardless of their race classifications. ▪ For students who are not Hispanic/Latino, we group them into one of the following race categories: Asian, black or African American, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, multiracial (including any non-Hispanic/Latino student indicating more than one race), white
Gender	▪ Male and female
English Learner	▪ Students who are classified as either needing instruction in English for speakers of other languages (ESOL) **or** who are classified as having limited English proficiency (LEP)
High Need	▪ Students who are classified as any of the following: (1) Economically disadvantaged, (2) Homeless, (3) Direct Certification, (4) Foster, (5) Migrant
Disability Category	▪ Students with disabilities are aggregated into two categories (physical and social/emotional/intellectual) as shown in Figure 1.4 in order to ensure that all student groups we report on have a sufficient sample size for analysis. ▪ Disability category is coded as "Not Listed" if the student is classified as having a disability but does not have information on a specific primary disability category.

Figure 1.4: Variable Summary – Disability Reclassification

Disability Category	Disability Type
Physical	Blind
	Hearing Impairment
	Partially Sighted
	Physical Impairment - Orthopedic Impairment
	Physical Impairment - Other Health Impairment
	Preschool Speech Delay (3 And 4 Year Olds Only)
	Speech and/or Language Impairment
Social/Emotional/Intellectual	Autism
	Developmental Delay
	Emotional Disability
	Emotional Disturbance
	Learning Disability
	Mild Intellectual Disability
	Moderate Intellectual Disability
	Traumatic Brain Injury
Not Listed	Not Listed

Figure 1.5: Variable Summary – Student Geographic Variables

Variables	Categories/Notes
District	▪ 28 different districts or charter schools (13 charters and 15 public school districts)
County	▪ Three counties ▪ Note districts spanning multiple counties are assigned to a single county in this analysis based on the location of the majority of elementary schools

METHODOLOGY

In this analysis, we provide an overview of student "accomplishment" across the six domains, as well as their overall "accomplishment" in each domain at kindergarten entry. We use descriptive analysis to examine patterns in teacher input based on level of experience with the survey, as well as "accomplishment" at kindergarten entry across different demographic and geographic groups. Then, we conduct a cluster analysis to create groupings of students with similar patterns of skills at kindergarten entry and examine the profiles of each of these groupings of students.

PATTERNS IN TEACHER INPUT

The first analysis compares the average domain scores and percentage of students at or above the widely held expectation cut score for teachers with one-year experience with those of teachers with two-year experience. This analysis allows us to identify patterns in the assignment of domain scores between teachers with varied levels of experience with the survey.

DEMOGRAPHIC ANALYSIS

We divide the demographic analysis into two parts. First, we investigate the demographic distributions of kindergarten students. We perform a descriptive analysis of student demographic data. Specifically, for each academic year, we provide the average age of students at kindergarten entry, as well as the distribution of students by gender, race/ethnicity, English learner status, disability status, and high need status. We also present the percentage of students in each district and county. This demographic analysis is presented overall to provide an overview of the profile of participating students.

Second, we examine student "accomplishment" in each domain at kindergarten entry across different demographic characteristics. For each academic year, we present the percentage of students who are "accomplished" in each domain at kindergarten entry within each demographic group. Note that we suppress "accomplishment" information for any demographic groups with fewer than 10 observations to protect students' confidentiality and to avoid presenting unreliable data on very small groups.

DISTRICT/CHARTER AND COUNTY ANALYSIS

In this analysis, we compare "accomplishment" in each domain at kindergarten entry across districts and charters, as well as across counties, in each year. We compare the percentage of students who meet or exceed the widely held expectation cut scores of "accomplished" in each domain as well as the percentage who are "accomplished" in each domain districtwide, countywide, and statewide. This analysis is used to compare students' "accomplishment" in all six domains at kindergarten entry across the state. We also present the average scores in each domain at the district, county, and state level.

CLUSTER ANALYSIS

Hanover uses cluster analysis to cluster students according to their scores at kindergarten entry in each domain. In order to conduct the analysis, we only focus on students with scores in all six domains.[5] After using this methodology to identify student profiles, we analyze the demographic and geographic differences between various student profiles. In this sub-section, we describe the cluster analysis methodology in more detail, explaining the variable selection and cluster assignment process.

SEGMENTATION VARIABLES

In the cluster analysis, Hanover uses domain scores rather than a binary indicator of whether a student is "accomplished" in each domain because of the greater granularity provided by the domain scores. Figure 1.6 summarizes the student numeric scores in each domain, as well as the associated cut score. For example, 16,729 students have available mathematics scores, with an average of 25.28, while the mathematics cut score is 30.

Figure 1.6: Summary Statistics of Student Numeric Scores in Each Domain

DOMAIN	RAW SCORE					CUT SCORE
	COUNT	MEAN	STD. DEV.	MIN	MAX	
Cognitive	17,169	29.77	8.15	1	50	30
Language	17,190	23.16	5.56	1	36	24
Literacy	16,865	40.65	15.97	1	85	34
Mathematics	16,729	25.28	8.31	1	49	30
Physical	17,353	18.25	3.96	1	27	18
Social-Emotional	17,502	26.60	7.26	1	45	26

As score scales are different in each domain, Hanover standardizes the scores before conducting the cluster analysis. This transformation step is calculated by taking a student's score in a given domain, subtracting the associated cut score, and dividing by the district standard deviation.[6]

The resulting standardized scores are measured in standard deviations above or below the cut score. This allows us to compare different domains using their standardized score format even though they have different scales in their original (numeric) format.[7] Figure 1.7 summarizes the standardized scores in each domain.

[5] After removing 1,412 records with one or more missing scores in any of the six domains, there are 16,313 total student records included in the cluster analysis across 2015-16 and 2016-17.

[6] Please note that we calculate the standard deviation and standardize the score distance from cut score after removing the records with one or more missing scores in any of the six domains.

[7] For example, the mathematics cut score is 30 and the district standard deviation is approximately 8. This means that a student with a raw score equal to the cut score (30) would have a standardized score of 0 (i.e., (30 raw score – 30 cut score)/8 standard deviation = 0). A student with a raw that is 1 standard deviation above the cut score (or 38) would have a standardized score of 1 (i.e., (38-30)/8 = 1), and a student with a raw score that is 1 standard deviation below the cut score (or 22) would have a standardized score of -1 (i.e., (22-30)/8 = -1).

Figure 1.7: Summary Statistics of Student Standardized Score Distance in each Domain

Domain	Standardized Score Distance				
	Count	Mean	Std. Dev.	Min	Max
Cognitive	16,313	-0.01	1.00	-3.63	2.50
Language	16,313	-0.14	1.00	-4.21	2.20
Literacy	16,313	0.45	1.00	-2.11	3.26
Mathematics	16,313	-0.56	1.00	-3.53	2.31
Physical	16,313	0.09	1.00	-4.43	2.35
Social-Emotional	16,313	0.12	1.00	-3.56	2.70

Please note that we removed 1,412 records with one or more missing scores in any of the six domains before standardizing the score distance.

Clustering Methodology

As discussed above, Hanover standardizes the score distance from each domain's cut score and conducts the cluster analysis, using the k-means clustering algorithm. Clusters are defined by using the standardized score distance in each domain. Other variables, such as demographic (e.g., gender, race/ethnicity) and geographic (e.g., county, school district) are not used to define the clusters, but are only used to describe differences between clusters after they are defined.

Determining Optimal Number of Clusters

To determine the optimal number of clusters within a dataset, we create a range of different clustering solutions and compare the amount of variance in the data which is explained by each clustering solution. Specifically, Hanover calculates the ratio of the between-cluster variation (a numeric measure of the differences between clusters) to the total variation present in the dataset. This ratio provides a measure of the variance within the data that is explained by the clustering solution. A higher ratio corresponds to a higher amount of variation explained.

An objective of the analysis is to keep the solution as simple as possible, because minimizing the number of clusters in the solution can produce more interpretable and actionable findings. The optimal number of clusters is the point at which the marginal increase in the variance explained by the increasing number of clusters is small. After the calculation, **Hanover selects five clusters** and employs the k-means clustering algorithm to create the clusters.

Student Profile Analysis

After classifying the five student clusters (profiles), we compare their demographic and geographic characteristics. We present the percentage of students in each profile in each demographic group and in public school districts and charter schools through tables, and we also visualize the rates of student profile characteristics in each public school district using maps. Similar to the descriptive analysis above, we hide the score information for any demographic groups with fewer than 10 observations.

SECTION II: PATTERNS IN TEACHER INPUT

Figure 2.1 presents the average score and the percentage of students who earned a proficiency rating of "accomplished" (by meeting or exceeding the cut score) in each domain and the percentage of students who are "accomplished" by teacher experience. Because some students are not scored in all six domains, the number of student scores in each domain varies. Figure 2.1 reveals several major trends:

- **In five of the six domains (all except mathematics), there are only small differences in the percentage of students classified as "accomplished" at kindergarten entry across years and teacher experience levels.**
- **A higher proportion of students were scored as "accomplished" in the literacy and physical domains, while a lower proportion of students were scored as "accomplished" in mathematics.** Teachers score more students at or above the literacy and physical thresholds, and the percentages of "accomplished" students in these two domains are both over 63 percent. In contract, in mathematics, the percentage is only 25.66 percent when it is scored by one-year experience teachers and 43.79 percent when it is scored by two-year experience teachers.
- **Teachers in 2016-17 scored a much higher percentage of students as "accomplished" in mathematics at kindergarten entry than teachers in 2015-16.** In 2015-16, only about 20 percent of students were classified as "accomplished" in mathematics at kindergarten entry, but this percentage more than doubled, to over 40 percent, in 2016-17. **This gap between 2015-16 and 2016-17 does not appear to be primarily a result of teachers' increased experience with the survey**, as teachers with one year of experience in 2016-17 classified over 40 percent of their students as "accomplished" in mathematics at kindergarten entry, which is more consistent with the evaluations of teachers with two years of experience in 2016-17 than with those of teachers with only one year of experience in the previous school year.

The gap in the percentage of students classified as "accomplished" in mathematics does not appear to be a result of changes in the demographic composition of the student population entering kindergarten in 2016-17 vs. 2015-16. **Since the gap in the percentage of students classified as "accomplished" in mathematics at kindergarten entry was significant across years, we carried out a supplementary regression analysis to confirm that this gap could not be attributed to any demographic differences in students with survey scores across years or across teacher experience levels.**

- Figure 2.2 shows the results of this analysis. This analysis confirms that teachers in 2016-17 score incoming kindergarten students 2.7 levels higher on mathematics, on average, than teachers in 2015-16, and thus their students are more likely to be classified as "accomplished" in mathematics by about 21 percentage points, even after controlling for the demographic characteristics of their students.
- After controlling for demographics and differences across school years, teachers with two years of experience record slightly higher levels than those with one year of experience (by about a quarter of a level on average, or by about half of a percentage point when comparing the percentage of students scored as "accomplished"), but this difference is small compared to the rating differences between years and is not statistically significant.

