National Center and State Collaborative

Cross-State Comparison of Participation and Performance on NCSC 2015 Administration

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Executive Summary

The purpose of this study is to investigate the participation and performance of students on the NCSC assessment across each state by various demographic and experiential variables. We performed descriptive and comparative statistical analyses and made summary statements describing participation and performance. We used population information about public school enrollment for each state to calculate and compare participation rates. Caution, however, is needed in generalizing the participation rates, because the enrollment data available represented previous year's enrollments.

Using data from the 2015 operational administration of the NCSC assessment, we examined cross-state comparisons of participation and performance[1]. The data represented demographic and test scores, as well as data from the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006). NCES provided data representing enrollment were obtained to calculate participation rates. Because the 2014-2015 enrollment data (as of September 16, 2016) were not released, the study used enrollment data from 2013-2014. While these data offer some sense of the participation rate, caution should be exercised in making any generalizations since the numbers represent the previous year.

There were a number of students with a variety of primary disabilities represented from the states involved in this study. Some categorizations of students were undefined and not involved in any cross-state comparisons. For statistical comparisons across states, a minimum number of 25 students were used as a basis for inclusion[2].

Across states, there appeared to be five primary disability categories with the most students: those with intellectual disabilities, multiple disabilities, autism, other health impairments, or a specific learning disability. There were occasions when the number of students in a state for a specific learning disability did not meet the minimum. As a result, these specific instances were not included.

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[1] Not all states participating in the 2015 NCSC assessment were involved. Eleven states gave permission to use student data for this study.

[2] To help us determine a sufficient number, we used an estimate of accuracy (99% confidence internal) that we would likely get for the coefficient of variation to be within 0.05 points. We used the coefficient of variation because it represents a quantity of the degree of variability to the mean. And because the degree of variation is a fundamental component in comparing the distribution and means across states, it was considered a good statistic with which to estimate a sufficient number give an accurate representation of the coefficient of variation. See Kelley (2007) for sample size recommendations for the coefficient of variation.

In summary, there clearly was substantial variability across states, grades, and primary disabilities in the performance on the spring 2015 operational administration of the NCSC assessment. There were consistencies in performance across content areas (i.e., mathematics and English language arts), but specific instances suggested some differences in specific disabilities and states.

To explore the pattern of student characteristics that differentiated higher and lower performing states, we performed 21 discriminant analyses. The effect sizes of the analyses were mostly small (suggesting other variables may be involved). The Mathematics Skill variable was found to be statistically significant for most of the discriminant analyses performed.

Using enrollment data from NCES, the participation rates across states were slightly over 1% of the public school enrollment. There were some differences, from one state showing a 1.0% participation rate, the lowest across states, and to a state with a 1.6% participation rate, representing the highest. This suggests differences in the nature of the student sample in each state. Therefore, we urge caution in making cross state comparisons.

Purpose

The National Center and State Collaborative (NCSC) is an alternate assessment designed to measure academic achievement for students with significant cognitive disabilities. As part of NCSC's goal to develop a quality assessment, an in-depth analysis was undertaken to examine the characteristics of the participants from each state and distill any patterns in their performance.

The purpose of this study is to explore the participation and performance of students on the NCSC assessment across each state by various demographic and experiential variables. We performed descriptive and comparative statistical analyses and made summary statements describing participation and performance. We used population information about public school enrollment for each state to calculate and compare participation rates. Caution, however, is needed in generalizing the participation rates, because the enrollment data available represented previous year's enrollments.

The intention of this analysis was to understand the similarity and differences across states among students taking alternate assessments. With this information, fairer comparisons can be made using comparable sets of students. Additionally, of who the examinees are may help inform assessment design, policies around access, and other policies (e.g., data definitions, data capturing, etc.).

The *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) provided characteristics of students from 15 states who had taken the Spring 2015 operational assessment (Thurlow, Quenemoen & Towles, 2016). The LCI was developed to be completed by teachers about students. While there are limitations to using the LCI, it offers important information about student characteristics.

Eighty-eight percent of the students from the 15 participating states had intellectual disabilities, autism, and multiple disabilities; 90% were able to communicate using symbolic or emerging symbolic expressive communication; 89% showed evidence of using receptive language,; 70% had vision within normal limits; 94% had hearing within normallimits, and 87% showed no significant motor dysfunction (Thurlow, Quenemoen, & Towles, 2016). Additionally, 68% of the students showed evidence of reading skills and 86% had math skills (Thurlow, Quenemoen, & Towles, 2016).

This study uses such characteristics of students to examine participation and performance on the 2015 assessment and make some comparisons across states. In doing so, we examined the following:

- Participation by State by Disability
- Participation Rate by State
- Performance on Mathematics and English Language Arts by State by Disability
- Participation by State by Grade by Disability
- Performance on Mathematics and English Language Arts by State by Grade by Disability
- Performance by each Primary Disability Category Shown
- Characteristics of Students by State and Disability based on Performance between States

Method

Data collected during the 2015 administration of the assessment were obtained from Measured Progress. The state partners participating in the 2015 assessment were Arizona, Arkansas, Connecticut, District of Columbia,

Idaho, Indiana, Maine, Montana, New Mexico, Pacific Assessment Consortium, Rhode Island, South Carolina, South Dakota, and the US Virgin Islands. Data represents students from the eleven states that provided release agreements. In order to preserve confidentiality, the name of the state is masked.

The operational data contained student demographic information, LCI responses, and assessment scores representing raw and scaled scores and performance levels. Performance comprised four levels with various ranges of scaled scores by grade. Level 1 represented the lowest level characterized by low task or test complexity. Level 4 represented the highest level characterized by high task or text complexity. The cut-offs for each level varied slightly across grades and content area. However, the cut-off of 1240 consistently represented the Level 3 performance level, characterized by moderate task or text complexity. (See NCSC, 2016).

Results

By primary disability, the number of students from the states involved in this study is shown in Table 1.

Table 1. Number of Students Participating in the 2015 Operational Administration by Primary Disability by State (Sorted by most frequent number overall in a primary disability)

Primary Disability	State											Total
	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	
Intellectual Disability	1,718	3,582	20	202	762	3,488	359	309	956	296	1,842	13,534
Autism	795	1,917	26	165	463	1,947	383	146	407	358	930	7,537
Multiple	550	870	14	74	254	1,015	352	171	323	158	249	4,030
Undefined	84	278	2	19	129	389	72	86	235	44	272	1,610
Other Health Imp.	411	154	-	8	125	320	101	47	94	56	157	1,473
Specific LD	221	228	-	2	19	179	55	20	41	20	32	817
Other	19	111	-	-	46	276	1	23	13	25	59	573
Emotional Disability	39	54	-	1	21	174	22	8	8	3	8	338
Traum. Br. Inj.	34	46	-	4	12	38	6	8	26	11	27	212
Orthopedic	12	34	2	1	9	71	2	3	13	4	43	194
Speech/Lang Imp.	51	11	-	-	38	9	37	10	15	5	4	180
Visual Imp.	18	16	1	-	4	37	1	3	10	5	33	128
Deaf	4	13	-	-	6	25	5	-	24	4	19	100
Hearing Imp.	12	11	-	1	8	17	1	-	3	1	11	65
Deaf/Blind	1	8	-	-	-	6	-	1	2	2	3	23
Total	3,969	7,333	65	477	1,896	7,991	1,397	835	2,170	992	3,689	30,814

As can be seen in Table 1, the primary disability categories with the most students overall (highlighted in yellow) were intellectual disability, autism, multiple disabilities, undefined, other health impairment, and specific learning disability. States in which the number of students associated with one of these six categories did not have a sufficient number (at least 25) for a statistical comparison[3] are highlighted in red.

[3] To help us determine the number that would serve as a sufficient number, we used an estimate of accuracy that we would likely get (99% confidence internal) for the coefficient of variation to be within 0.05 points. We used the coefficient of variation because it represents a quantity of the degree of variability to the mean. And because the degree of variation is a fundamental component in comparing the distribution and means across states, it was considered a good statistic to use to estimate a sufficient number needed to give us an accurate representation of coefficient of variation. See Kelley (2007) for sample size recommendations for the coefficient of variation.

As can also be seen in Table 1, for the other disabilities where the total number of students was not in the top six most frequent across states, there were states in specific instances with a minimum number of 25 that offered a statistical comparison; these are highlighted in yellow.

Table 2 shows the percent of students in a state with each type of disability.

Table 2. Percent of Students by State Participating in the 2015 Operational Administration by Primary Disability (Sorted by most frequent number overall in a primary disability)

	State											
Primary Disability	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	Total
Intellectual Disability	43%	49%	31%	42%	40%	44%	26%	37%	44%	30%	50%	13,534
Autism	20%	26%	40%	35%	24%	24%	27%	17%	19%	36%	25%	7,537
Multiple	14%	12%	22%	16%	13%	13%	25%	20%	15%	16%	7%	4,030
Undefined	2%	4%	3%	4%	7%	5%	5%	10%	11%	4%	7%	1,610
Other Health Imp.	10%	2%	0%	2%	7%	4%	7%	6%	4%	6%	4%	1,473
Specific LD	6%	3%	0%	0%	1%	2%	4%	2%	2%	2%	1%	817
Other	0%	2%	0%	0%	2%	3%	0%	3%	1%	3%	2%	573
Emotional Disability	1%	1%	0%	0%	1%	2%	2%	1%	0%	0%	0%	338
Traum. Br. Inj.	1%	1%	0%	1%	1%	0%	0%	1%	1%	1%	1%	212
Orthopedic	0%	0%	3%	0%	0%	1%	0%	0%	1%	0%	1%	194
Speech/Lang Imp.	1%	0%	0%	0%	2%	0%	3%	1%	1%	1%	0%	180
Visual Imp.	0%	0%	2%	0%	0%	0%	0%	0%	0%	1%	1%	128
Deaf	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	100
Hearing Imp.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	65
Deaf/Blind	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	23
Total	3,969	7,333	65	477	1,896	7,991	1,397	835	2,170	992	3,689	30,814

As seen in Table 2, there are some differences in the distribution of primary disability by state with respect to each state's total number of students taking the NCSC assessment in the spring of 2015. In one state (S11), 50% of the students had been identified with a primary disability of "Intellectual Disability", representing the largest proportion with this type among the states. Another state (S02) had 49% identified with a primary disability of "Intellectual Disability", representing the largest proportion within that state. This was consistent with the finding in Thurlow, Quenemoen, & Towles (2016) for 15 states in aggregate.

However, there were three states with the smallest percentage for the primary disability of "Intellectual Disability" (S03, S07, S10), even though in one of them (S07) the percentage was slightly smaller. These states showed "Autism" as representing the largest percentage. Thus, the distribution of the type of primary disability (as reported on the LCI) showed some variability in which primary disability was more frequent in a few states.

We next compared the performance across states for each of the primary disabilities with the larger total numbers. This involved the primary disability categories highlighted in yellow in Table 1, including intellectual disability, autism, multiple disabilities, other health impairments, and specific learning disability. Even though the "undefined" category was one of the top six most frequent categories, we did not include this in the comparison of performance across states. This category was probably used when the primary disability

was unknown to the teacher making the rating or due to some kind of coding error. So, no meaningful association of performance could be made with this category.

The statistical comparisons involved calculating and comparing the 95% confidence intervals of the mean performance in mathematics and English language arts (ELA) for each of the five primary disabilities in each state[4]. Additionally, to control for overall type I error rate and accommodate the homogeneity of variance seen with these variables, we performed post hoc comparisons using the Games-Howell procedure and evaluated the statistical significance at $p < .05$.

Overall

Table 3 shows the results of the statistical comparisons of performance between each state on mathematics for students with the primary disability of intellectual disability.

Table 3. Statistically Significant Difference between each State on Mathematics Performance for Students with Intellectual Disability

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01		+	N/A			+		+	+	+	+
→	S02	-		N/A	-	-		-				+
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04		+	N/A			+		+	+	+	+
→	S05		+	N/A			+		+	+	+	+
→	S06	-		N/A	-	-						+
→	S07		+	N/A					+			+
→	S08	-		N/A	-	-		-				
→	S09	-		N/A	-	-						+
→	S10	-		N/A	-	-						+
→	S11	-	-	N/A	-	-	-	-		-	-	

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

The comparison of the 95% confidence interval of the mean mathematics scale score is showing in Figure 1. As can be seen in Table 3 and Figure 1, there are some states (i.e., S01, S04, S05, and S07) that had statistically significantly higher performance than other states (i.e., S02, S06, S08, S09, S10, and S11). The states that performed statistically significantly higher than the others also showed mean performance above the cut-off for Level 3.