Figure 2.1: Patterns in Teacher Input

Domain	Measurement	One-Year Experience		Two-Year Experience
		2015-16	2016-17	2016-17
Cognitive	N	7,685	2,663	6,333
	Average Score	29.82	29.33	29.94
	Percentage of Students Who Are "accomplished" at Kindergarten Entry	55.72%	51.60%	56.67%
Language	N	7,690	2,686	6,322
	Average Score	23.26	22.65	23.29
	Percentage of Students Who Are "accomplished" at Kindergarten Entry	54.84%	51.94%	55.22%
Literacy	N	7,580	2,574	6,205
	Average Score	41.02	39.51	40.99
	Percentage of Students Who Are "accomplished" at Kindergarten Entry	69.45%	63.36%	68.17%
Mathematics	N	7,511	2,599	6,158
	Average Score	23.41	26.41	27.06
	Percentage of Students Who Are "accomplished" at Kindergarten Entry	20.25%	41.32%	43.80%
Physical	N	7,740	2,740	6,339
	Average Score	18.32	18.38	18.22
	Percentage of Students Who Are "accomplished" at Kindergarten Entry	63.55%	65.36%	62.77%
Social Emotional	N	7,865	2,749	6,357
	Average Score	26.54	26.70	26.74
	Percentage of Students Who Are "accomplished" at Kindergarten Entry	61.20%	60.46%	61.96%

Figure 2.2: Differences in Mathematics "accomplishment" at Kindergarten Entry, Controlling for Demographics and District/Charter of Enrollment

	Average Score	Percent "accomplished" at Kindergarten Entry
School Year (reference group: 2015-16)		
2016-17	2.6610***	0.2119***
Teacher Experience (reference group: one-year experience)		
Two-Year Experience	0.2480	0.0047
High Need Status (reference group: students without high need)		
High Need	-1.7923***	-0.0887***
Disability Category (reference group: students without disability)		
Not Listed	-5.4536***	-0.1555***
Physical	-1.4218***	-0.0846***
Social/ Emotional/Intellectual	-4.5029***	-0.1926***
English Learner (reference group: not an English learner)		
English Learner	-3.5285***	-0.1442***
Gender (reference group: female)		
Male	-0.1179	-0.0019
Race/Ethnicity (reference group: white)		
American Indian	0.2646	-0.0299
Asian	3.5969***	0.2119***
Black	-1.4025***	-0.0643***
Hawaiian/Pacific Islander	--	--
Hispanic/Latino	-1.8869***	-0.0723***
Multiracial	-0.6936**	-0.0358**
Model Statistics		
District/Charter Fixed Effects	Yes	Yes
(Intercept)	-5,336.2586***	--
R^2	0.2124	--
Number of Observations	16,202	16,268

Note: *** p<0.01, ** p<0.05, * p<0.1. Coefficients for "Average Score" model calculated using an Ordinary Least Squares (OLS) regression model. Coefficients for the "Percent "accomplished" at Kindergarten Entry" model in this table represent marginal effects at the means for a logistic regression model (rather than the raw regression coefficients), and show the effect of moving from the reference category for a variable to the category in question, for a student who is average in terms of the other variables in the model.

SECTION III: DEMOGRAPHIC ANALYSIS

STUDENT DEMOGRAPHICS

This subsection shows student demographic distributions in each year. Figure 3.1 depicts student demographic information. There are 8,169 students who participated in the program in the 2015-16 academic year, and the number increases to 9,556 in the 2016-17 academic year. Because some demographic information is unavailable for some students, the number of students included in each demographic analysis varies. The following lists some key trends from these figures:

- **The average student age is five.** The average age in 2015-16 is 5.05, and this is nearly unchanged in 2016-17, at 5.02.
- **Male students slightly outnumber female students.** In 2015-16, about 48 percent of the participating population is female, and in 2016-17, this proportion increases to over 49 percent.
- **White, black, and Hispanic/Latino students are the three major race/ethnicity groups**. In both years, white students are the plurality group, making up over 40 percent of the population. Black students are the largest minority group in the state, representing about 28 percent of the participating population. The state also has a large number of Hispanic/Latino students, who make up 19 percent of the population.
- **The percentage of students classified as English learners is slightly lower in 2016-17 than in 2015-16.** In 2015-16, 19 percent of students are English learners, while this drops to 16 percent in 2016-17.
- **The percentage of students with high need drops significantly in the second year.** While about 60 percent of students have high need in 2015-16, the rate decreases to 37 percent in 2016-17. Drops in the percentage of economically disadvantaged and direct certification students in the participating study population may contribute to this decrease.
- **Students with disabilities make up 13 to 16 percent of the population, and social/emotional/intellectual is the more common disability category, compared to physical.** The percentage of students with social/emotional/intellectual disabilities is 55.50 percent in 2015 and 61.98 percent in 2016.

Figure 3.1: Student Demographic Distribution

Category	Sub-Category	2015-16 Average/ Percentage	2016-17 Average/ Percentage
Age	--	5.05	5.02
Race/Ethnicity	American Indian	0.23%	0.28%
	Asian	4.21%	4.05%
	Black	27.60%	28.00%
	Hawaiian/ Pacific Islander	0.07%	0.19%
	Hispanic/Latino	18.02%	19.46%
	Multiracial	4.68%	5.16%
	White	45.18%	42.85%
Gender	Female	47.96%	49.22%
	Male	52.04%	50.78%
English Learner	No	80.95%	84.15%
	Yes	19.05%	15.85%
High Need	No	40.92%	63.43%
	Yes	59.08%	36.57%
County	Kent	17.74%	17.52%
	New Castle	63.81%	62.57%
	Sussex	18.45%	19.91%
Disability Category	Without Disability	84.09%	86.91%
	Not Listed	0.31%	0.50%
	Physical	6.78%	4.47%
	Social/Emotional/Intellectual	8.83%	8.12%
N	--	8,169	9,556

Note: In 2015-16, only 7,657 students have data available on their district or charter and county.

SKILLS AT KINDERGARTEN ENTRY BY DEMOGRAPHICS

This subsection examines students' "accomplishment" in each domain at kindergarten entry in each year by different demographic characteristics. Figure 3.2 and Figure 3.3 display the proportion of students who are "accomplished" in each domain in 2015-16 and 2016-17 across various demographic groups. Some key characteristics are summarized as follows:

- **The percentage of students who are "accomplished" at kindergarten entry in mathematics in 2016-17 is higher than it is in 2015-16.** In most demographic groups, the percentage of students who are "accomplished" in mathematics in 2016-17 is 10 to 30 percentage points higher than in 2015-16.
- **Across all domains, a higher proportion of age four students are "accomplished" when entering kindergarten compared to age five students.** This is likely because the age four students are entering kindergarten because they were tested for giftedness. Differences between age five and age six students are not particularly consistent across domains or years.
- **Asian students have the highest rate of "accomplishment" at kindergarten entry across most domains in both years, while Hispanic/Latino students have the lowest.** Asian students have lower rate of "accomplishment" relative to other groups on the language domain, while Hispanic/Latino students show the largest gaps compared to other students on the language and literacy domains. "Accomplishment" is most similar across groups on the physical domain.
- **Female students are more likely to be "accomplished" in each domain at kindergarten entry than male students.** The gap between male and female students at kindergarten entry is at least 9 percentage points in both years in four of the six domains (cognitive, language, physical, and social/emotional). In mathematics, however, the gap is less than 1 percentage point in 2015-16 and only 2 percentage points in 2016-17.
- **English learners are less likely than their peers to be "accomplished" in each domain at kindergarten entry, with the largest gaps in language and literacy.** The gap in "accomplishment" at kindergarten entry between English learners and their peers is 18 to 28 percentage points in language and literacy. The gap is smaller in other domains, with the narrowest gap of only 3 to 4 percentage points occurring in the physical domain. The gap between English learners and other students widens notably between 2015-16 and 2016-17 in mathematics, from 8 percentage points to 22 percentage points.
- **Students with high need are less likely to be "accomplished" in each domain at kindergarten entry.** The percentage of students with high need who are "accomplished" is 11 to 21 percentage points lower in most domains, with the smallest gap of only 8 points appearing in the physical domain.

- **"Accomplishment" at kindergarten entry in each domain is lower for students with disabilities, but the gap to students without disabilities is much smaller for students with physical disabilities than for those with social/emotional/intellectual disabilities.** The percentage of students with physical disabilities who are "accomplished" at kindergarten entry is within 12 percentage points of the percentage for students without disabilities in every domain except language in both years, while the percentage of students with social/emotional/intellectual disabilities who are "accomplished" at kindergarten entry is over 20 points lower in most domains in both years.

Figure 3.2: Percentage of Students Who are "Accomplished" in Each Domain at Kindergarten Entry, by Demographics – 2015-16

Category		Category N Range	Percent Who are "accomplished" at Kindergarten Entry					
			Cognitive	Language	Literacy	Mathematics	Physical	Social Emotional
Age	4	43-44	55.81%	59.09%	75.00%	20.93%	68.18%	70.45%
	5	7,242-7,598	55.72%	54.86%	68.99%	20.26%	63.11%	61.25%
	6	307-353	50.93%	51.10%	66.47%	20.20%	63.88%	49.86%
Race/Ethnicity	American Indian	16-18	56.25%	68.75%	56.25%	17.65%	64.71%	55.56%
	Asian	325-337	62.69%	50.60%	79.38%	34.77%	67.37%	65.28%
	Black	2,118-2,210	50.78%	52.68%	67.27%	15.58%	61.83%	57.42%
	Hawaiian/Pacific Islander	6	--	--	--	--	--	--
	Hispanic/Latino	1,353-1,427	45.18%	41.51%	52.98%	12.27%	60.01%	54.17%
	Multiracial	363-377	56.40%	55.28%	68.02%	16.80%	64.23%	59.95%
	White	3,410-3,620	61.77%	61.49%	75.47%	25.31%	64.74%	65.14%
Gender	Female	3,644-3,837	61.67%	60.62%	72.43%	20.77%	69.93%	69.17%
	Male	3,948-4,158	49.84%	49.28%	65.65%	19.78%	56.92%	53.08%
English Learners	No	6,164-6,489	57.88%	58.30%	73.18%	21.80%	63.76%	62.23%
	Yes	1,428-1,509	45.42%	39.39%	50.52%	13.59%	60.70%	54.65%
High Need	No	3,108-3,284	66.28%	64.80%	81.33%	30.21%	68.25%	70.13%
	Yes	4,484-4,711	48.00%	47.70%	60.29%	13.36%	59.64%	54.30%
Disability Category	Without Disability	6,389-6,725	58.76%	59.32%	71.32%	22.02%	66.84%	64.55%
	Not Listed	21-25	39.13%	26.09%	50.00%	4.76%	34.78%	24.00%
	Physical	515-543	49.91%	41.50%	67.49%	15.73%	55.82%	54.14%
	Social/Emotional/Intellectual	667-702	29.59%	22.54%	47.64%	7.35%	35.14%	31.34%

Figure 3.3: Percentage of Students Who are "Accomplished" in Each Domain at Kindergarten Entry, by Demographics – 2016-17

Category		Category N Range	Percent Who are "accomplished" at Kindergarten Entry					
			Cognitive	Language	Literacy	Mathematics	Physical	Social Emotional
Age	4	26-27	66.67%	73.08%	85.19%	62.96%	80.77%	76.92%
	5	8,916-9,278	55.26%	54.27%	66.64%	42.91%	63.42%	61.47%
	6	181-187	58.47%	53.85%	73.48%	51.93%	73.22%	62.57%
Race/Ethnicity	American Indian	27	66.67%	51.85%	66.67%	40.74%	51.85%	48.15%
	Asian	376-386	68.49%	61.40%	80.85%	64.29%	72.28%	68.13%
	Black	2,516-2,648	49.67%	51.33%	65.62%	39.53%	61.45%	55.89%
	Hawaiian/Pacific Islander	18	44.44%	50.00%	66.67%	33.33%	55.56%	77.78%
	Hispanic/Latino	1,750-1,846	46.44%	39.31%	49.44%	28.91%	62.15%	58.07%
	Multiracial	468-490	58.76%	57.26%	68.50%	45.51%	65.31%	63.67%
	White	3,959-4,076	61.36%	61.94%	73.88%	49.51%	64.86%	65.90%
Gender	Female	4,483-4,668	59.95%	60.17%	68.88%	44.35%	69.71%	67.57%
	Male	4,641-4,823	50.91%	48.64%	64.85%	42.00%	57.81%	55.69%
English Learner	No	7,692-7,985	57.83%	58.76%	71.05%	46.63%	64.24%	63.21%
	Yes	1,432-1,506	42.31%	30.76%	44.38%	24.44%	60.56%	52.66%
High Need	No	5,827-6,011	60.61%	60.02%	72.02%	48.45%	66.40%	65.71%
	Yes	3,297-3,480	46.23%	44.35%	57.70%	33.79%	58.90%	54.31%
Disability Category	Without Disability	7,933-8,245	58.40%	57.96%	68.99%	45.83%	66.18%	64.46%
	Not Listed	44-47	26.09%	27.66%	40.91%	25.00%	40.43%	38.30%
	Physical	410-425	51.06%	43.40%	66.26%	37.56%	58.35%	58.35%
	Social/Emotional/Intellectual	737-774	27.06%	23.14%	45.49%	18.45%	41.02%	33.46%

SECTION IV: DISTRICT/CHARTER AND COUNTY ANALYSIS

STUDENT DISTRIBUTION ACROSS DISTRICTS AND CHARTERS

This subsection shows student geographic distributions in each year. Figure 4.1 presents the percentage of students in each county and district or charter school. Key patterns in students' geographic distribution include:

- **Students' geographic distribution is consistent over time.** New Castle County accounts for 63.81 percent of participating students in 2015-16 and 62.54 percent in 2016-17. Kent and Sussex each account for about 18 percent. Christina School District and Red Clay Consolidated School District account for the highest numbers of participants in New Castle County. Caesar Rodney School District and Capital School District each account for more than 25 percent of Kent County students. In Sussex, Indian River School District accounts for over 40 percent of the participating students.
- Four charter schools in New Castle County reported data for the first time in 2016-17, but these additions account for a relatively small percentage of the overall student population and do not affect New Castle's overall share of the participating population, which stays at about 63 percent. The four charters reporting data for the first time in 2016-17 are Academic Antonia Alonso, Edison (Thomas A.) Charter School, Family Foundations Academy, and MOT Charter School. While Family Foundations Academy reported some data in 2016-17, it has been excluded from this section because their students did not have recorded observations in every domain.

Figure 4.1: Student Distribution by District or Charter

County	District Name	2015-16		2016-17	
		N	Percentage	N	Percentage
Kent	Academy of Dover Charter School	1,360	3.38%	1,674	2.33%
	Caesar Rodney School District		35.15%		34.53%
	Campus Community Charter School		2.43%		2.09%
	Capital School District		29.12%		26.88%
	Lake Forest School District		12.06%		19.12%
	Providence Creek Academy Charter School		3.97%		4.54%
	Woodbridge School District		13.90%		10.51%
New Castle	Academia Antonia Alonso	4,891	--	5,979	2.36%
	Appoquinimink School District		9.81%		11.39%
	Brandywine School District		13.56%		11.87%
	Christina School District		25.62%		21.54%
	Colonial School District		10.39%		11.84%
	East Side Charter School		1.29%		1.07%
	Edison (Thomas A.) Charter School		--		1.62%
	Family Foundations Academy		--		0.84%
	First State Montessori Academy		1.00%		1.25%
	Kuumba Academy Charter School		1.80%		1.52%
	Las Americas Aspira Academy		2.02%		1.64%
	MOT Charter School		--		1.25%
	Newark Charter School		3.33%		3.14%
	Odyssey Charter School		2.74%		2.69%
	Red Clay Consolidated School District		21.59%		19.59%
	Smyrna School District		6.85%		6.37%
Sussex	Cape Henlopen School District	1,528	12.04%	1,903	17.24%
	Indian River School District		44.04%		42.56%
	Laurel School District		8.84%		8.20%
	Milford School District		21.53%		17.50%
	Seaford School District		13.55%		14.50%

SKILLS AT KINDERGARTEN ENTRY BY DISTRICT/CHARTER AND COUNTY

Figure 4.2 and Figure 4.3 present the percentage of students "accomplished" in each domain within each district or charter and county. Figure 4.4 and Figure 4.5 compare this "accomplishment" rate between charters and school districts (as aggregated groups) in each county. We also calculate the average scores in each domain for each geographic grouping in Figure 4.6 and Figure 4.7. Moreover, Figure 4.8 and Figure 4.9 convert the average scores to the average rating of level on each objective, and present the average levels in each domain by district. The trends we observe do not depend on which of these two measures we examine; districts and charters that have high or low rates of students scored as "accomplished" at kindergarten entry have correspondingly high or low average scores. Therefore, to reduce redundancy, our discussion focuses on the percent of students who are "accomplished" in each domain and omits any direct discussion of the average scores. Key trends in the six domains by geography include:

- **In 2016-17, the proportion of students who are "accomplished" in all domains is higher in each district or charter and county than in 2015-16.** Statewide, the proportion of students "accomplished" in every domain increases from 15 percent to 18 percent.
- **Sussex County has the lowest percentage of students who are "accomplished" in each domain at kindergarten entry, while New Castle and Kent County have more similar percentages of "accomplished" students.**
- **The percentage of "accomplished" students varies greatly within each county.** In 2015-16, the difference between the district with the largest proportion of students who are "accomplished" on every domain at kindergarten entry and the district with the smallest in each county is 13 percentage points for Sussex County, 47 percentage points for Kent County, and 39 percentage points for New Castle. In 2016-17 the gaps widen to 21, 87, and 57 percentage points for these three counties respectively. There are similarly wide differences within each county when examining each domain individually.
- **There is no clear trend in "accomplishment" at kindergarten entry for charters as compared to public school districts.** Although charter schools on average have higher "accomplishment" rates in some domains, the variation across individual charter schools is large. While some charters, such as Campus Community Charter School and Odyssey Charter School, have some of the highest proportions of students who are "accomplished" at kindergarten entry across multiple domains, other charters, such as Academy of Dover Charter School and Las Americas Aspira Academy, have some of the lowest proportions.

Figure 4.2: Percentage of Students Who are "Accomplished" at Kindergarten Entry – 2015-16

County	District	County N	District N Range	Percent Who are "Accomplished" at Kindergarten Entry					
				Cognitive	Language	Literacy	Math	Physical	Social Emotional
State	--	**7,779**	--	**55.52%**	**54.92%**	**69.60%**	**20.39%**	**63.66%**	**62.18%**
Kent	Academy of Dover Charter School	1,360	37-46	34.78%	23.91%	69.57%	18.92%	58.70%	54.35%
	Caesar Rodney School District		469-478	86.82%	80.97%	91.81%	19.12%	93.91%	82.70%
	Campus Community Charter School		33	87.88%	69.70%	100.00%	66.67%	93.94%	84.85%
	Capital School District		391-396	44.19%	47.07%	65.65%	12.15%	64.63%	57.91%
	Lake Forest School District		142-164	45.73%	27.44%	47.18%	14.63%	35.98%	39.63%
	Providence Creek Academy Charter School		53-54	62.96%	52.83%	79.25%	37.74%	58.49%	60.38%
	Woodbridge School District		188-189	44.44%	41.27%	52.13%	17.46%	59.26%	61.38%
	Kent County		--	**60.88%**	**55.74%**	**72.65%**	**18.19%**	**70.97%**	**65.51%**
Sussex	Cape Henlopen School District	1,528	144-184	53.26%	56.52%	65.64%	15.28%	54.35%	47.28%
	Indian River School District		635-673	49.18%	42.79%	64.96%	17.18%	55.44%	50.97%
	Laurel School District		125-135	42.96%	41.86%	52.27%	13.74%	64.39%	63.91%
	Milford School District		325-329	55.93%	57.93%	66.56%	19.94%	78.66%	70.43%
	Seaford School District		206-207	20.77%	51.21%	25.73%	5.34%	44.44%	52.91%
	Sussex County		--	**46.73%**	**48.78%**	**58.85%**	**15.62%**	**59.59%**	**56.12%**
New Castle	Appoquinimink School District	4,891	395-480	70.42%	57.95%	81.88%	24.94%	53.26%	72.80%
	Brandywine School District		654-663	57.62%	62.92%	69.39%	19.15%	66.92%	65.95%
	Christina School District		1199-1253	55.87%	52.37%	69.58%	15.51%	63.76%	59.23%
	Colonial School District		479-508	44.29%	44.58%	60.55%	17.46%	52.98%	60.87%
	East Side Charter School		63	41.27%	52.38%	73.02%	6.35%	66.67%	41.27%
	First State Montessori Academy		49	95.92%	71.43%	97.96%	46.94%	75.51%	83.67%
	Kuumba Academy Charter School		85-88	69.32%	70.11%	85.06%	14.94%	65.12%	65.91%
	Las Americas Aspira Academy		99	46.46%	59.60%	78.79%	10.10%	48.48%	43.43%
	Newark Charter School		139-163	50.31%	58.90%	84.29%	44.44%	72.39%	65.03%
	Odyssey Charter School		134	76.87%	70.15%	94.78%	50.75%	82.09%	79.10%
	Red Clay Consolidated School District		1015-1056	55.59%	56.71%	69.27%	26.89%	65.81%	61.03%
	Smyrna School District		315-335	53.73%	63.58%	76.88%	29.25%	60.18%	67.47%
	New Castle County		--	**56.78%**	**56.60%**	**72.13%**	**22.48%**	**62.90%**	**63.14%**

Figure 4.3: Percentage of Students Who are "Accomplished" at Kindergarten Entry – 2016-17

County	District	County N	District N Range	Percent Who are "Accomplished" at Kindergarten Entry					
				Cognitive	Language	Literacy	Math	Physical	Social Emotional
State	**--**	**9,556**	**--**	**55.36%**	**54.31%**	**66.83%**	**43.15%**	**63.66%**	**61.53%**
Kent	Academy of Dover Charter School	1,674	39	25.64%	28.21%	53.85%	30.77%	41.03%	43.59%
	Caesar Rodney School District		575-578	80.56%	80.07%	86.28%	53.74%	89.43%	78.86%
	Campus Community Charter School		35	100.00%	100.00%	100.00%	97.14%	97.14%	100.00%
	Capital School District		442-450	37.84%	45.50%	42.28%	28.48%	61.21%	48.21%
	Lake Forest School District		296-320	27.00%	28.44%	35.00%	32.92%	48.13%	32.81%
	Providence Creek Academy Charter School		76	92.11%	88.16%	67.11%	57.89%	89.47%	82.89%
	Woodbridge School District		153-176	38.29%	40.00%	54.90%	22.22%	54.29%	64.20%
	Kent County		**--**	**54.41%**	**56.30%**	**60.39%**	**40.47%**	**69.30%**	**60.14%**
Sussex	Cape Henlopen School District	1,903	283-328	48.52%	44.26%	61.18%	35.97%	46.60%	50.46%
	Indian River School District		702-810	47.84%	44.84%	63.04%	36.45%	57.16%	59.14%
	Laurel School District		139-156	34.84%	63.23%	49.68%	21.58%	69.23%	59.35%
	Milford School District		311-333	66.67%	59.70%	79.30%	39.23%	80.91%	67.17%
	Seaford School District		250-276	30.23%	37.84%	32.67%	14.74%	50.38%	45.65%
	Sussex County		**--**	**47.77%**	**47.98%**	**60.12%**	**32.52%**	**59.57%**	**57.11%**
New Castle	Academia Antonia Alonso	5,979	141	86.52%	45.39%	46.81%	42.55%	91.49%	90.78%
	Appoquinimink School District		651-681	60.09%	57.88%	83.36%	52.44%	56.27%	63.21%
	Brandywine School District		675-710	50.51%	57.80%	57.75%	36.56%	59.97%	65.08%
	Christina School District		1,240-1,288	57.93%	52.15%	63.67%	41.37%	60.28%	60.89%
	Colonial School District		699-708	57.65%	54.39%	72.79%	44.67%	62.09%	58.90%
	East Side Charter School		63-64	59.38%	71.43%	76.56%	65.08%	98.44%	59.38%
	Edison (Thomas A.) Charter School		73-97	16.49%	38.14%	71.23%	5.15%	50.52%	54.64%
	First State Montessori Academy		75	74.67%	68.00%	85.33%	64.00%	84.00%	72.00%
	Kuumba Academy Charter School		40-91	90.16%	39.13%	98.36%	85.25%	68.67%	61.54%
	Las Americas Aspira Academy		98	37.76%	44.90%	57.14%	52.04%	67.35%	48.98%
	MOT Charter School		75	81.33%	89.33%	92.00%	92.00%	78.67%	84.00%
	Newark Charter School		164-188	43.62%	51.60%	74.39%	32.32%	45.74%	49.47%
	Odyssey Charter School		161	80.12%	76.40%	94.41%	77.64%	76.40%	77.64%
	Red Clay Consolidated School District		1,093-1,171	61.23%	57.49%	68.80%	48.40%	67.67%	65.73%
	Smyrna School District		377-381	54.35%	57.78%	85.22%	60.32%	68.25%	65.87%
	New Castle County		**--**	**58.02%**	**55.73%**	**70.70%**	**47.11%**	**63.36%**	**63.34%**