[4] Where the confidence intervals do not overlap with each other, this represents a statistically significant difference ($p < .05$).

Figure 1. Comparison of 95% Confidence Interval (CI) of the Mean Mathematics Scale Score across States for Students with Intellectual Disability

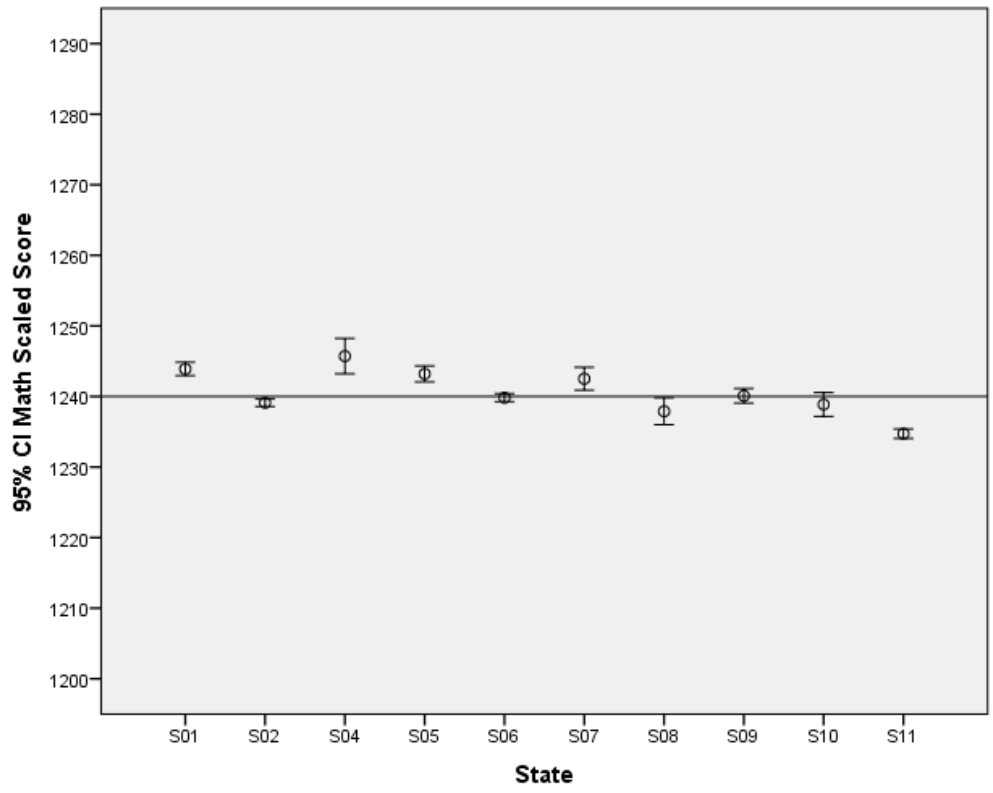


Table 4. Statistically Significant Difference between each State on English Language Arts (ELA) Performance for Students with Intellectual Disability

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01		+	N/A			+			+	+	+
→	S02	-		N/A	-	-	-	-				+
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04		+	N/A								+
→	S05		+	N/A			+			+	+	+
→	S06	-	+	N/A		-		-				+
→	S07		+	N/A			+			+	+	+
→	S08			N/A								+
→	S09	-		N/A		-		-				+
→	S10	-		N/A		-		-				+
→	S11	-	-	N/A	-	-	-	-	-	-	-	

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

As can be seen in Table 4 and Figure 2, four states (S01, S04, S05, and S07) are statistically significantly higher than two states (i.e., S02 and S11).

Figure 2. Comparison of 95% Confidence Interval (CI) of the Mean English Language Arts (ELA) Scale Score across States for Students with Intellectual Disability

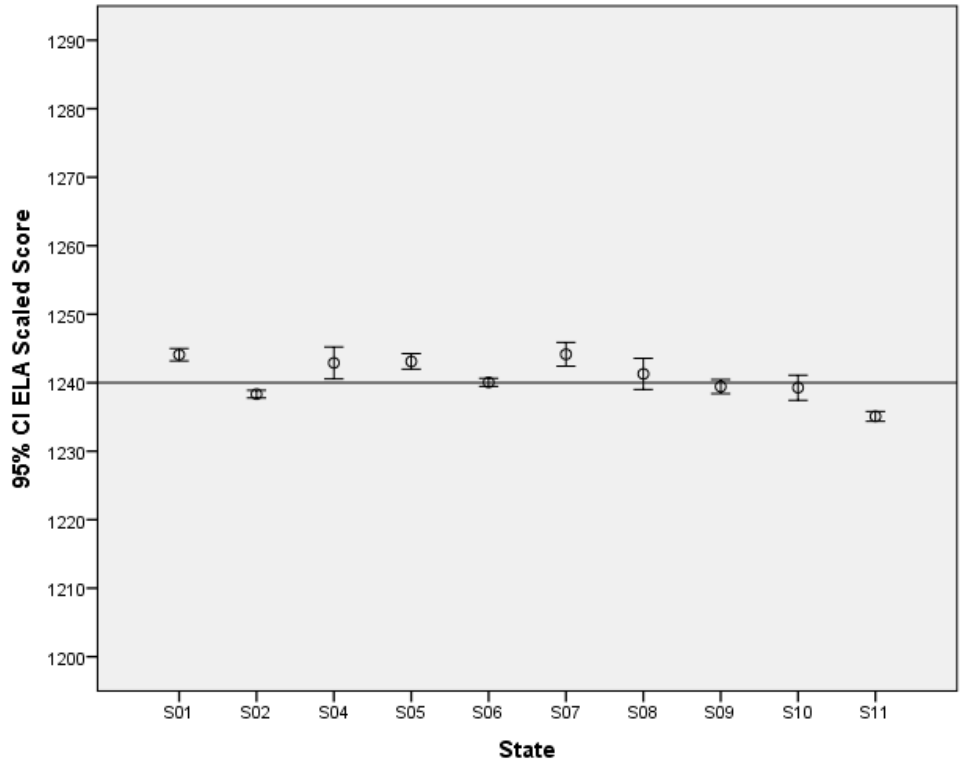


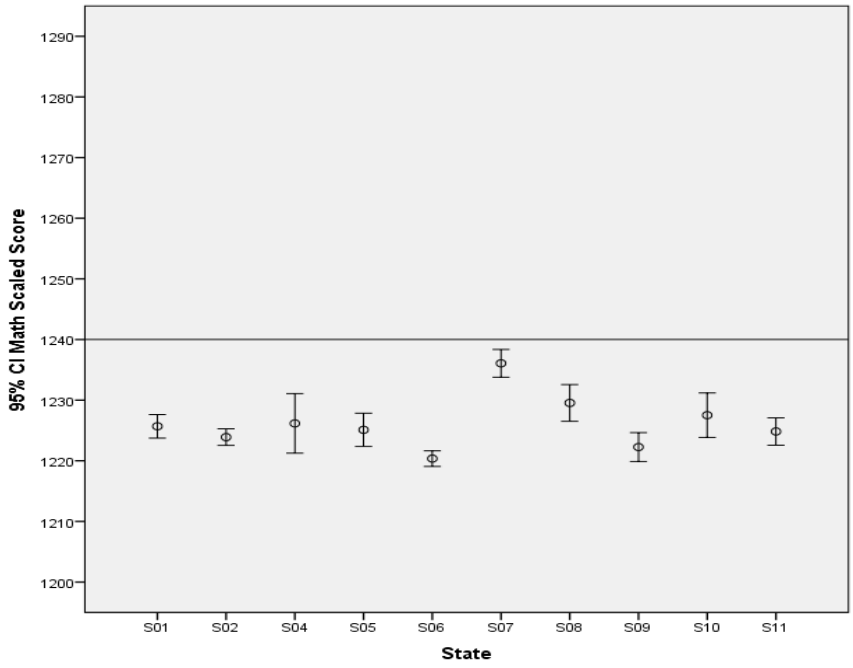
Table 5. Statistically Significant Difference between each State on Mathematics Performance for Students with Multiple Disabilities

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01			N/A			+	-				
→	S02			N/A			+	-	-			
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04			N/A				-				
→	S05			N/A				-				
→	S06	-	-	N/A				-	-		-	-
→	S07	+	+	N/A	+	+	+		+	+	+	+
→	S08		+	N/A			+	-		+		
→	S09			N/A				-	-			
→	S10			N/A			+	-				
→	S11			N/A			+	-				

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

Figure 3. Comparison of 95% Confidence Interval (CI) of the Mean Mathematics Scale Score across States for Students with Multiple Disabilities

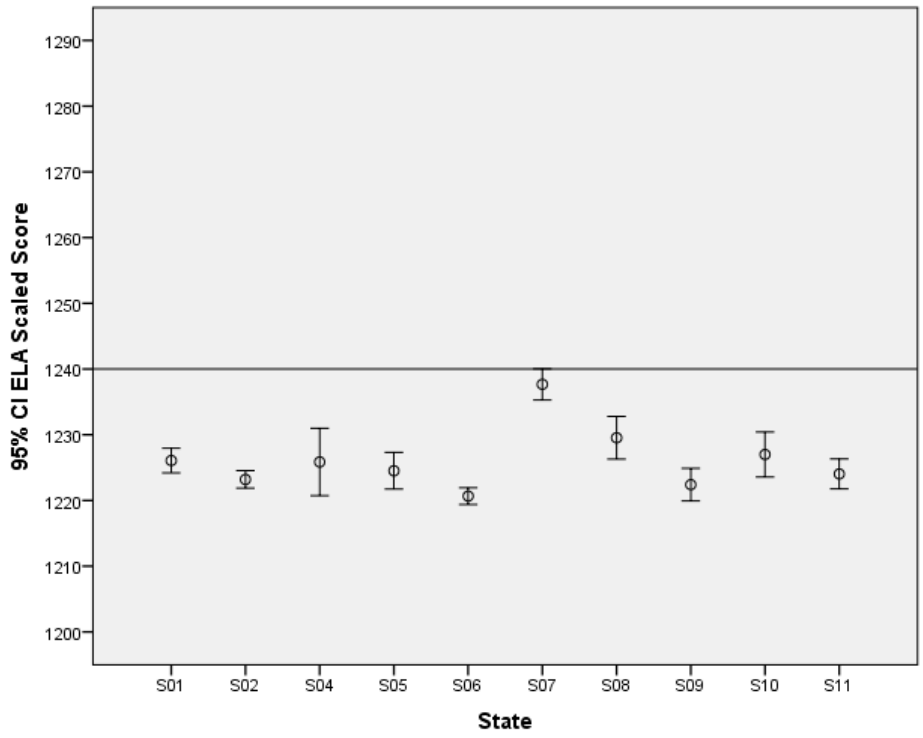


As can be seen in Table 5 and Figure 3, all states performed below the cut-off of the Level 3 performance level. One state (S07) was statistically significantly higher than all the rest.

Table 6. Statistically Significant Difference between each State on English Language Arts (ELA) Performance for Students with Multiple Disabilities

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01			N/A			+	-				
→	S02			N/A				-	-			
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04			N/A				-				
→	S05			N/A				-				
→	S06	-		N/A				-	-		-	
→	S07	+	+	N/A	+	+	+		+	+	+	+
→	S08		+	N/A			+	-		+		
→	S09			N/A				-	-			
→	S10			N/A			+	-				
→	S11			N/A				-				
Note: Compare horizontally												
+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference												

Figure 4. Comparison of 95% Confidence Interval (CI) of the Mean English Language Arts (ELA) Scale Score across States for Students with Multiple Disabilities



Similar to mathematics performance across states for students with multiple disabilities, as can be seen in Table 6 and Figure 4, one state showed statistically significantly higher performance (S07) than the others in English language arts. The performance for all these states, however, was below the cut-off for the Level 3 performance level.