Figure 4.4: Percentage of Students Who are "Accomplished" at Kindergarten Entry – 2015-16

County	District/Charter	County N	District N Range	Percent Who are "accomplished" at Kindergarten Entry					
				Cognitive	Language	Literacy	Math	Physical	Social Emotional
State	**--**	**7,779**	**--**	**55.52%**	**54.92%**	**69.60%**	**20.39%**	**63.66%**	**62.18%**
Kent	Charter School	1,360	123-133	59.40%	46.97%	81.06%	39.84%	67.42%	64.39%
	Public School		1,190-1,227	61.04%	56.69%	71.73%	16.01%	71.36%	65.63%
	Kent County		**--**	**60.88%**	**55.74%**	**72.65%**	**18.19%**	**70.97%**	**65.51%**
New Castle	Charter School	4,891	569-596	61.24%	63.53%	85.84%	31.99%	69.19%	63.76%
	Public School		4,057-4,295	56.16%	55.64%	70.25%	21.11%	62.02%	63.06%
	New Castle County		**--**	**56.78%**	**56.60%**	**72.13%**	**22.48%**	**62.90%**	**63.14%**
Sussex	Public School	1,528	1,435-1,528	46.73%	48.78%	58.85%	15.62%	59.59%	56.12%
	Sussex County		**--**	**46.73%**	**48.78%**	**58.85%**	**15.62%**	**59.59%**	**56.12%**

Figure 4.5: Percentage of Students Who are "Accomplished" at Kindergarten Entry – 2016-17

County	District/Charter	County N	District N Range	Percent Who are "accomplished" at Kindergarten Entry					
				Cognitive	Language	Literacy	Math	Physical	Social Emotional
State	**--**	**9,556**	**--**	**55.36%**	**54.31%**	**66.83%**	**43.15%**	**63.66%**	**61.53%**
Kent	Charter School	1,674	150	76.67%	75.33%	71.33%	60.00%	78.67%	76.67%
	Public School		1,466-1,524	52.17%	54.42%	59.28%	38.51%	68.38%	58.51%
	Kent County		**--**	**54.41%**	**56.30%**	**60.39%**	**40.47%**	**69.30%**	**60.14%**
New Castle	Charter School	5,979	890-1,040	59.90%	55.53%	75.66%	53.90%	68.22%	64.71%
	Public School		4,735-4,939	57.63%	55.76%	69.77%	45.79%	62.34%	63.05%
	New Castle County		**--**	**58.02%**	**55.73%**	**70.70%**	**47.11%**	**63.36%**	**63.34%**
Sussex	Public School	1,903	1,685-1,903	47.77%	47.98%	60.12%	32.52%	59.57%	57.11%
	Sussex County		**--**	**47.77%**	**47.98%**	**60.12%**	**32.52%**	**59.57%**	**57.11%**

Figure 4.6: Average Score in Each Domain – 2015-16

County	District Name	County N	District N Range	Average Score in Each Domain					
				Cognitive	Language	Literacy	Mathematics	Physical	Social Emotional
Cut Score				30	24	34	30	18	26
State	--	**7,779**	--	**29.78**	**23.26**	**41.11**	**23.46**	**18.32**	**26.78**
Kent	Academy of Dover Charter School	1,360	37-46	28.00	21.09	38.04	26.78	17.37	25.87
	Caesar Rodney School District		469-478	34.87	25.91	49.48	25.78	21.40	29.43
	Campus Community Charter School		33	36.03	26.73	57.64	30.67	21.76	31.06
	Capital School District		391-396	27.99	22.96	37.99	23.12	18.34	26.43
	Lake Forest School District		142-164	26.86	20.30	32.87	23.37	15.76	23.73
	Providence Creek Academy Charter School		53-54	31.33	24.26	47.28	27.57	18.64	27.15
	Woodbridge School District		188-189	27.05	21.42	35.70	20.35	17.18	25.95
	Kent County		--	**30.47**	**23.53**	**42.09**	**24.16**	**19.00**	**27.21**
Sussex	Cape Henlopen School District	1,528	144-184	29.98	23.33	41.14	23.62	17.41	25.11
	Indian River School District		635-673	28.34	21.56	38.42	21.79	17.59	25.19
	Laurel School District		125-135	25.67	20.81	35.65	20.81	17.92	27.03
	Milford School District		325-329	29.16	23.61	39.83	22.04	19.45	27.36
	Seaford School District		206-207	22.75	22.79	25.32	18.03	16.41	24.72
	Sussex County		--	**27.72**	**22.32**	**36.97**	**21.41**	**17.84**	**25.74**
New Castle	Appoquinimink School District	4,891	395-480	32.30	24.06	44.98	25.47	17.88	28.78
	Brandywine School District		654-663	30.41	24.11	40.08	23.94	18.64	27.34
	Christina School District		1,199-1,253	30.14	22.86	40.74	22.64	18.12	26.14
	Colonial School District		479-508	27.42	22.37	37.55	22.28	17.59	26.79
	East Side Charter School		63	27.27	22.44	39.95	22.49	18.16	23.89
	First State Montessori Academy		49	35.65	24.73	55.43	28.84	20.31	30.04
	Kuumba Academy Charter School		85-88	31.33	23.84	45.63	24.95	18.16	27.55
	Las Americas Aspira Academy		99	29.25	23.77	41.19	23.10	16.78	23.68
	Newark Charter School		139-163	30.63	24.68	54.04	27.19	19.72	27.01
	Odyssey Charter School		134	33.66	25.31	54.73	28.05	19.52	29.22
	Red Clay Consolidated School District		1,015-1,056	30.22	23.32	41.36	24.04	18.40	26.67
	Smyrna School District		315-335	29.78	24.46	44.64	24.71	18.36	28.15
	New Castle County		--	**30.23**	**23.48**	**42.13**	**23.89**	**18.28**	**26.98**

Figure 4.7: Average Score in Each Domain – 2016-17

County	District Name	County N	District N Range	Average Score in Each Domain					
				Cognitive	Language	Literacy	Mathematics	Physical	Social Emotional
Cut Score				30	24	34	30	18	26
State	--	**9,556**	--	**29.77**	**23.10**	**40.56**	**26.87**	**18.28**	**26.73**
Kent	Academy of Dover Charter School	1,674	39	23.72	18.51	34.15	24.72	15.49	22.31
	Caesar Rodney School District		575-578	33.90	26.51	47.33	29.13	20.89	30.16
	Campus Community Charter School		35	37.91	28.86	55.80	37.51	21.91	32.89
	Capital School District		442-450	26.61	22.66	31.19	24.62	18.22	24.96
	Lake Forest School District		296-320	24.17	19.87	31.82	23.88	17.21	21.74
	Providence Creek Academy Charter School		76	36.55	27.01	40.46	27.43	20.82	31.29
	Woodbridge School District		153-176	26.38	21.80	36.99	21.41	17.45	27.66
	Kent County		--	**29.33**	**23.60**	**38.61**	**26.16**	**19.00**	**26.83**
Sussex	Cape Henlopen School District	1,903	283-328	28.21	21.49	37.18	26.99	16.76	24.25
	Indian River School District		702-810	28.98	21.85	40.43	25.47	17.99	26.48
	Laurel School District		139-156	28.38	23.97	32.88	22.97	18.46	27.57
	Milford School District		311-333	31.58	23.70	44.15	26.85	19.66	27.68
	Seaford School District		250-276	24.45	20.41	28.51	20.03	16.96	24.01
	Sussex County		--	**28.63**	**22.10**	**38.17**	**24.99**	**17.97**	**26.04**
New Castle	Academia Antonia Alonso	5,979	141	33.01	22.48	28.64	23.58	19.84	29.16
	Appoquinimink School District		651-681	31.15	23.84	46.23	28.66	17.28	27.02
	Brandywine School District		675-710	28.41	23.06	35.33	25.56	17.85	26.53
	Christina School ,District		1,240-1,288	30.01	22.67	38.99	26.55	17.99	26.47
	Colonial School District		699-708	30.46	23.20	42.41	27.68	18.27	26.01
	East Side Charter School		63-64	29.75	24.87	40.16	30.62	21.84	27.23
	Edison (Thomas A.) Charter School		73-97	24.86	21.37	39.26	23.25	17.86	25.95
	First State Montessori Academy		75	34.40	26.75	52.59	30.69	20.56	30.03
	Kuumba Academy Charter School		40-91	35.10	21.33	51.95	34.64	17.88	25.90
	Las Americas Aspira Academy		98	27.40	20.89	37.03	28.54	17.78	25.21
	MOT Charter School		75	32.52	27.97	52.25	35.71	20.40	30.91
	Newark Charter School		164-188	28.86	23.04	43.72	25.66	17.13	25.75
	Odyssey Charter School		161	34.76	26.01	55.20	34.83	18.98	29.48
	Red Clay Consolidated School District		1,093-1,171	30.86	23.44	41.99	27.34	18.47	27.62
	Smyrna School District		377-381	29.46	23.66	48.62	30.45	18.57	27.40
	New Castle County		--	**30.25**	**23.27**	**41.84**	**27.64**	**18.17**	**26.92**

Figure 4.8: Average Rating of Level in Each Domain – 2015-16

County	District Name	County N	District N Range	Average Rating of Level in Each Domain					
				Cognitive	Language	Literacy	Mathematics	Physical	Social Emotional
Average Rating of Level on each Objective				5	6	3.4	5	6	5.2
State	--	**7,779**	--	**4.96**	**5.82**	**4.11**	**3.91**	**6.11**	**5.36**
Kent	Academy of Dover Charter School	1,360	37-46	4.67	5.27	3.80	4.46	5.79	5.17
	Caesar Rodney School District		469-478	5.81	6.48	4.95	4.30	7.13	5.89
	Campus Community Charter School		33	6.01	6.68	5.76	5.11	7.25	6.21
	Capital School District		391-396	4.66	5.74	3.80	3.85	6.11	5.29
	Lake Forest School District		142-164	4.48	5.07	3.29	3.90	5.25	4.75
	Providence Creek Academy Charter School		53-54	5.22	6.07	4.73	4.59	6.21	5.43
	Woodbridge School District		188-189	4.51	5.35	3.57	3.39	5.73	5.19
	Kent County		--	**5.08**	**5.88**	**4.21**	**4.03**	**6.33**	**5.44**
Sussex	Cape Henlopen School District	1,528	144-184	5.00	5.83	4.11	3.94	5.80	5.02
	Indian River School District		635-673	4.72	5.39	3.84	3.63	5.86	5.04
	Laurel School District		125-135	4.28	5.20	3.57	3.47	5.97	5.41
	Milford School District		325-329	4.86	5.90	3.98	3.67	6.48	5.47
	Seaford School District		206-207	3.79	5.70	2.53	3.00	5.47	4.94
	Sussex County		--	**4.62**	**5.58**	**3.70**	**3.57**	**5.95**	**5.15**
New Castle	Appoquinimink School District	4,891	395-480	5.38	6.01	4.50	4.24	5.96	5.76
	Brandywine School District		654-663	5.07	6.03	4.01	3.99	6.21	5.47
	Christina School District		1,199-1,253	5.02	5.72	4.07	3.77	6.04	5.23
	Colonial School District		479-508	4.57	5.59	3.76	3.71	5.86	5.36
	East Side Charter School		63	4.54	5.61	4.00	3.75	6.05	4.78
	First State Montessori Academy		49	5.94	6.18	5.54	4.81	6.77	6.01
	Kuumba Academy Charter School		85-88	5.22	5.96	4.56	4.16	6.05	5.51
	Las Americas Aspira Academy		99	4.88	5.94	4.12	3.85	5.59	4.74
	Newark Charter School		139-163	5.10	6.17	5.40	4.53	6.57	5.40
	Odyssey Charter School		134	5.61	6.33	5.47	4.68	6.51	5.84
	Red Clay Consolidated School District		1,015-1,056	5.04	5.83	4.14	4.01	6.13	5.33
	Smyrna School District		315-335	4.96	6.12	4.46	4.12	6.12	5.63
	New Castle County		--	**5.04**	**5.87**	**4.21**	**3.98**	**6.09**	**5.40**