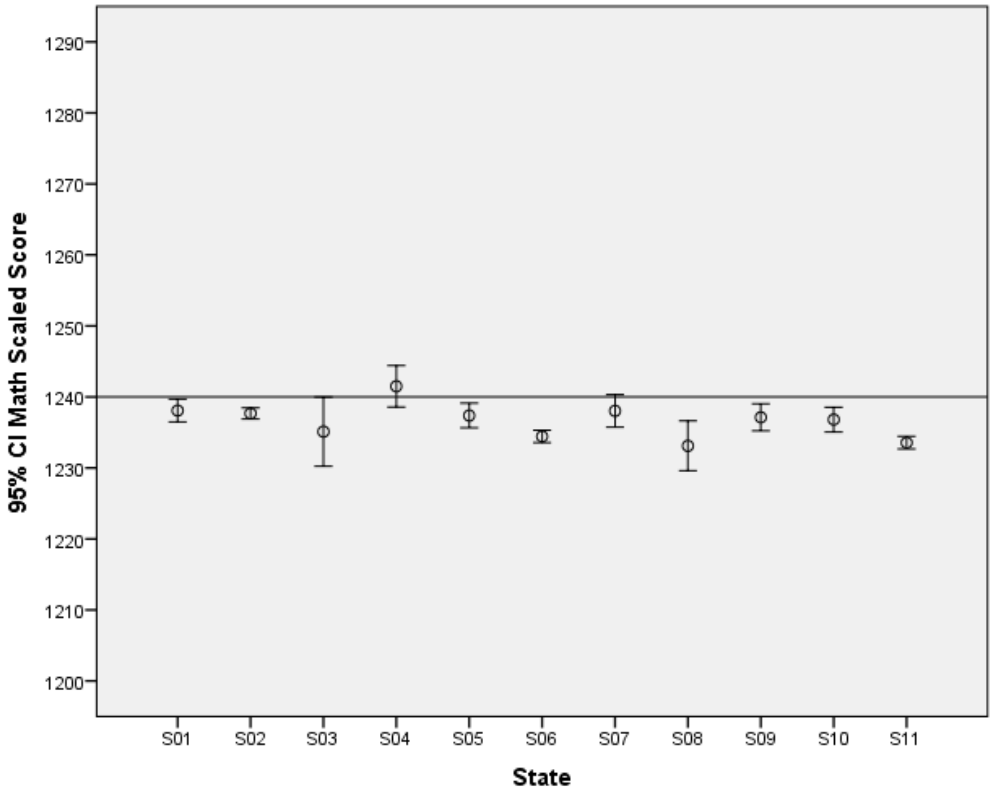
Table 7. Statistically Significant Difference between each State on Mathematics Performance for Students with Autism

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01						+					+
→	S02						+					+
→	S03											
→	S04						+		+			+
→	S05											+
→	S06	-	-		-							
→	S07											+
→	S08				-							
→	S09											+
→	S10											+
→	S11	-	-		-	-		-		-	-	

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

Figure 5. Comparison of 95% Confidence Interval (CI) of the Mean Mathematics Scale Score across States for Students with Autism



As can be seen in Table 7 and Figure 5, almost all of the states shown performed below the cut-off of Level 3. One state (S04) was statistically significantly higher in performance than three others (S06, S08, and S11). One state (S11) performed statistically significantly lower than most of the states (S01, S02, S04, S05, S07, S10, and S11).

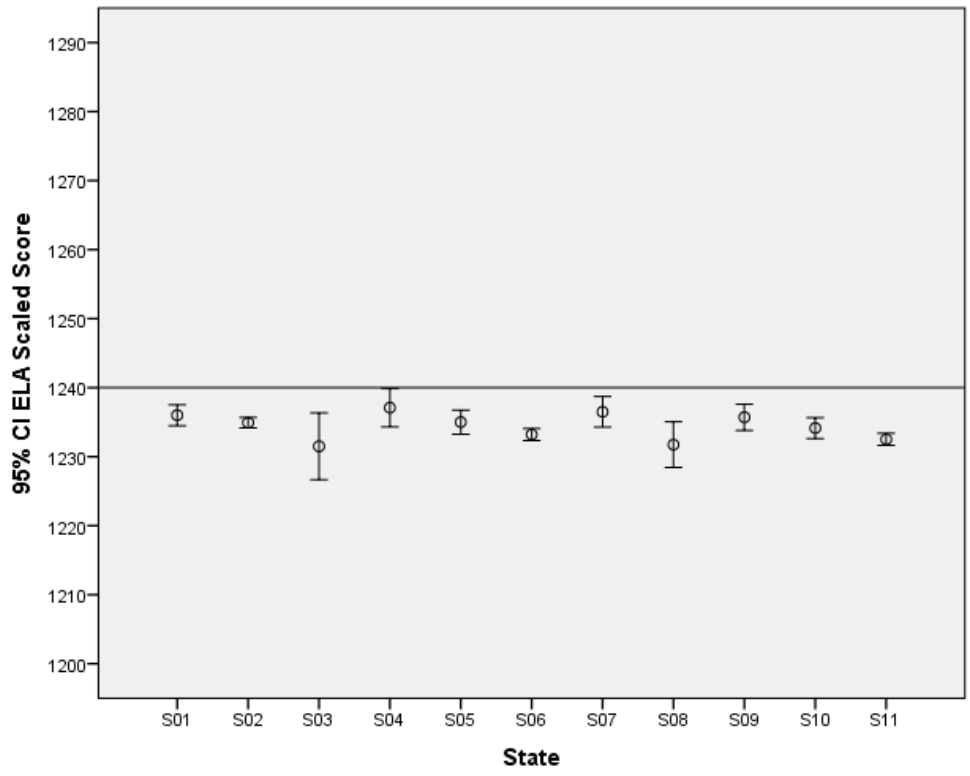
Table 8. Statistically Significant Difference between each State on English Language Arts (ELA) Performance for Students with Autism

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01											+
→	S02											+
→	S03											
→	S04											
→	S05											
→	S06											
→	S07											+
→	S08											
→	S09											
→	S10											
→	S11	-	-					-				

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

Figure 6. Comparison of 95% Confidence Interval (CI) of the Mean English Language Arts (ELA) Scale Score across States for Students with Autism



As can be seen in Table 8 and Figure 6, almost all of the states performed similarly with the exception of one state (S11) that performed statistically significantly lower than three others (S01, S02, and S07).

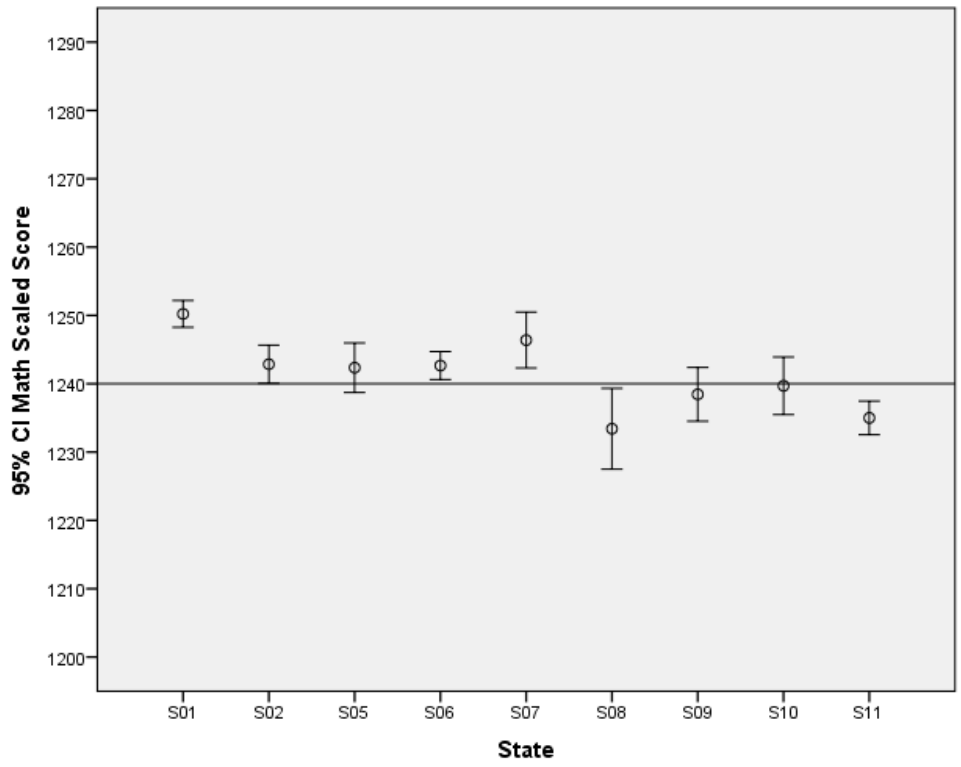
Table 9. Statistically Significant Difference between each State on Mathematics Performance for Students with Other Health Impairment

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01		+	N/A	N/A	+	+		+	+	+	+
→	S02	-		N/A	N/A							+
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S05	-		N/A	N/A							+
→	S06	-		N/A	N/A							+
→	S07			N/A	N/A				+			+
→	S08	-		N/A	N/A			-				
→	S09	-		N/A	N/A							
→	S10	-		N/A	N/A							
→	S11	-	-	N/A	N/A	-	-	-				

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

Figure 7. Comparison of 95% Confidence Interval (CI) of the Mean Mathematics Scale Score across States for Students with Other Health Impairment



As can be seen in Table 9 and Figure 7, one state (S01) performed statistically significantly higher than the rest of the states except one (S07). One state (S11) seemed to perform statistically significantly lower than five of the other states (S01, S02, S05, S06, and S07).

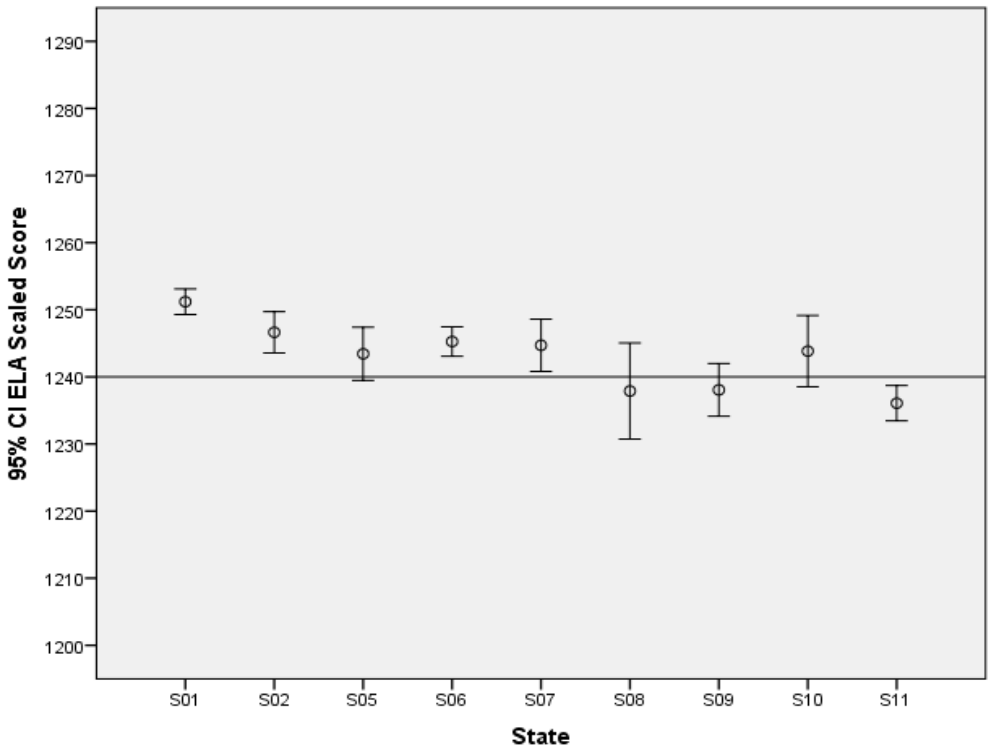
Table 10. Statistically Significant Difference between each State on English Language Arts (ELA) Performance for Students with Other Health Impairment

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01			N/A	N/A	+	+		+	+		+
→	S02			N/A	N/A					+		+
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S05	-		N/A	N/A							
→	S06	-		N/A	N/A					+		+
→	S07			N/A	N/A							+
→	S08	-		N/A	N/A							
→	S09	-	-	N/A	N/A		-					
→	S10			N/A	N/A							
→	S11	-	-	N/A	N/A		-	-				

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

Figure 8. Comparison of 95% Confidence Interval (CI) of the Mean English Language Arts (ELA) Scale Score across States for Students with Other Health Impairment



In mathematics, one state performed statistically significantly higher than most (S05, S05, S08, S08, and S11) in English language arts, as seen in Table 9 and Figure 8. One state (S11) seemed to perform statistically significantly lower than four other states (S01, S02, S06 and S07). These four states also performed above the cut-off for Level 3.

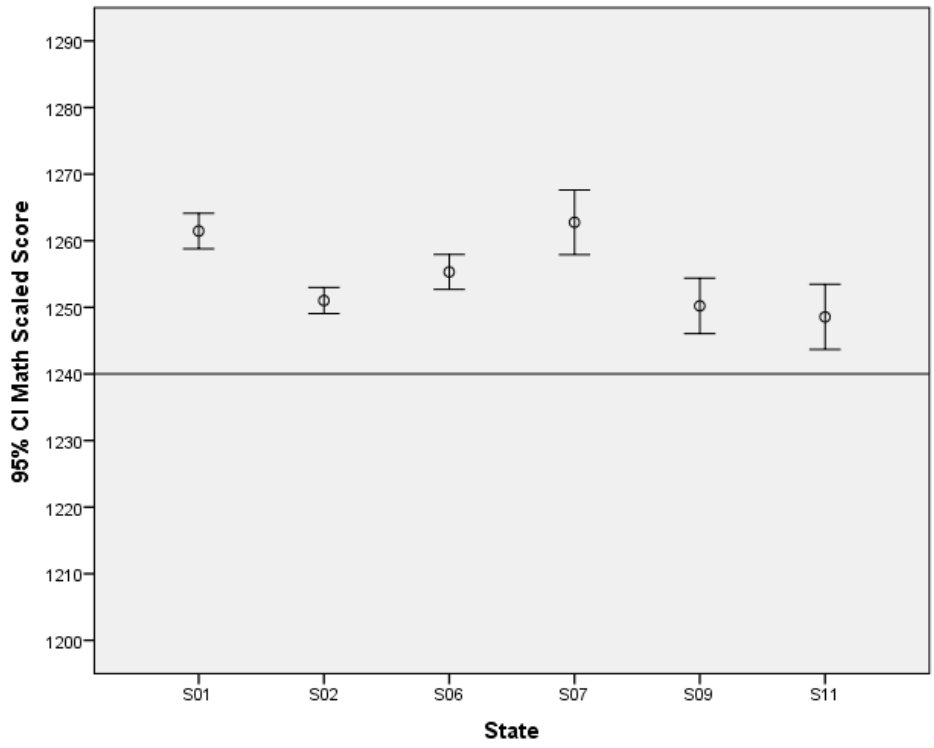
Table 11. Statistically Significant Difference between each State on Mathematics Performance for Students with Specific LD

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01		+	N/A	N/A	N/A	+		N/A	+	N/A	+
→	S02	-		N/A	N/A	N/A		-	N/A		N/A	
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S05	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
→	S06	-		N/A	N/A				N/A		N/A	
→	S07		+	N/A	N/A				N/A	+	N/A	+
→	S08	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
→	S09	-		N/A	N/A			-	N/A		N/A	
→	S10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
→	S11	-		N/A	N/A			-	N/A		N/A	

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

Figure 9. Comparison of 95% Confidence Interval (CI) of the Mean Mathematics Scale Score across States for Students with Specific LD



All states, as can be seen in Figure 9, performed above the cut-off for Level 3. As indicated in Table 11 and Figure 9, one state was statistically significantly higher than four of the five states shown (i.e., S02, S06, S09, and S11).

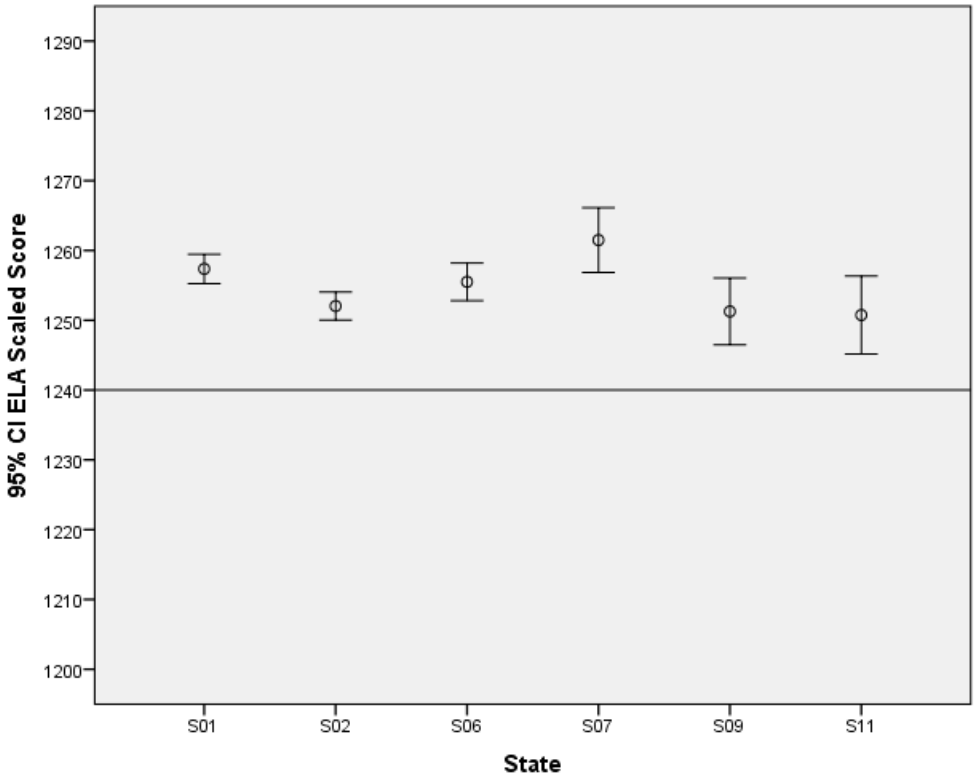
Table 12. Statistically Significant Difference between each State on English Language Arts (ELA) Performance for Students with Specific LD

		State										
		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
→	S01		+	N/A	N/A	N/A			N/A		N/A	
→	S02	-		N/A	N/A	N/A		-	N/A		N/A	
→	S03	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S04	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
→	S05	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
→	S06			N/A	N/A				N/A		N/A	
→	S07		+	N/A	N/A				N/A	+	N/A	+
→	S08	N/A	N/A	N/A	N/A	N/A	N/A	N/A			N/A	
→	S09			N/A	N/A			-	N/A		N/A	
→	S10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
→	S11			N/A	N/A			-	N/A		N/A	

Note: Compare horizontally

+ state is statistically significantly higher; - state is statistically significantly lower; blank is no difference

Figure 10. Comparison of 95% Confidence Interval (CI) of the Mean English Language Arts (ELA) Scale Score across States for Students with Specific LD



As can be seen in Table 12 and Figure 10, students with a specific learning disability (LD) in most states performed similarly in English language arts .

After examining the performance by disability and by state, we examined the performance by grade by disability and by state. We made comparisons when there were sufficient numbers of students taking the assessment. As we did in the previous analysis, the minimum number that we used was 25. Table 13 shows the grade, state, and primary disability that had a sufficient number of students to make a statistical comparison (at least 25).

Table 13. The State, Primary Disability and Grade with Sufficient Number of Students Taking the Assessment to make a Statistical Comparison

		State										
Grade	Primary Disability	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
3	Undefined		X				X					X
	Intellectual Disability	X	X			X	X	X	X	X	X	X
	Multiple	X	X			X	X	X	X	X		X
	Autism	X	X		X	X	X	X	X	X	X	X
	Speech/Lang Imp.											
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.											
	Emotional Disability											
	Deaf/Blind											
	Other Health Imp.	X					X					X
	Orthopedic											
	Deaf											
	Specific LD											
	other		X				X					X
4	Undefined		X				X			X		X
	Intellectual Disability	X	X		X	X	X	X	X	X	X	X
	Multiple	X	X			X	X	X		X	X	
	Autism	X	X			X	X	X	X	X	X	X
	Speech/Lang Imp.											
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.											
	Emotional Disability											
	Deaf/Blind											
	Other Health Imp.	X				X	X					
	Orthopedic											
	Deaf											
	Specific LD		X									
	other						X					
5	Undefined		X			X	X			X		X
	Intellectual Disability	X	X		X	X	X	X	X	X	X	X
	Multiple	X	X			X	X	X		X	X	X
	Autism	X	X			X	X	X		X	X	X
	Speech/Lang Imp.											
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.											
	Emotional Disability											
	Deaf/Blind											
	Other Health Imp.	X	X				X					
	Orthopedic											
	Deaf											
	Specific LD		X									
	other						X					
6	Undefined		X				X					X
	Intellectual Disability	X	X		X	X	X	X	X	X	X	X
	Multiple	X	X			X	X	X	X	X		X
	Autism	X	X		X	X	X	X		X	X	X
	Speech/Lang Imp.											
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.											
	Emotional Disability											
	Deaf/Blind											
	Other Health Imp.	X	X				X					X
	Orthopedic											
	Deaf											
	Specific LD	X	X									
	other						X					

Table 13 (cont'd). The State, Primary Disability and Grade with Sufficient Number of Students Taking the Assessment to make a Statistical Comparison

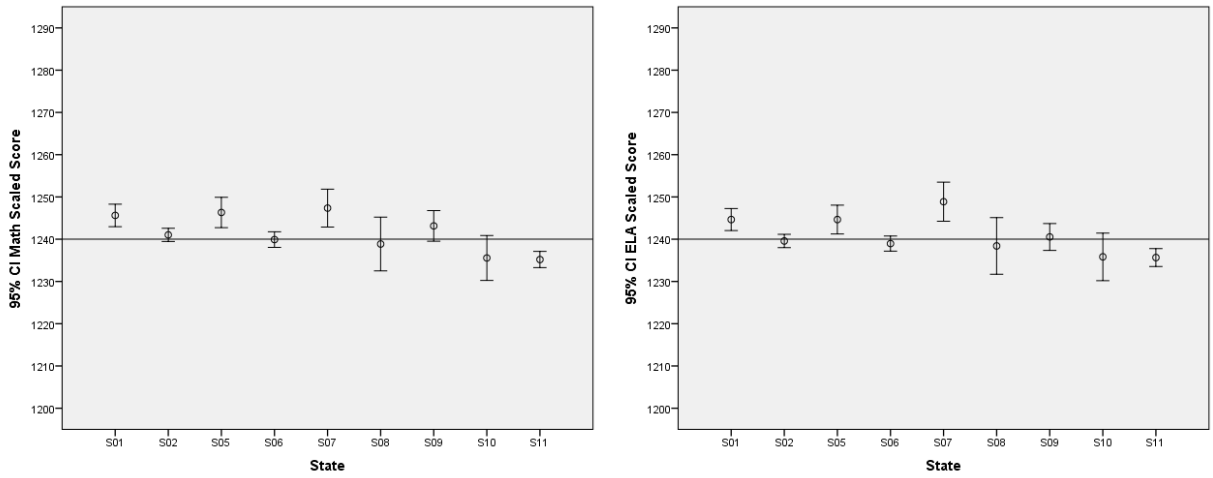
		State									
Grade	Primary Disability	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
7	Undefined		X				X			X		X
	Intellectual Disability	X	X		X	X	X	X	X	X	X	X
	Multiple	X	X			X	X	X	X	X		X
	Autism	X	X		X	X	X	X	X	X	X	X
	Speech/Lang Imp.											
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.											
	Emotional Disability						X					
	Deaf/Blind											
	Other Health Imp.	X					X					
	Orthopedic											
	Deaf											
	Specific LD	X	X									
	other						X					
8	Undefined		X				X			X		X
	Intellectual Disability	X	X		X	X	X	X	X	X	X	X
	Multiple	X	X			X	X	X	X	X		X
	Autism	X	X			X	X	X		X	X	X
	Speech/Lang Imp.											
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.											
	Emotional Disability						X					
	Deaf/Blind											
	Other Health Imp.	X	X				X					X
	Orthopedic											
	Deaf											
	Specific LD	X	X				X					
	other						X					
10	Undefined						X					
	Intellectual Disability						X					
	Multiple						X					
	Autism						X					
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.						X					
	Emotional Disability						X					
	Other Health Imp.											
	Orthopedic						X					
	Deaf						X					
	Specific LD						X					
	other		X							X		X
11	Undefined		X							X		X
	Intellectual Disability	X	X		X	X		X	X	X	X	X
	Multiple	X	X			X		X		X		
	Autism	X	X			X		X		X	X	X
	Speech/Lang Imp.											
	Hearing Imp.											
	Visual Imp.											
	Traum. Br. Inj.											
	Emotional Disability											
	Deaf/Blind											
	Other Health Imp.	X										
	Orthopedic											
	Deaf											
	Specific LD	X	X									
	other	X	X		X	X		X	X	X	X	X

As can be seen in Table 13, there are a number of occasions in which there were not sufficient numbers of students. Additionally, a primary disability represented as "undefined" or "other" was not compared across states, even though there may have been sufficient numbers. The comparisons are presented by state using the same approaches used earlier in making comparisons across states by primary disability.