Figure 4.9: Average Rating of Level in Each Domain – 2016-17

County	District Name	County N	District N Range	Average Rating of Level in Each Domain					
				Cognitive	Language	Literacy	Mathematics	Physical	Social Emotional
Average Rating of Level on each Objective				5	6	3.4	5	6	5.2
State	--	**9,556**	--	**4.96**	**5.78**	**4.06**	**4.48**	**6.09**	**5.35**
Kent	Academy of Dover Charter School	1,674	39	3.95	4.63	3.42	4.12	5.16	4.46
	Caesar Rodney School District		575-578	5.65	6.63	4.73	4.86	6.96	6.03
	Campus Community Charter School		35	6.32	7.21	5.58	6.25	7.30	6.58
	Capital School District		442-450	4.44	5.66	3.12	4.10	6.07	4.99
	Lake Forest School District		296-320	4.03	4.97	3.18	3.98	5.74	4.35
	Providence Creek Academy Charter School		76	6.09	6.75	4.05	4.57	6.94	6.26
	Woodbridge School District		153-176	4.40	5.45	3.70	3.57	5.82	5.53
	Kent County		--	**4.89**	**5.90**	**3.86**	**4.36**	**6.33**	**5.37**
Sussex	Cape Henlopen School District	1,903	283-328	4.70	5.37	3.72	4.50	5.59	4.85
	Indian River School District		702-810	4.83	5.46	4.04	4.25	6.00	5.30
	Laurel School District		139-156	4.73	5.99	3.29	3.83	6.15	5.51
	Milford School District		311-333	5.26	5.93	4.41	4.47	6.55	5.54
	Seaford School District		250-276	4.07	5.10	2.85	3.34	5.65	4.80
	Sussex County		--	**4.77**	**5.53**	**3.82**	**4.17**	**5.99**	**5.21**
New Castle	Academia Antonia Alonso	5,979	141	5.50	5.62	2.86	3.93	6.61	5.83
	Appoquinimink School District		651-681	5.19	5.96	4.62	4.78	5.76	5.40
	Brandywine School District		675-710	4.73	5.76	3.53	4.26	5.95	5.31
	Christina School District		1,240-1,288	5.00	5.67	3.90	4.43	6.00	5.29
	Colonial School District		699-708	5.08	5.80	4.24	4.61	6.09	5.20
	East Side Charter School		63-64	4.96	6.22	4.02	5.10	7.28	5.45
	Edison (Thomas A.) Charter School		73-97	4.14	5.34	3.93	3.87	5.95	5.19
	First State Montessori Academy		75	5.73	6.69	5.26	5.12	6.85	6.01
	Kuumba Academy Charter School		40-91	5.85	5.33	5.20	5.77	5.96	5.18
	Las Americas Aspira Academy		98	4.57	5.22	3.70	4.76	5.93	5.04
	MOT Charter School		75	5.42	6.99	5.23	5.95	6.80	6.18
	Newark Charter School		164-188	4.81	5.76	4.37	4.28	5.71	5.15
	Odyssey Charter School		161	5.79	6.50	5.52	5.80	6.33	5.90
	Red Clay Consolidated School District		1,093-1,171	5.14	5.86	4.20	4.56	6.16	5.52
	Smyrna School District		377-381	4.91	5.91	4.86	5.08	6.19	5.48
	New Castle County		--	**5.04**	**5.82**	**4.18**	**4.61**	**6.06**	**5.38**

SECTION V: CLUSTER ANALYSIS

This section presents the profile of each group of students uncovered by the cluster analysis. First, we visualize the distribution of "accomplishment" in each domain at kindergarten entry by student profile and describe potential invention strategies for the students in each profile. Second, we compare demographic and geographic characteristics across different student profiles.

CLUSTER ANALYSIS AND STUDENT PROFILE OVERVIEW

Based on the results of the cluster analysis, students are segmented into five profiles as discussed in the Data and Methodology section. Figure 5.1 presents a box plot that includes the core summary statistics in each domain for each profile. The box plot enables us to study the distributional characteristics as well as the level of scores in each profile. The key statistics displayed by the box plot are:[8]

- **Median**. The median marks the mid-point of the data and is shown by the line that divides the box into two parts. Half of the scores are greater than or equal to this value and half are less.
- **Interquartile range**. The middle box represents the middle 50 percent of scores for the profile.
- **Whiskers**. The upper and lower whiskers show the range of scores outside the middle 50 percent. They extend to the highest and lowest values observed in the profile, excluding outliers that fall more than 1.5 times the interquartile range from the edges of the box.

Since we standardized the score distances for each domain, we are able to compare the "accomplishment" across different profiles. The five student profiles are described as follows:

- **Profile A**
  - Average scores at kindergarten entry are consistently higher across domains.
  - The average score in literacy is higher than that in other domains, while average scores in mathematics are lower than that in other domains (though still higher than in other profiles and generally above the widely held expectations cut score).
- **Profile B**
  - Average scores are above the cut scores across almost all the domains, except for mathematics.
  - In this profile, 75 percent or more of students were scored at or above the widely held expectations cut score in the cognitive, language, literacy, social-emotional, and physical domains, while around 25 percent of students were scored at or above the cut score in mathematics.

[8] Please note that there are some outside values (outliers) that fall outside the upper and lower whiskers. Because there are only a small number of these values, we remove them from the plot to simplify the display.

- **Profile C**
  - Average scores are below the cut scores across almost all the domains, except for literacy.
  - In this profile, 75 percent or more of students were scored below the cut scores in the cognitive, language, mathematics, social-emotional, and physical domains, while more than 75 percent of students were scored at or above the cut score in literacy.
- **Profile D**
  - Average scores are generally below the cut scores across domains, although around 50 percent are above in the physical and social-emotional domains.
  - Students in this profile have low average scores in mathematics, compared with other below-the-cut-score domains (e.g., cognitive, language).
- **Profile E**
  - Average scores are consistently lower across domains.

Figure 5.1: Domain Profiles by Student Profile

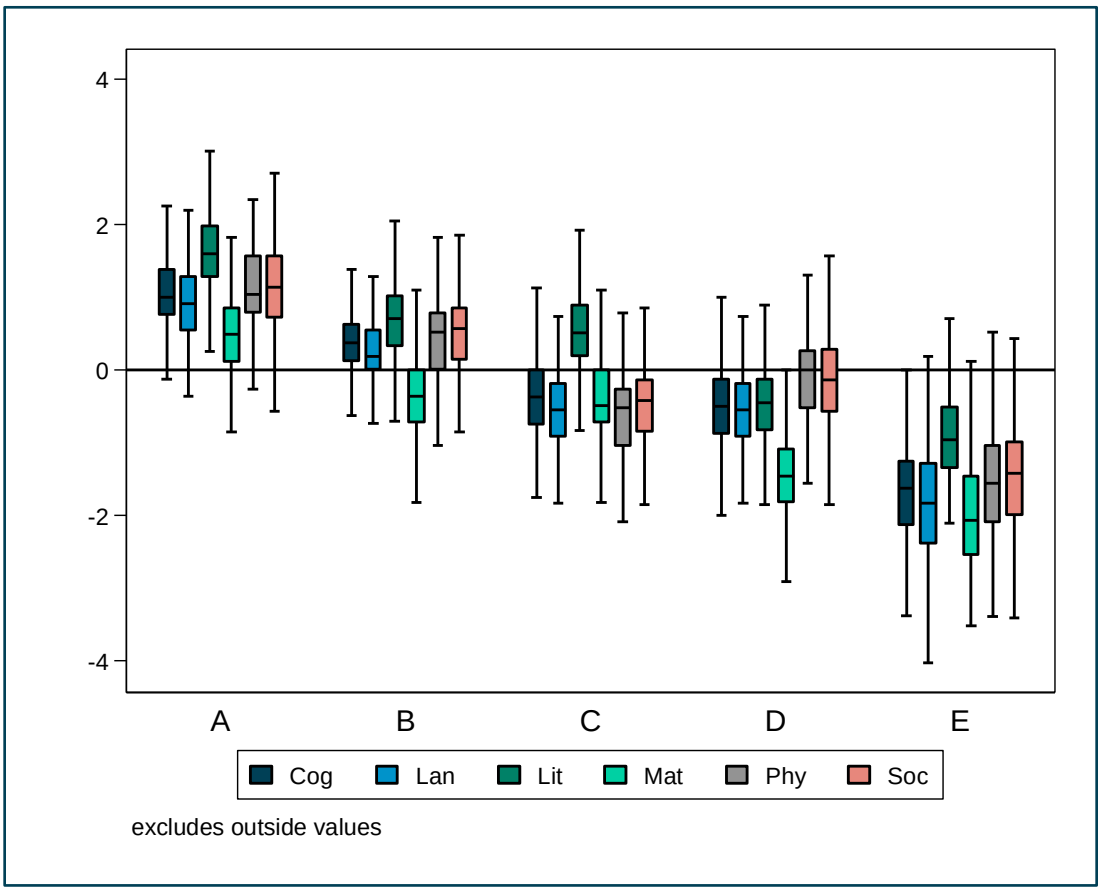


Figure 5.2 presents the number and percentage of students in each profile and Figure 5.3 summarizes the profiles and briefly notes potential support strategies. Note that there may be more uncertainty about the validity of the recommendations for the mathematics domain than for the other domains, due to the dramatic change in scores that we observed across years in this domain.[9] If the higher 2016-17 math "accomplishment" rates are more indicative of students' actual mathematics skills, then this analysis may overstate the need for mathematics supports, since it is based on both years of data.

Figure 5.2: Number and Percentage of Students by Student Profile

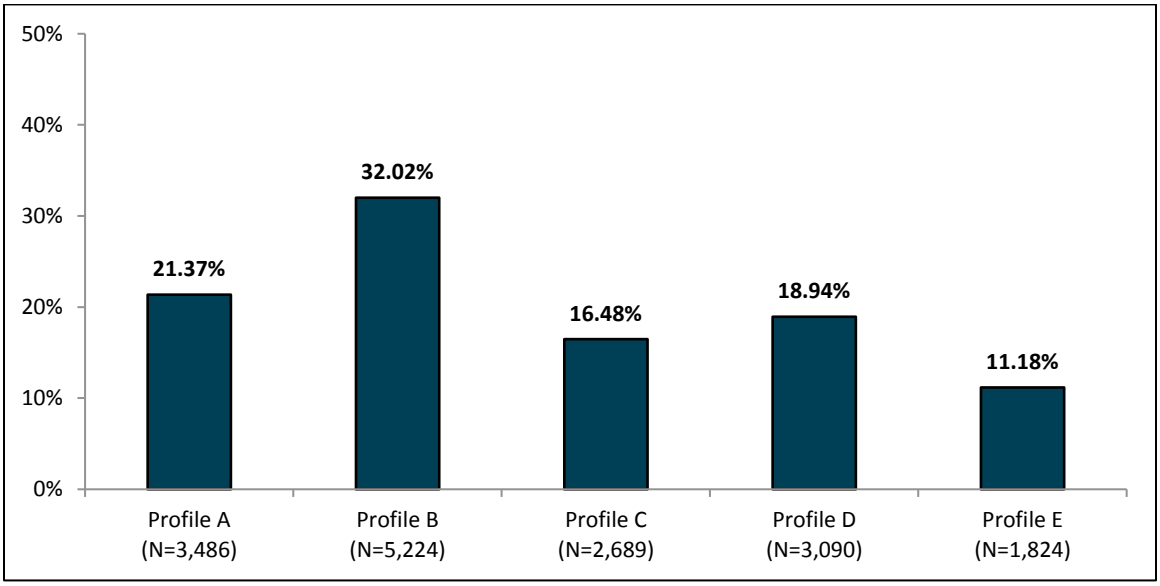


Figure 5.3: Domain Profiles and Support Description by Student Profile

STUDENT PROFILE	POTENTIAL PROFILE	DESCRIPTION	% OF STUDENTS
A	No Additional Support	▪ Retain current level of supports to sustain student success.	21.37%
B	Targeted Mathematics Support	▪ Targeted mathematics support with focused support for the other five domains. ▪ As the largest of the five student profiles, improving proficiency in mathematics will push it forward.	32.02%

[9] Because we are not able to distinguish which year is more representative for the future trends, also for the purpose of maximizing the sample size, we include data from both years for the cluster analysis. Section VI contains a full discussion of the potential caveat of including both years of data.