Grade 3

Comparison of performance in the NCSC mathematics and English language arts (ELA) assessments by state for grade 3 with students with intellectual disability, multiple disabilities, autism, and other health impairments are shown in Figures 11 to 14, respectively. The 95% confidence intervals of the means are shown for each state that had the minimum number for statically valid comparisons (at least 25)[5].

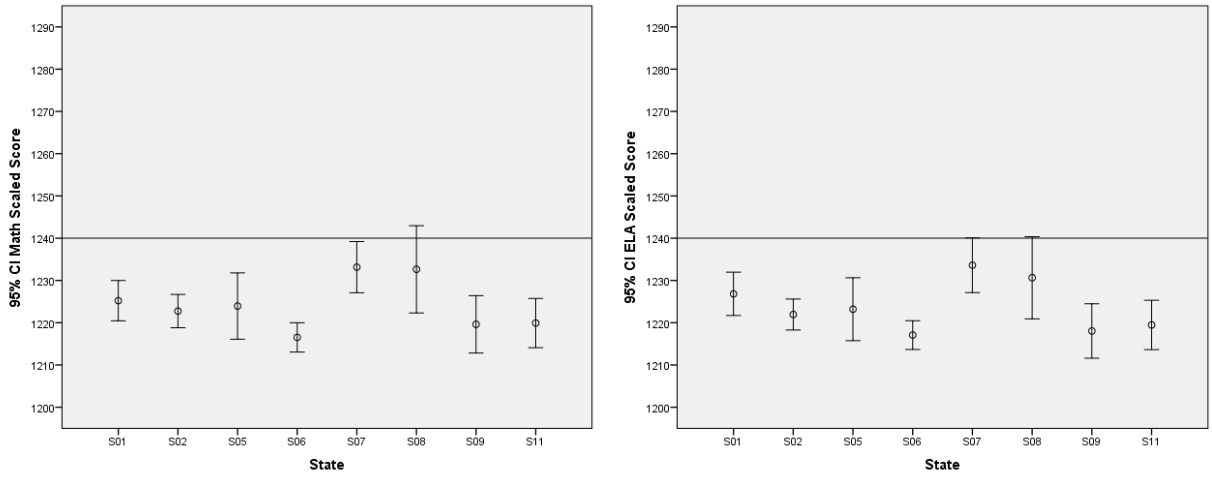
Figure 11. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 3 for Students with Intellectual Disability



As seen in Figure 11, three states (S01, S05, and S07) performed above the cut-off for Level 3 in both mathematics and English language arts. One state (S11) was clearly below the cut-off for Level 3 in both content areas. The other states seemed to have students perform above and below the Level 3 cut-off.

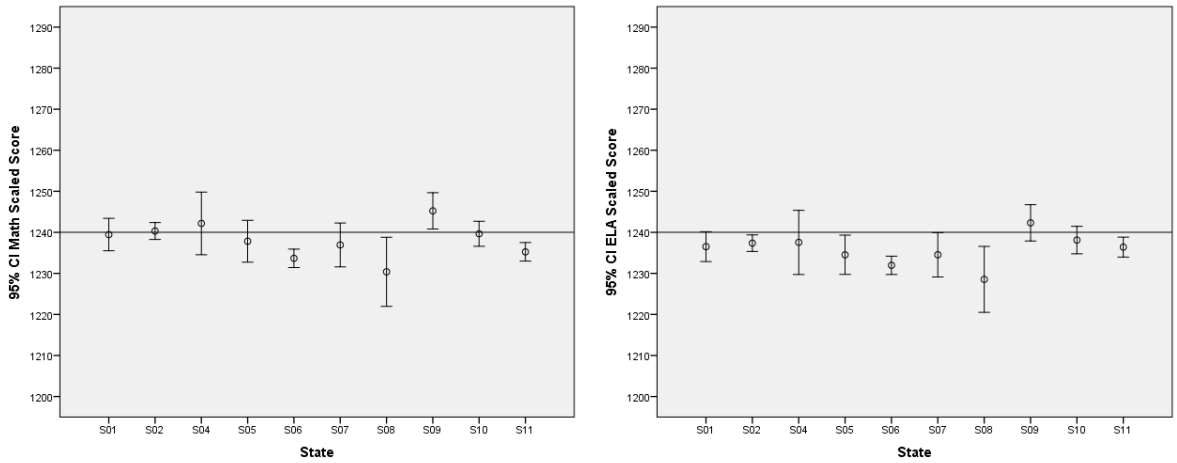
[5] Where the confidence intervals do not overlap with each other, this represents a statistically significant difference ($p < .05$).

Figure 12. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 3 for Students with Multiple Disabilities



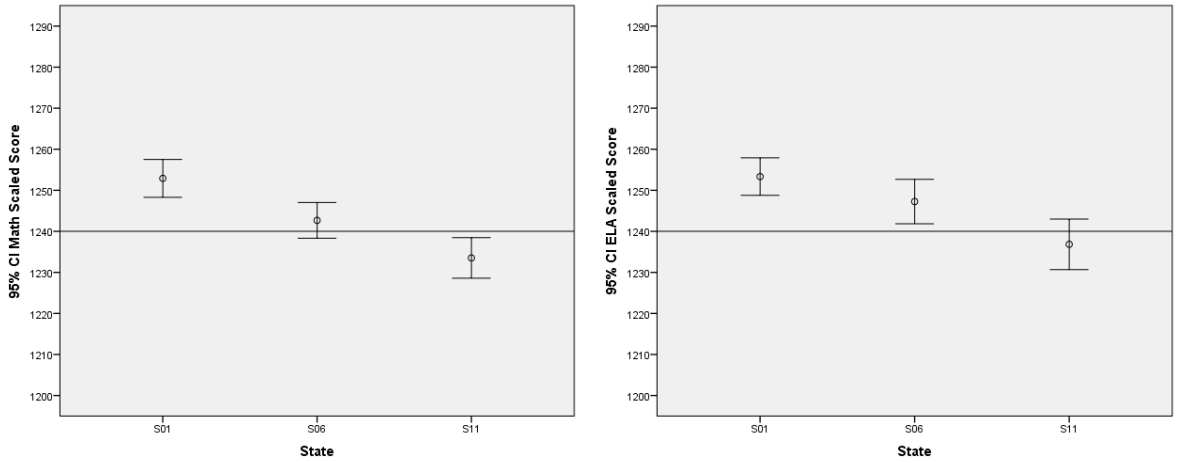
As seen in Figure 12, most states performed below the Level 3 cut-off in both mathematics and English language arts. One state (S08) showed some proportion of students performing above the Level 3 cut-off.

Figure 13. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 3 for Students with Autism



As seen in Figure 13, most states are performing around the cut-off for Level 3 in both areas. However, it does appear that state S09 in mathematics has most students above the cut-off and is statistically significantly higher than two other states (S06 and S11) in math and one other state (S06) in ELA.

Figure 14. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 3 for Students with Other Health Impairments



Grade 4

Comparison of performance in the NCSC mathematics and English language arts (ELA) assessments by state for grade 4 with students with intellectual disability, multiple disabilities, autism, and other health impairments are shown in Figures 15 to 18, respectively. The 95% confidence intervals of the means are shown for each state that has the minimum number for statically valid comparisons.

Figure 15. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 4 for Students with Intellectual Disability

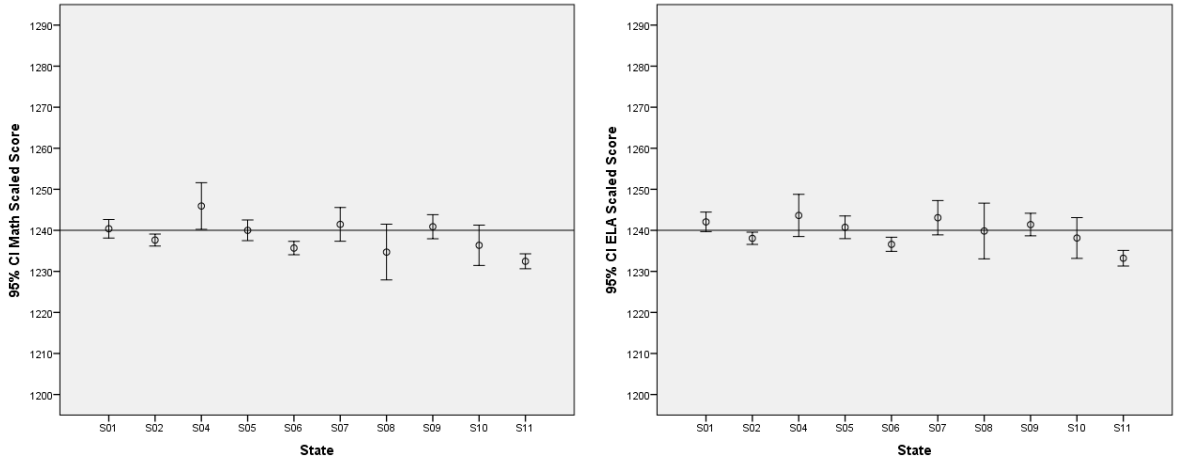


Figure 16. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 4 for Students with Multiple Disabilities

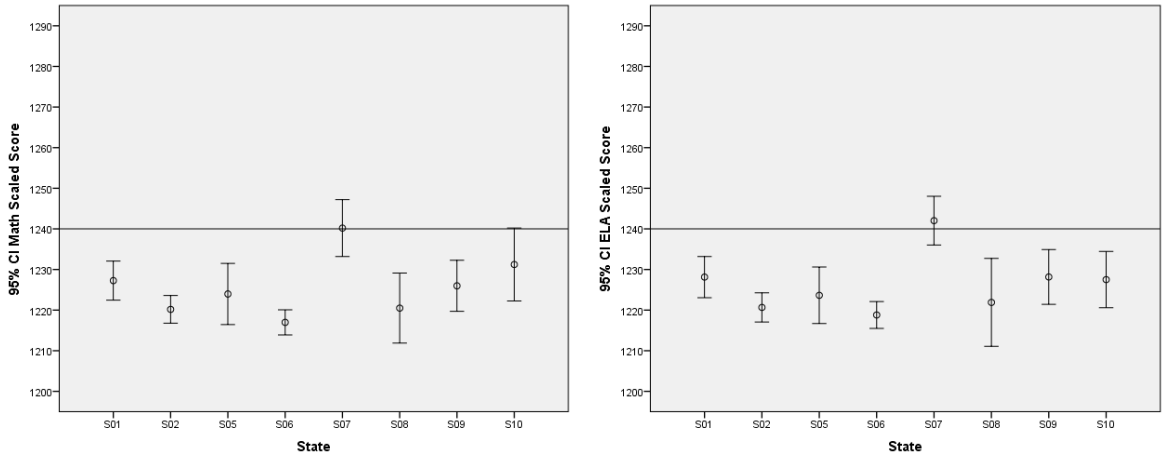


Figure 17. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 4 for Students with Autism