Student Profile	Potential Profile	Description	% of Students
C	Targeted Support for all Domains Except for Literacy	▪ Focused literacy support with targeted support for the other five domains.	16.48%
D	Intensive Mathematics Support and Targeted Support in Other Domains	▪ Intensive mathematics support and targeted support in the cognitive, language, and literacy domains. ▪ Focused-to-targeted support in the physical and social-emotional domains.	18.94%
E	Intensive Support for all Domains	▪ Intensive support in all domains is required for this small student profile.	11.18%

STUDENT PROFILE ANALYSIS OUTCOMES

In following subsections, we compare the five student profiles in terms of demographic characteristics and geographic location. Demographic variables include race/ethnicity, gender, age, English learner status, disability category, and high need status. Geographic variables are county and school district or charter.

DEMOGRAPHIC ANALYSIS OF STUDENT PROFILES

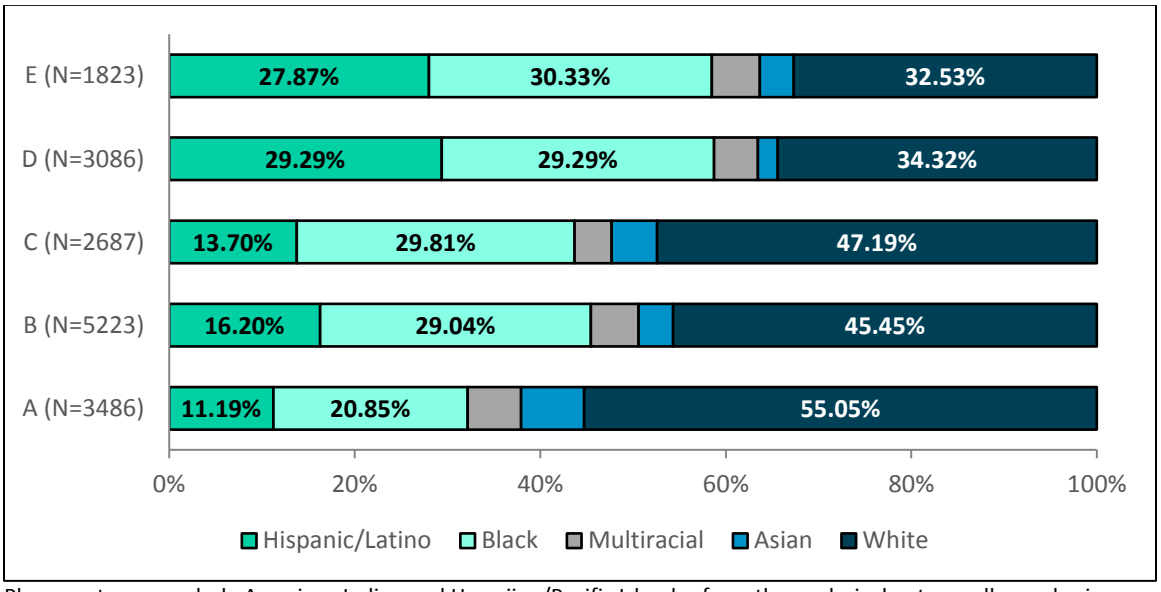
In this subsection, we highlight some demographic characteristics that have a clear trend across different profiles (Figure 5.4, Figure 5.5, Figure 5.6, Figure 5.7, Figure 5.8).[10] Our demographic profile analysis yields the following key findings:

- **A higher proportion of Hispanic/Latino and black students tend to be in Profiles D and E, while white and Asian students are more likely to be in Profiles A and B**. For example, in Figure 5.4 , 55.05 percent and 11.19 percent of the students in Profile A (i.e., require minimal additional support) are white students and Hispanic/Latino students, respectively, but 32.53 percent and 27.87 percent of Profile E students (i.e., require intensive broad-based support) are white and Hispanic/Latino students, respectively.
- **A higher proportion of female students are in Profile A than E.** In Figure 5.5, 56.17 percent of the Profile A students are female, while 35.87 percent of the Profile E students are female.
- **English learners are more likely to be in Profiles D and E than their peers.** For example, in Figure 5.6, 29.00 percent of Profile E students are English learners, while 9.06 percent of Profile A students are English learner.

[10] Please note that the full tables with complete count and percentages by student profile and demographic subgroups can be found in the Appendix Section.

- **There are higher proportions of students without disabilities in Profiles A, B, and C, while more students with disabilities (especially students with social/emotional/intellectual disabilities) are in Profile D and E.** For example, in Figure 5.7, 22.75 percent of students in Profile E have social/emotional/intellectual disabilities are in Profile E, compared with only 1.75 percent in Profile A.
- **The percentage of high need students is higher in Profile D and E than in Profile A.** In Figure 5.8, there are 62.45 percent and 60.39 percent of high need students in Profile E and Profile D, respectively, compared with 27.74 percent in Profile A.

Figure 5.4: Demographic Analysis of Student Profiles – Race/Ethnicity



Please note: we exclude American Indian and Hawaiian/Pacific Islander from the analysis due to small sample sizes.

Figure 5.5: Demographic Analysis of Student Profiles – Gender

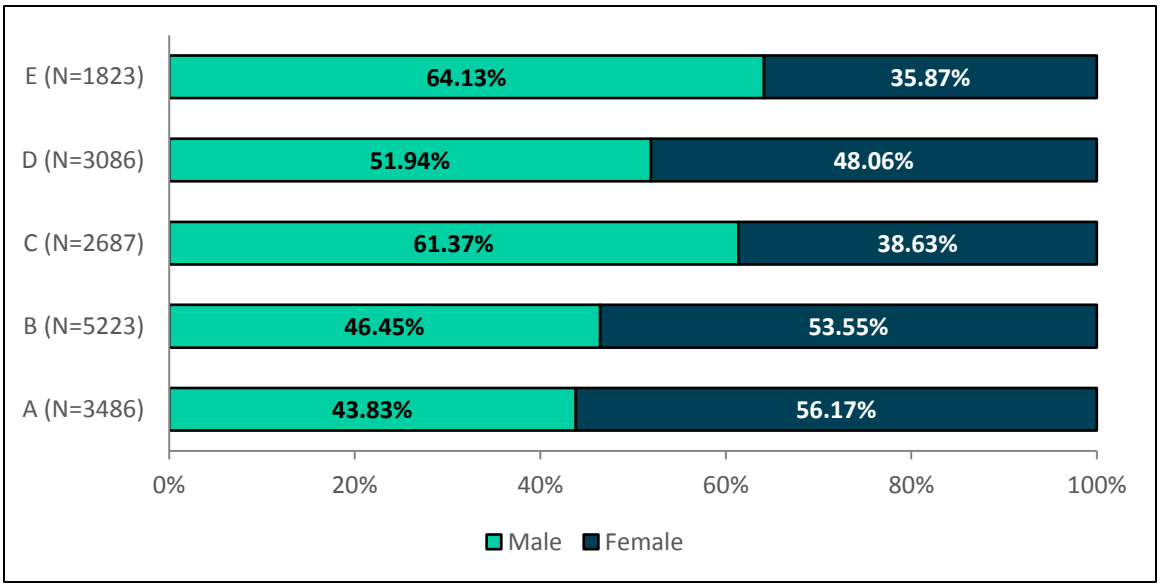
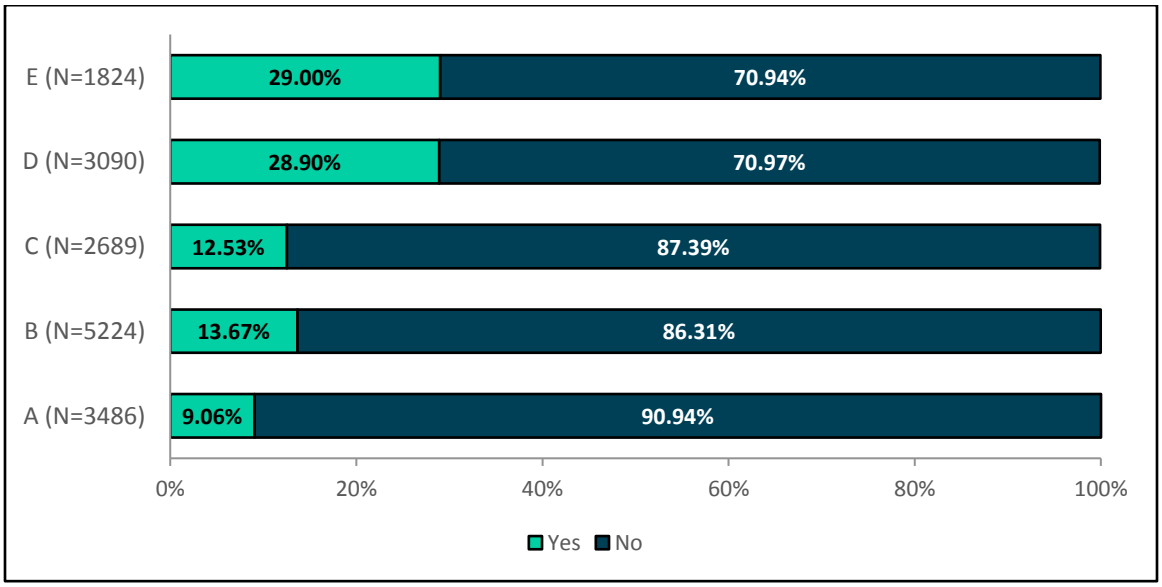
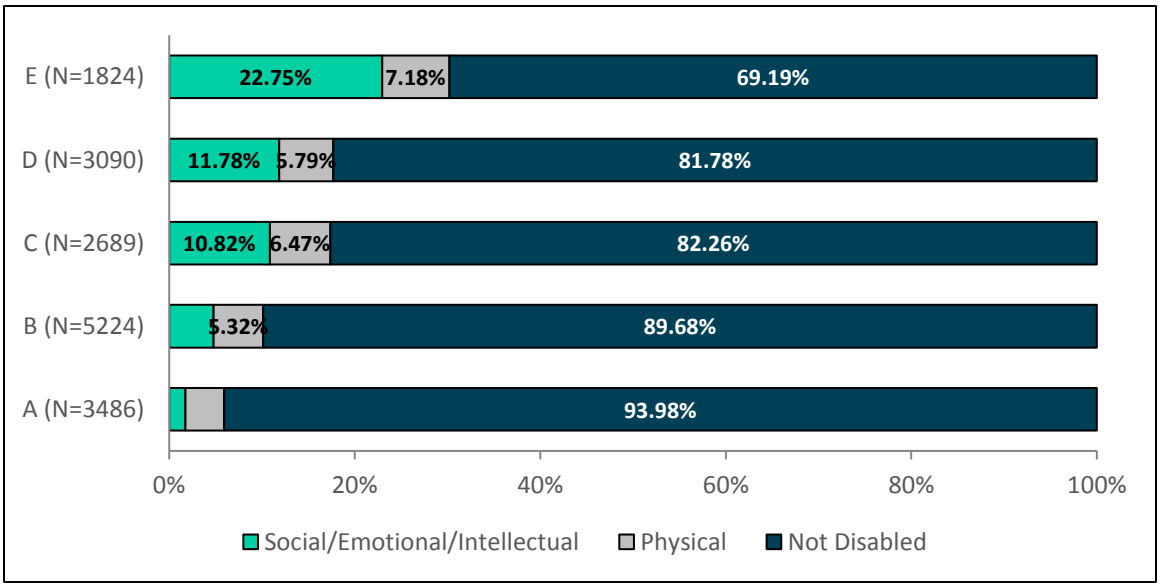