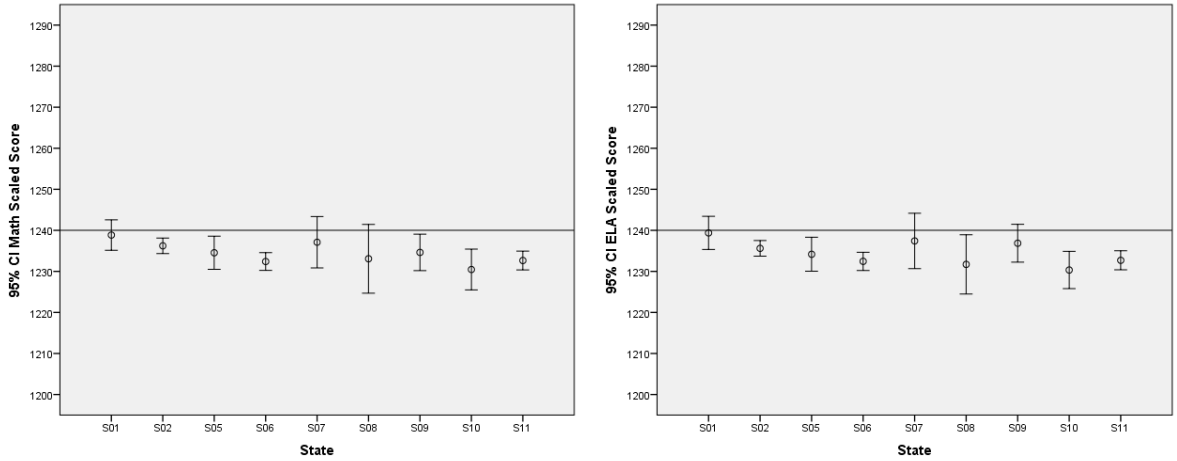
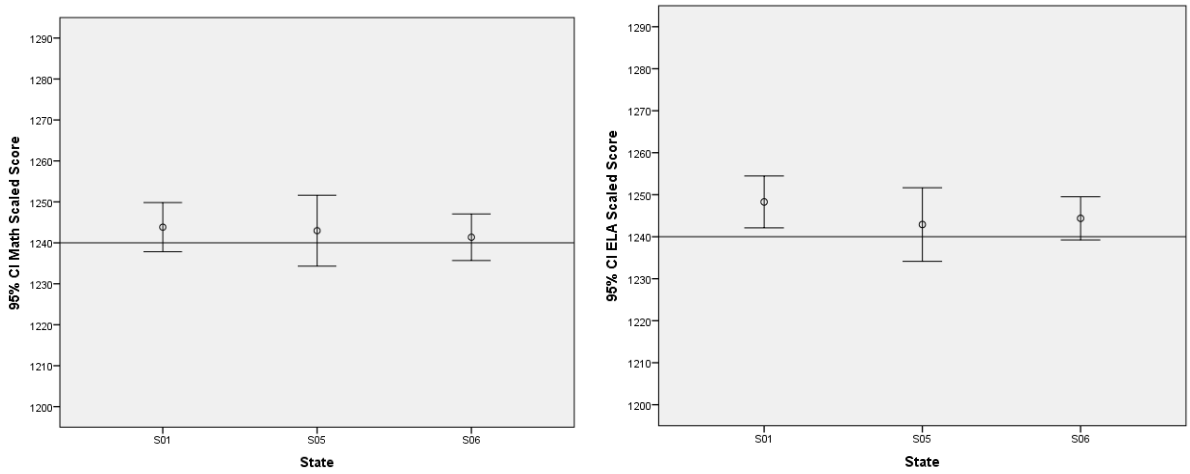


Figure 18. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 4 for Students with Other Health Impairments



Grade 5

Comparison of performance in the NCSC mathematics and English language arts (ELA) assessments by state for grade 5 with students with intellectual disability, multiple disabilities, autism, and other health impairments are shown in Figures 19 to 22, respectively. The 95% confidence intervals of the means are shown for each state that has the minimum number for statically valid comparisons.

Figure 19. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 5 for Students with Intellectual Disability

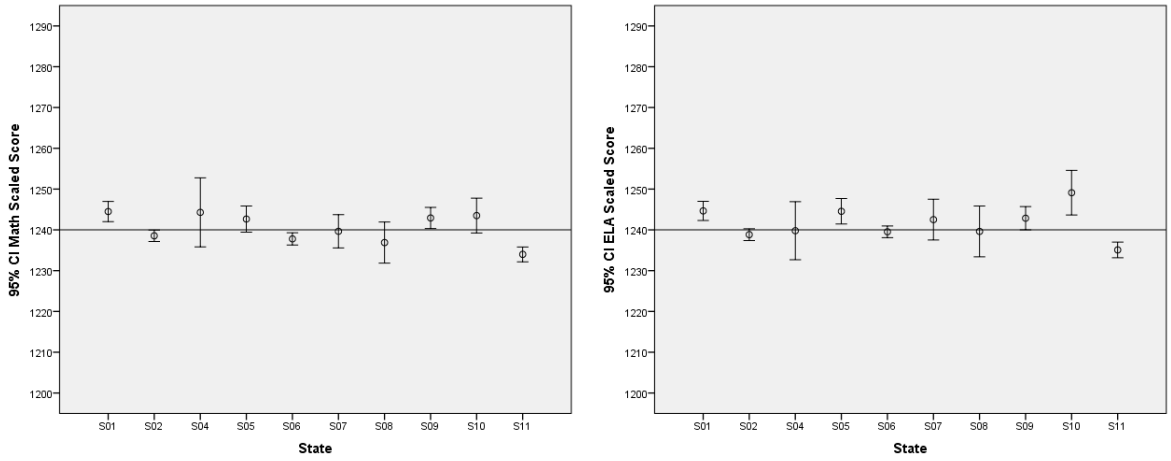


Figure 20. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 5 for Students with Multiple Disabilities

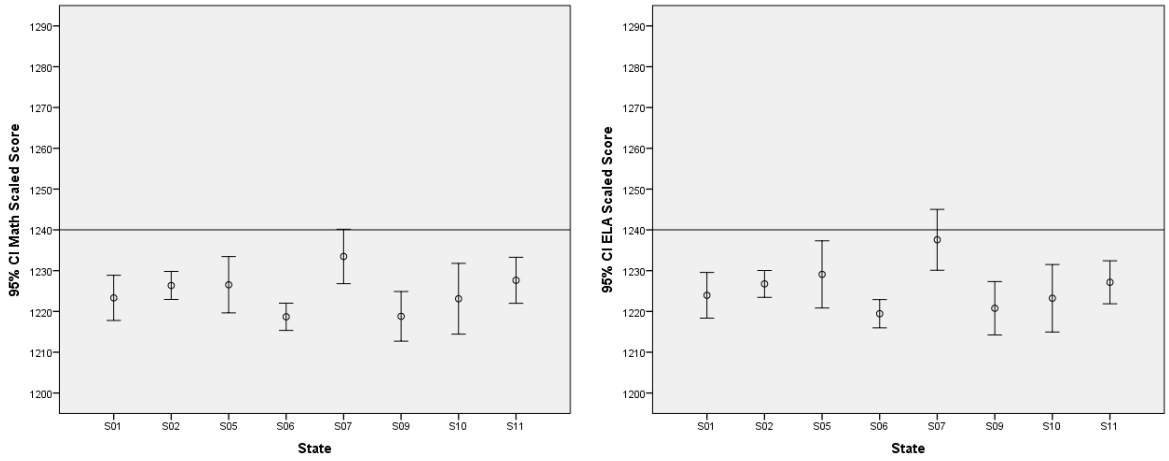


Figure 21. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 5 for Students with Autism

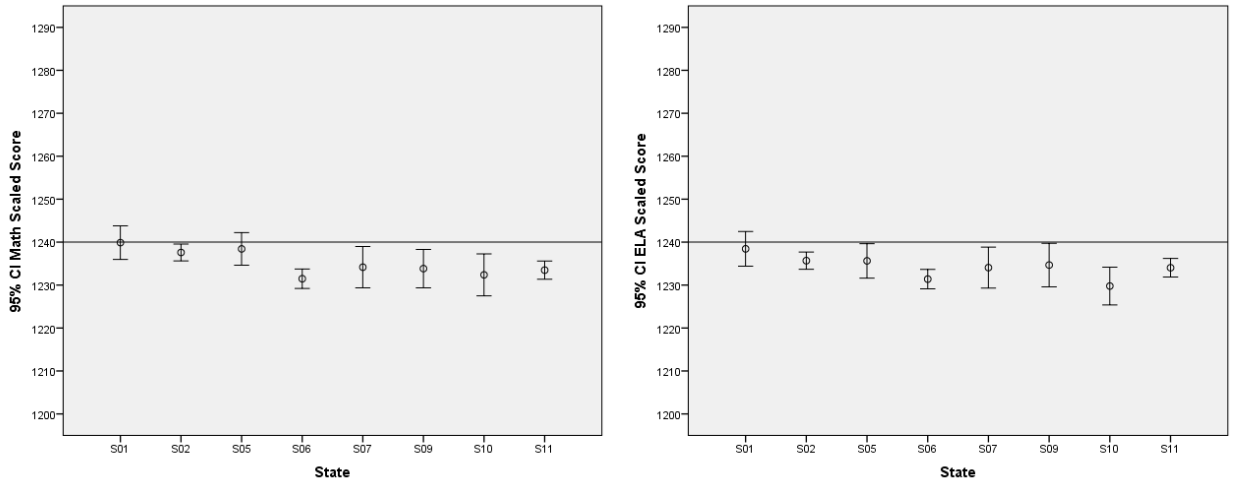
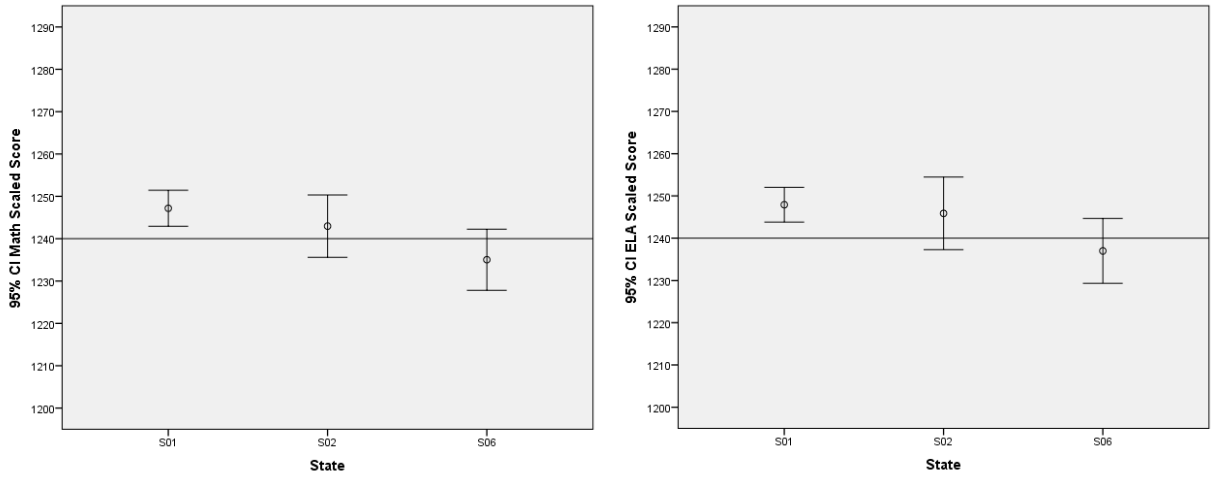


Figure 22. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 5 for Students with Other Health Impairments



Grade 6

Comparison of performance in the NCSC mathematics and English language arts (ELA) assessments by state for grade 6 with students with intellectual disability, multiple disabilities, autism, other health impairments, and a specific learning disability (LD) are shown in Figures 23 to 26, respectively. The 95% confidence intervals of the means are shown for each state that has the minimum number for statically valid comparisons.