Figure 5.6: Demographic Analysis of Student Profiles – English Learner



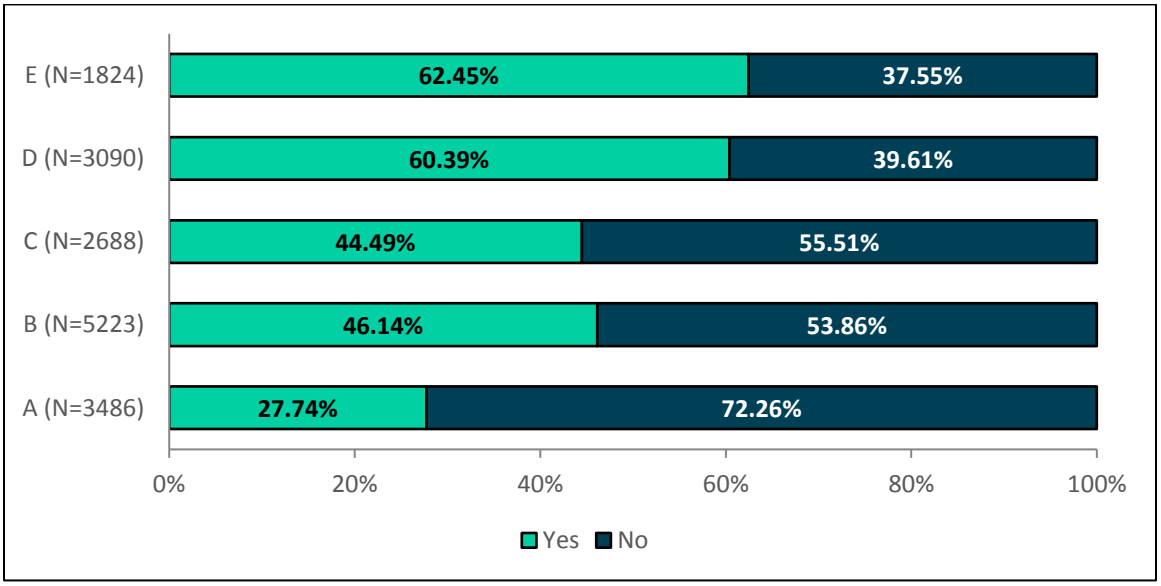
Please note: some rates do not equal to 100% due to a small number of students with missing English learner status

Figure 5.7: Demographic Analysis of Student Profiles – Disability Category



Please note that we exclude "Not Listed" students from the analysis, due to the small sample sizes.

Figure 5.8: Demographic Analysis of Student Profiles – High Need



GEOGRAPHIC ANALYSIS OF STUDENT PROFILES

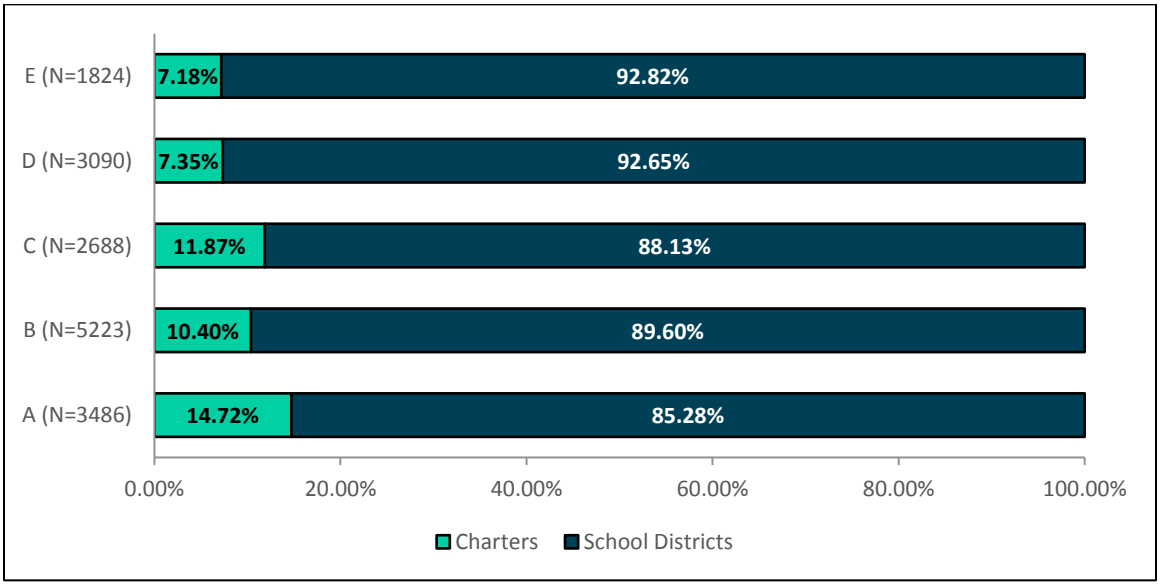
In this subsection, we present data on the distribution of students across profiles by county, district, and charter. We illustrate the distribution of students across profiles in school districts using maps in Figure 5.10, Figure 5.11, and Figure 5.12. These maps only show school districts, and all charter schools are not listed in these maps; Figure 5.13 shows the full

distribution of students in each school district and charter in table form.[11] Figure 5.9 shows the overall proportion of students at charters and in school districts in each student profile.

Our student geographic profile analysis yielded the following key findings:

- **Students in Profiles D and E are more concentrated in Sussex County (Figure 5.11 and Figure 5.12).** There are 38.22 percent of Profile D and E students in Sussex County, while the percentages are 29.91 and 27.32 for Kent and New Castle Counties, respectively. Within Sussex County, the percentage of students in Profiles D and E is especially high in the western part, especially for the following counties and districts: Seaford School District, Laurel School District, and Indian River School District.
- **Students in Profile A are more likely to be in Kent and New Castle County.** Specifically, the counties and districts with the associated percentage of students in Profile A are Caesar Rodney School District in Kent County (43.67 percent) and Appoquinimink School District, Red Clay Consolidated School District, and Smyrna School District in New Castle County (from 26.74 percent to 28.82 percent).
- **Students from some charter schools are more concentrated in Profile A than their counterparts in school districts.** Compared to school districts, the percentage of students who are in Profile A are very high for the following charters: Campus Community Charter School (72.06 percent), MOT Charter School (62.67 percent), Odyssey Charter School (45.76 percent), First State Montessori Academy (45.16 percent), and Providence Creek Academy Charter School (40.31 percent).

Figure 5.9: Geographic Analyses of Student Profiles – School Districts vs. Charters



[11] All charter schools are excluded from the maps. They are: Academia Antonia Alonso, Academy of Dover Charter School, Campus Community Charter School, East Side Charter School, Edison (Thomas A.) Charter School, First State Montessori Academy, Kuumba Academy Charter School, Las Americas Aspira Academy, MOT Charter School, Newark Charter School, Odyssey Charter School, Providence Creek Academy Charter School.

Figure 5.10: Percentage of Students in Each Profile by School District

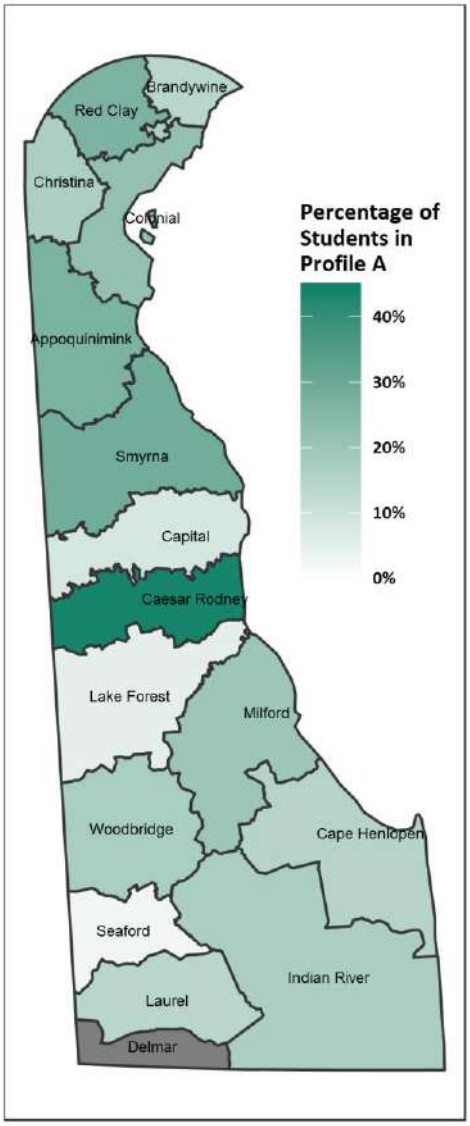
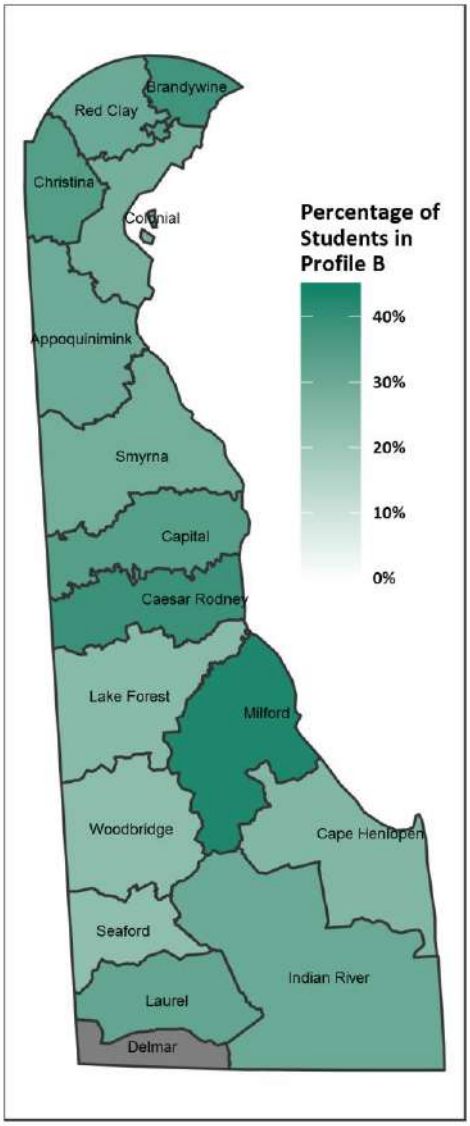
PROFILE A	PROFILE B
	

Figure 5.11: Percentage of Students in Each Profile by School District

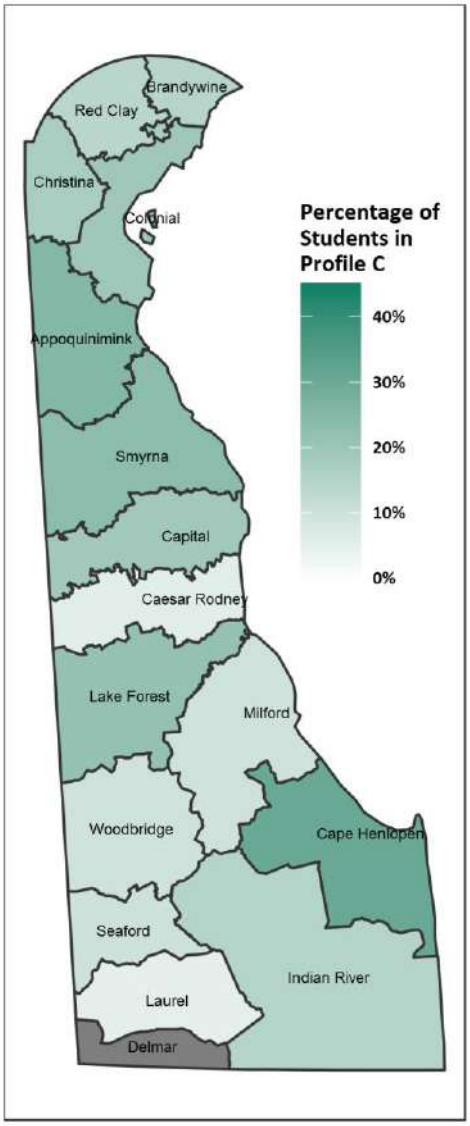
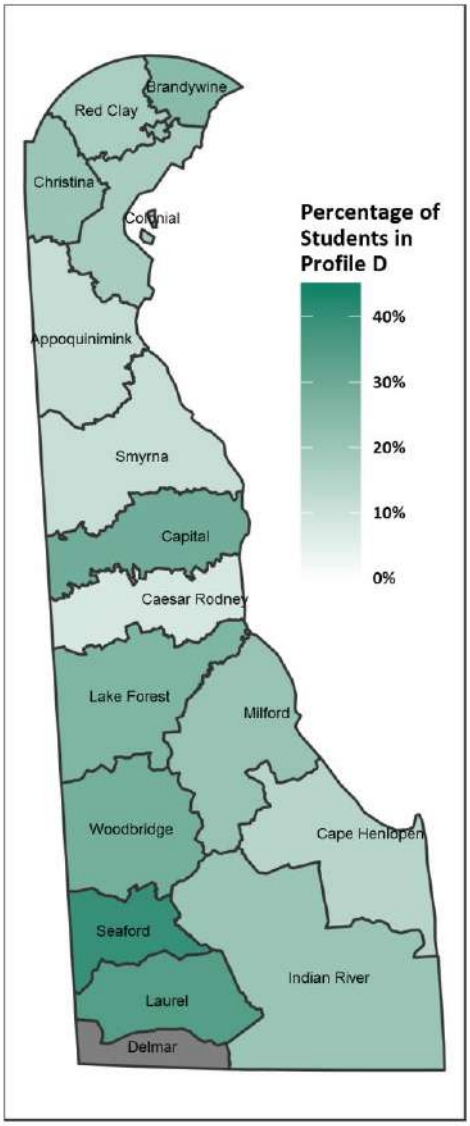
PROFILE C	PROFILE D
	