Figure 22. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 6 for Students with Intellectual Disability

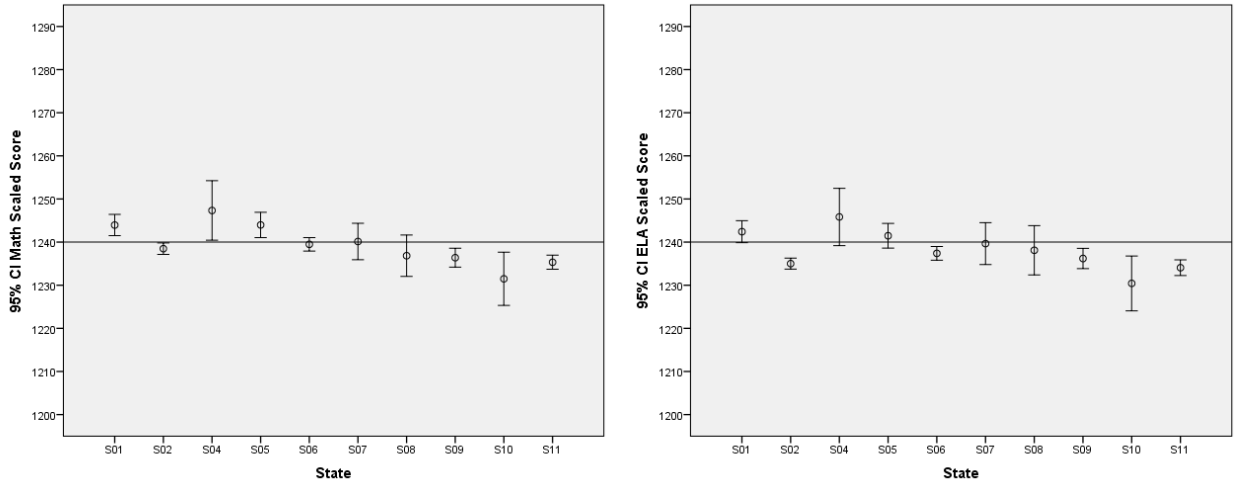


Figure 23. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 6 for Students with Multiple Disabilities

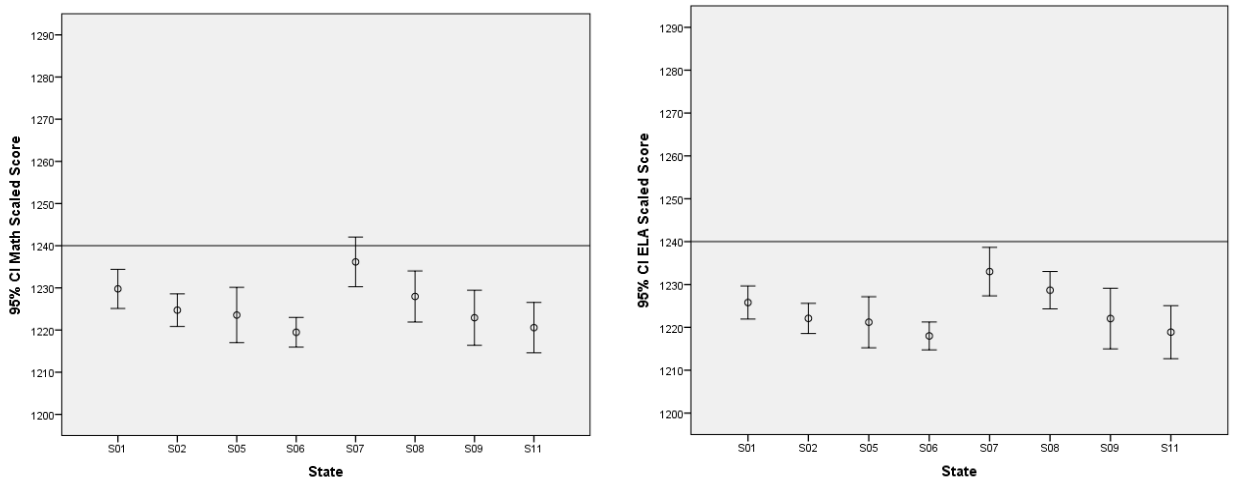


Figure 24. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 6 for Students with Autism

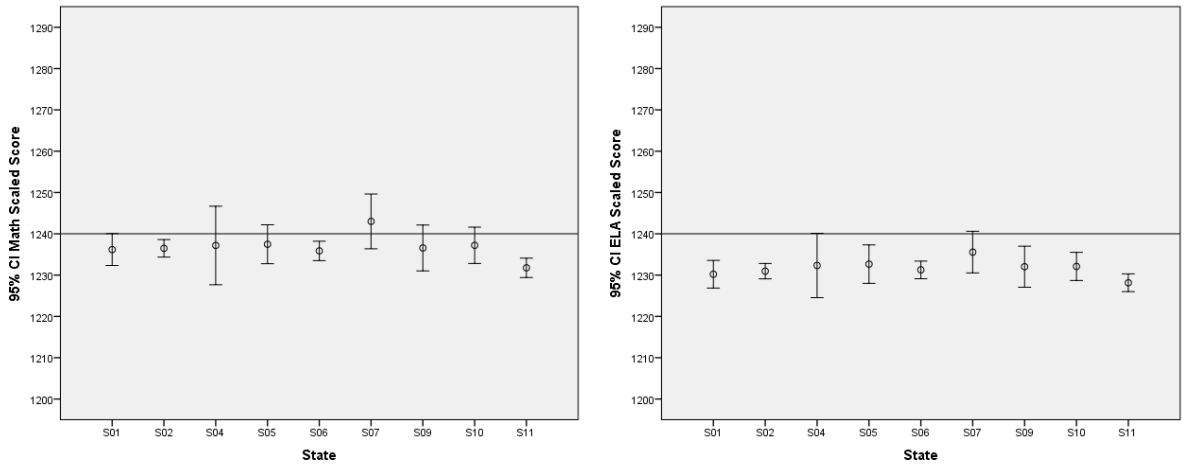


Figure 25. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 6 for Students with Other Health Impairments

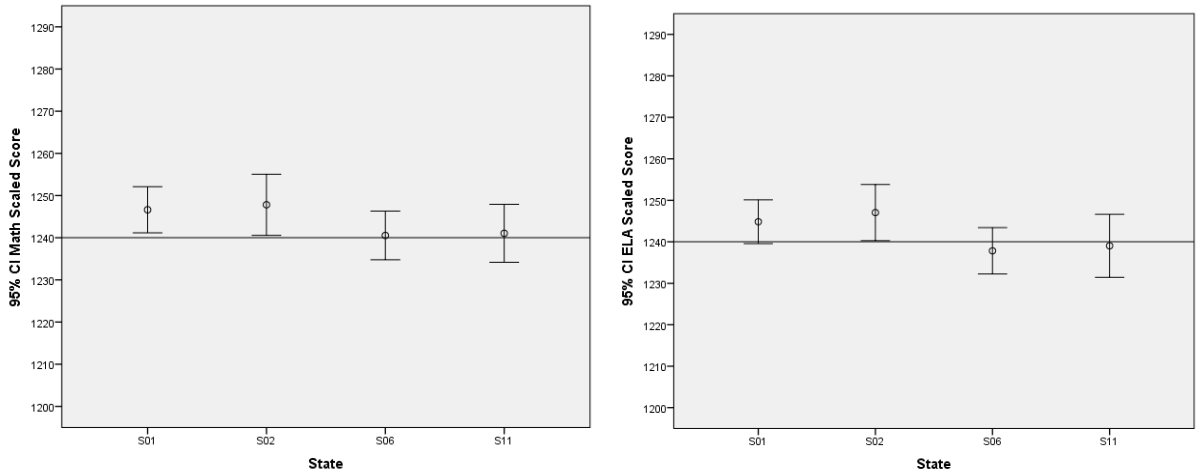
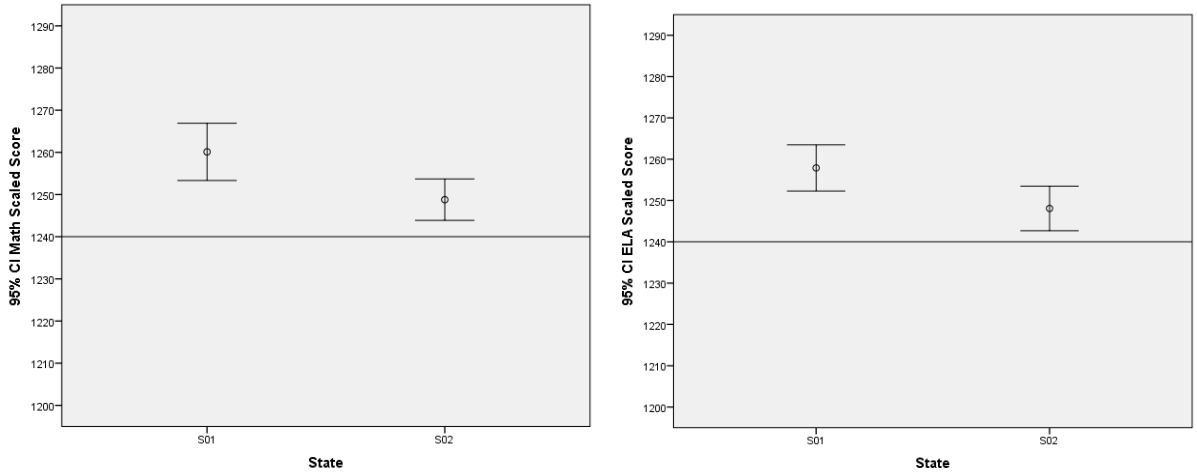


Figure 26. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 6 for Students with Specific Learning Disability (LD)



Grade 7

Comparison of performance in the NCSC mathematics and English language arts (ELA) assessments by state for grade 7 with students with intellectual disability, multiple disabilities, autism, other health impairments, and a specific learning disability (LD) are shown in Figures 27 to 31, respectively. The 95% confidence intervals of the means are shown for each state that has the minimum number for statically valid comparisons.

Figure 27. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 7 for Students with Intellectual Disability

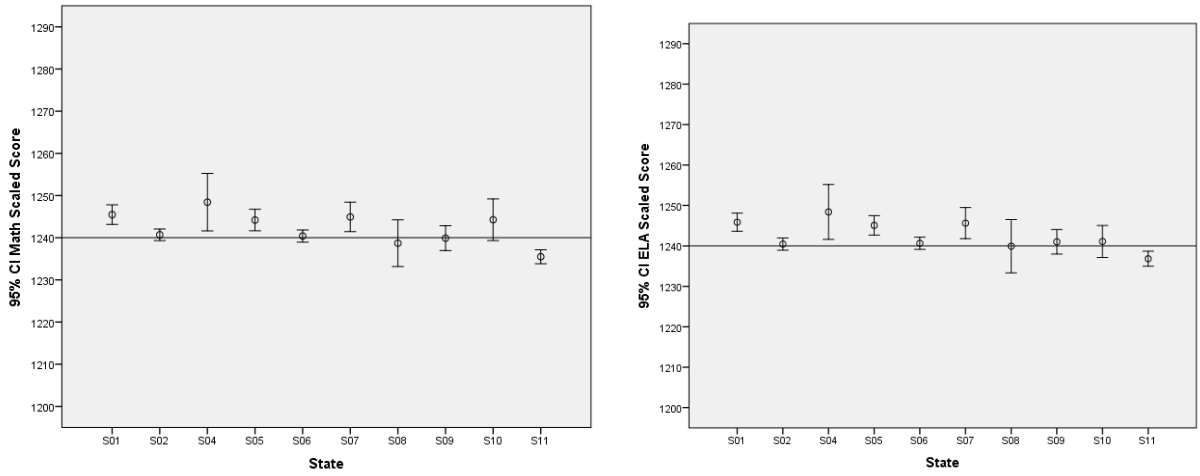


Figure 28. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 7 for Students with Multiple Disabilities

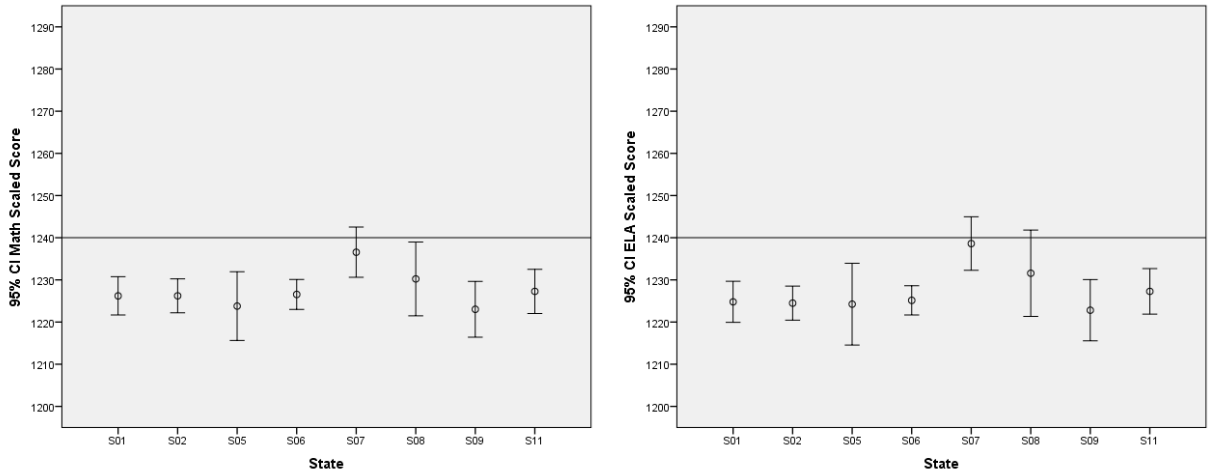


Figure 29. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 7 for Students with Autism