Figure 5.12: Percentage of Students in Each Profile by School District

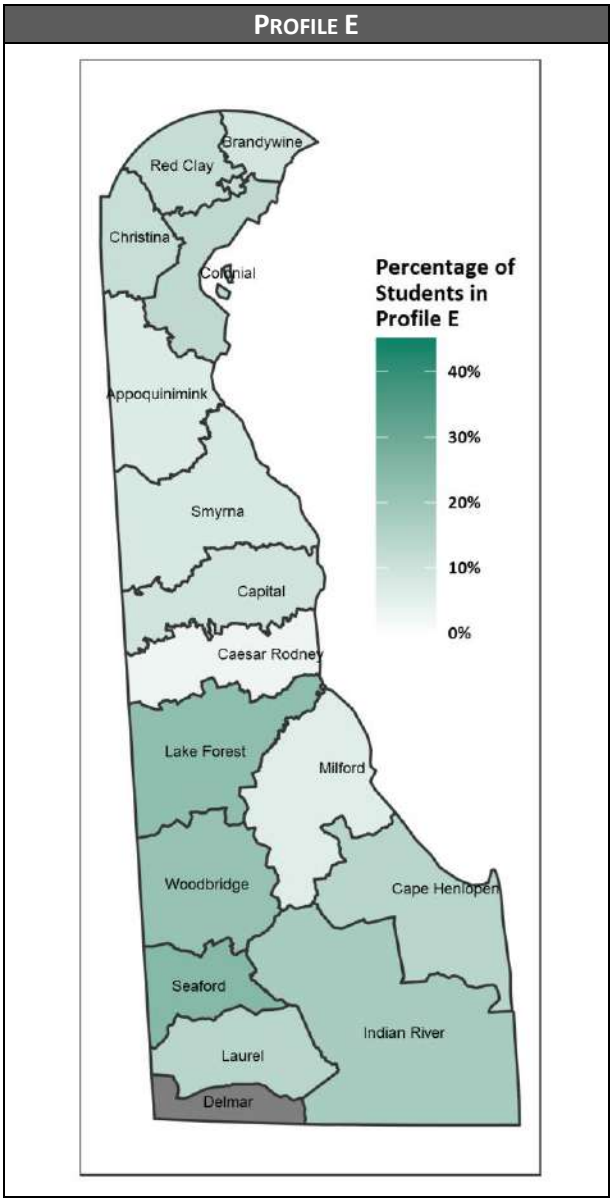


Figure 5.13: Student Geographic Distribution by Student Profile

County	School District	A		B		C		D		E	
		N	%	N	%	N	%	N	%	N	%
Kent	Academy of Dover Charter School	0	--	27	35.06%	30	38.96%	3	--	17	22.08%
	Caesar Rodney School District	455	43.67%	408	39.16%	60	5.76%	85	8.16%	34	3.26%
	Campus Community Charter School	49	72.06%	14	20.59%	3	--	2	--	0	--
	Capital School District	69	8.27%	286	34.29%	158	18.94%	242	29.02%	79	9.47%
	Lake Forest School District	23	5.25%	106	24.20%	95	21.69%	114	26.03%	100	22.83%
	Providence Creek Academy Charter School	52	40.31%	33	25.58%	13	10.08%	30	23.26%	1	--
	Woodbridge School District	59	17.30%	80	23.46%	33	9.68%	96	28.15%	73	21.41%
	Kent County	**707**	**24.14%**	**954**	**32.57%**	**392**	**13.38%**	**572**	**19.53%**	**304**	**10.38%**
Sussex	Cape Henlopen School District	64	14.99%	109	25.53%	130	30.44%	63	14.75%	61	14.29%
	Indian River School District	225	16.83%	403	30.14%	199	14.88%	273	20.42%	237	17.73%
	Laurel School District	38	14.23%	84	31.46%	14	5.24%	92	34.46%	39	14.61%
	Milford School District	127	19.97%	273	42.92%	62	9.75%	134	21.07%	40	6.29%
	Seaford School District	12	3.51%	81	23.68%	38	11.11%	117	34.21%	94	27.49%
	Sussex County	**466**	**15.49%**	**950**	**31.57%**	**443**	**14.72%**	**679**	**22.57%**	**471**	**15.65%**
New Castle	Academia Antonia Alonso	15	10.64%	63	44.68%	2	--	52	36.88%	9	--
	Appoquinimink School District	280	26.74%	311	29.70%	263	25.12%	122	11.65%	71	6.78%
	Brandywine School District	189	14.22%	506	38.07%	195	14.67%	322	24.23%	117	8.80%
	Christina School District	409	16.77%	842	34.52%	420	17.22%	493	20.21%	275	11.28%
	Colonial School District	258	21.90%	331	28.10%	231	19.61%	206	17.49%	152	12.90%
	East Side Charter School	28	22.22%	44	34.92%	20	15.87%	19	15.08%	15	11.90%
	Edison (Thomas A.) Charter School	4	--	33	45.21%	9	--	21	28.77%	6	--
	First State Montessori Academy	56	45.16%	42	33.87%	17	13.71%	7	--	2	--
	Kuumba Academy Charter School	29	23.20%	50	40.00%	34	27.20%	5	--	7	--
	Las Americas Aspira Academy	16	8.12%	71	36.04%	53	26.90%	31	15.74%	26	13.20%
	MOT Charter School	47	62.67%	19	25.33%	5	--	2	--	2	--
	Newark Charter School	82	27.06%	57	18.81%	85	28.05%	40	13.20%	39	12.87%
	Odyssey Charter School	135	45.76%	90	30.51%	48	16.27%	15	5.08%	7	--
	Red Clay Consolidated School District	565	26.84%	639	30.36%	298	14.16%	361	17.15%	242	11.50%
	Smyrna School District	200	28.82%	198	28.53%	162	23.34%	79	11.38%	55	7.93%
	New Castle County	**2,313**	**22.56%**	**3,296**	**32.15%**	**1,842**	**17.97%**	**1,775**	**17.32%**	**1,025**	**10.00%**
Charters vs. Districts (Statewide)	School Districts	2,973	85.28%	4,680	89.60%	2,369	88.14%	2,863	92.65%	1,693	92.82%
	Charters	513	14.72%	543	10.42%	319	11.87%	227	7.35%	131	7.18%

SECTION VI: CAVEATS AND NEXT STEPS

INCONSISTENT SCORING IN MATHEMATICS

As a next step, DDOE may consider a deeper examination of the mathematics score criterion. As discussed in Section 2, the proportion of students scored as "accomplished" in mathematics increases from about 20 percent in 2015-16 to more than 40 percent in 2016-17, and the increase is consistent statewide. With data in only two years, our current analysis is unable to identify whether this increase represents an ongoing trend, a one-time increase, or a fluctuation that will disappear in future years.

Our analysis includes a descriptive analysis comparing between 2015-16 and 2016-17, and a cluster analysis using both years' information. Because we are not able to distinguish which year is more representative for the future trends, also for the purpose of maximizing the sample size, we include data from both years for the cluster analysis. This inclusion of all available data brings up a potential caveat where some of its findings may be affected by any ongoing trends in students' mathematics scores at kindergarten entry. If the higher mathematics "accomplishment" persists, it may overstate the need for mathematics supports across clusters, while the opposite may be true if mathematics scores revert to the lower levels seen in 2015-16.

DDOE could potentially investigate this question in greater depth using the following four methods:

- **Compare training for teachers in the two years.** While materials are the same in both years, the training that teachers received are different. Comparing any potential differences in trainings between the two years could help identify whether changes in training in the mathematics domain led to the change in scores.
- **Survey teachers who participated in both years.** As teachers with two years of experience are familiar with the administration of the DE-ELS in both years, designing targeted survey questions on potential changes in mathematics observation and surveying these teachers may contribute to identifying the cause of the increase in mathematics scores. These teachers may be able to provide insight into any changes they made in the way they scored students in the mathematics observation, since our analysis revealed that their scores were much higher.
- **Run focus groups or surveys of teachers.** Focus groups may provide a chance to get teachers' input on the potential causes of the higher scores in mathematics in the 2016-17 academic year.
- **Collect more data.** In the short term, adding 2017-18 survey results to current analysis may help reveal whether reported "accomplishment" in mathematics at kindergarten entry stabilizes at the level seen in 2016-17, or whether it continues to converge with the higher "accomplishment" rates in other domains (or even reverts to the lower level seen in 2015-16). In the long term, including three to five more years of data should lead to more stable results.

APPENDIX

Figure A.7.1: Student Demographic Distribution by Student Profile

Category	Sub-Category	A		B		C		D		E	
		N	Percentage	N	Percentage	N	Percentage	N	Percentage	N	Percentage
Race/ Ethnicity	Amer. Indian	3,486	--	5,223	0.27%	2,687	--	3,086	--	1,823	--
	Asian		6.77%		3.71%		4.88%		2.11%		3.62%
	Black		20.85%		29.04%		29.81%		29.29%		30.33%
	Hawaiian/Pacific Islander		--		--		--		--		--
	Hispanic/Latino		11.19%		16.20%		13.70%		29.29%		27.87%
	Multiracial		5.77%		5.13%		3.98%		4.73%		5.16%
	White		55.05%		45.45%		47.19%		34.32%		32.53%
Gender	Female	3,486	56.17%	5,223	53.55%	2,687	38.63%	3,086	48.06%	1,823	35.87%
	Male		43.83%		46.45%		61.37%		51.94%		64.13%
Age	4 Years Old	3,486	0.55%	5,223	0.46%	2,687	0.41%	3,086	--	1,823	--
	5 Years Old		96.41%		96.46%		97.02%		97.28%		96.87%
	6 Years Old		3.04%		3.03%		2.57%		2.40%		2.85%
English Learner	No	3,486	90.94%	5,223	86.31%	2,687	87.39%	3,086	70.97%	1,823	70.94%
	Yes		9.06%		13.67%		12.53%		28.90%		29.00%
High Need	No	3,486	72.26%	5,223	53.86%	2,688	55.51%	3,090	39.61%	1,824	37.55%
	Yes		27.74%		46.14%		44.49%		60.39%		62.45%

Figure A.7.2: Student Disability Category Distribution by Student Profile

Disability Category	A		B		C		D		E	
	N	Percentage	N	Percentage	N	Percentage	N	Percentage	N	Percentage
Without Disability	3,276	93.98%	4,685	89.68%	2,212	82.26%	2,527	81.78%	1,262	69.19%
Not Listed	4	--	12	0.23%	12	0.45%	20	0.65%	16	0.88%
Physical	145	4.16%	278	5.32%	174	6.47%	179	5.79%	131	7.18%
Social/Emotional/Intellectual	61	1.75%	249	4.77%	291	10.82%	364	11.78%	415	22.75%

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