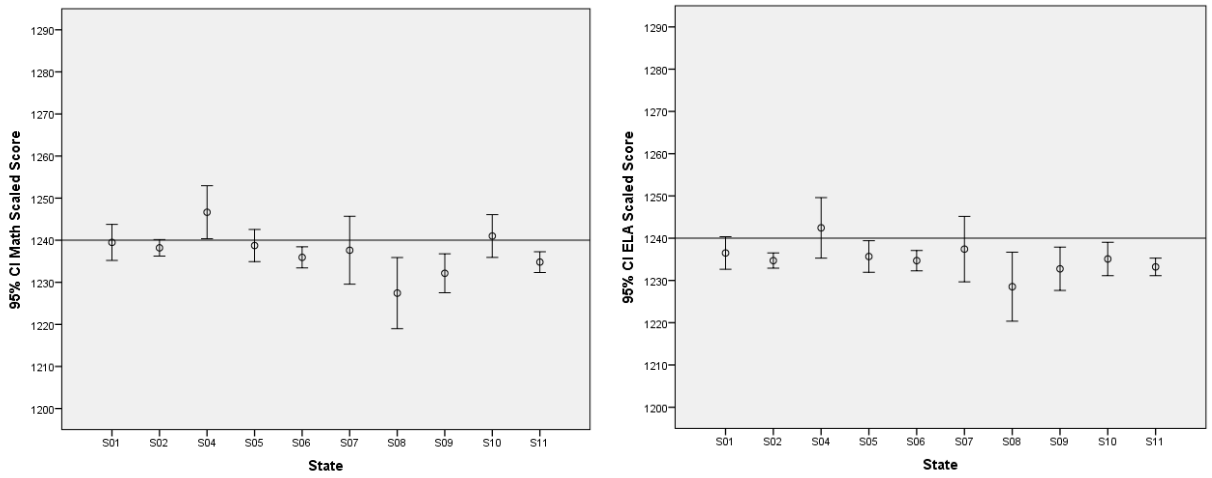


Figure 30. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 7 for Students with Other Health Impairments

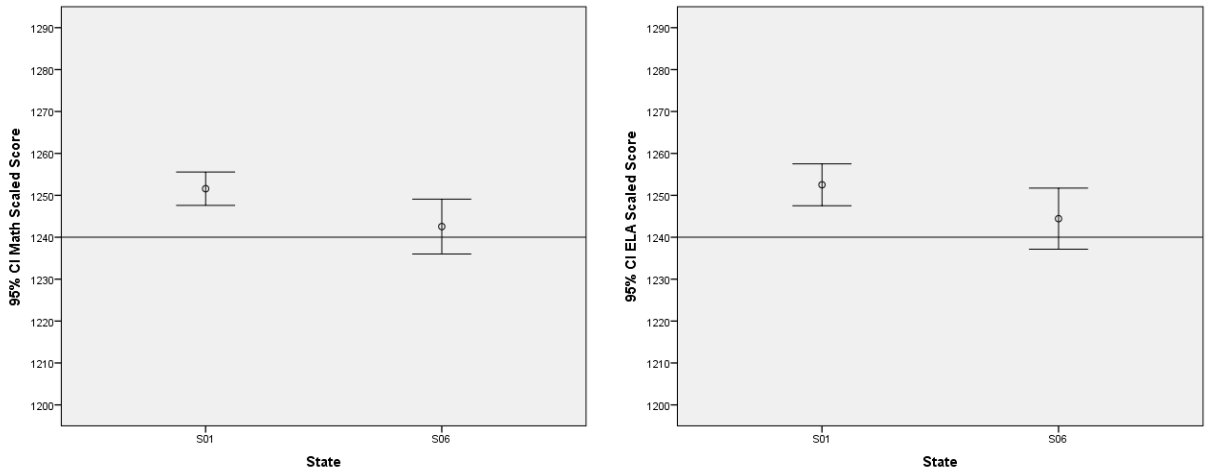
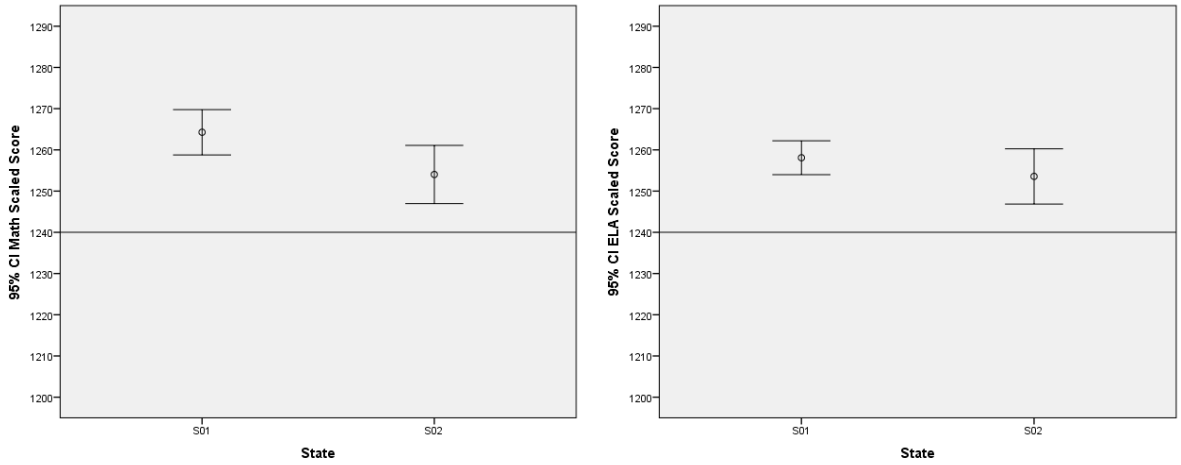


Figure 31. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 7 for Students with a Specific Learning Disability (LD)



Grade 8

Comparison of performance in the NCSC mathematics and English language arts (ELA) assessments by state for grade 8 with students with intellectual disability, multiple disabilities, autism, other health impairments, and a specific learning disability (LD) are shown in Figures 32 to 36, respectively. The 95% confidence intervals of the means are shown for each state that has the minimum number for statically valid comparisons.

Figure 32. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 8 for Students with Intellectual Disability

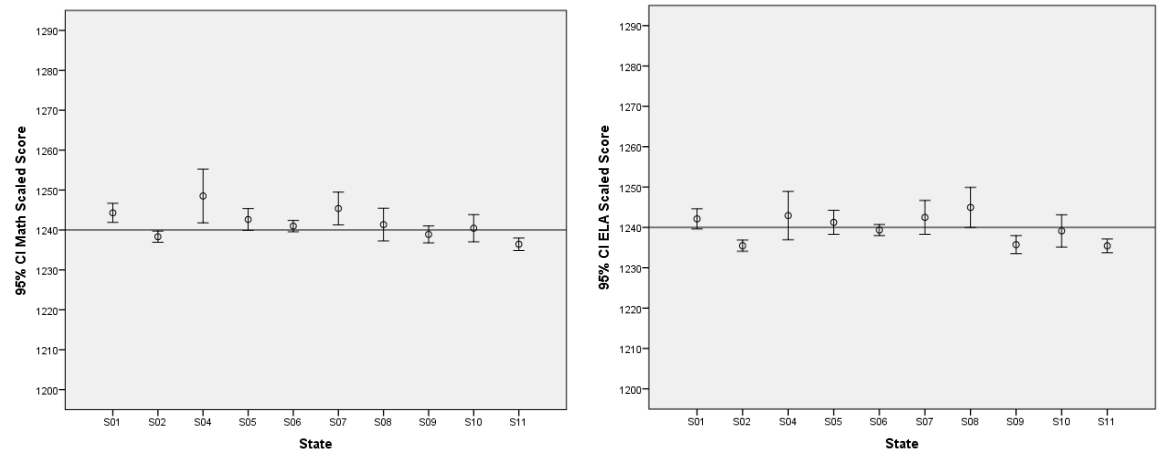


Figure 33. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 8 for Students with Multiple Disabilities

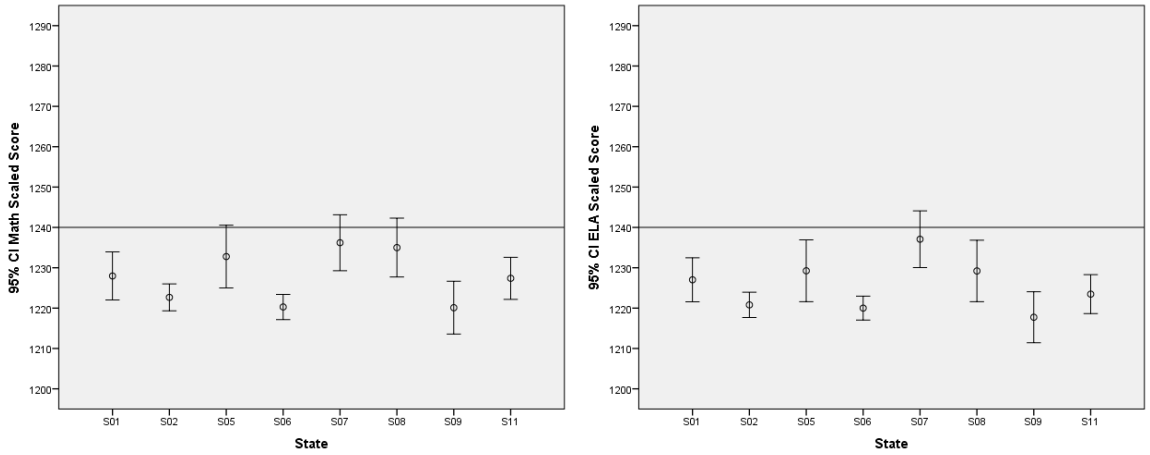


Figure 34. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 8 for Students with Autism

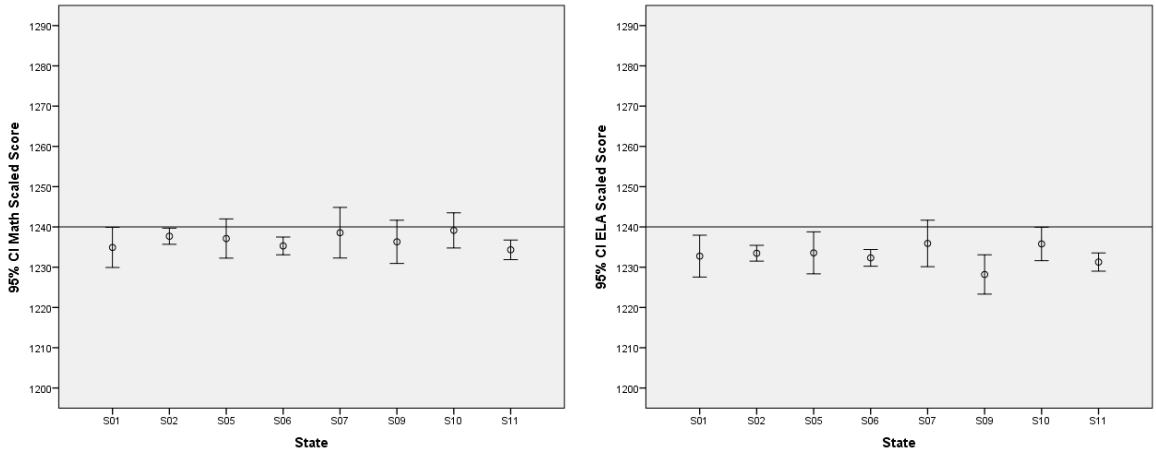


Figure 35. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 8 for Students with Other Health Impairments

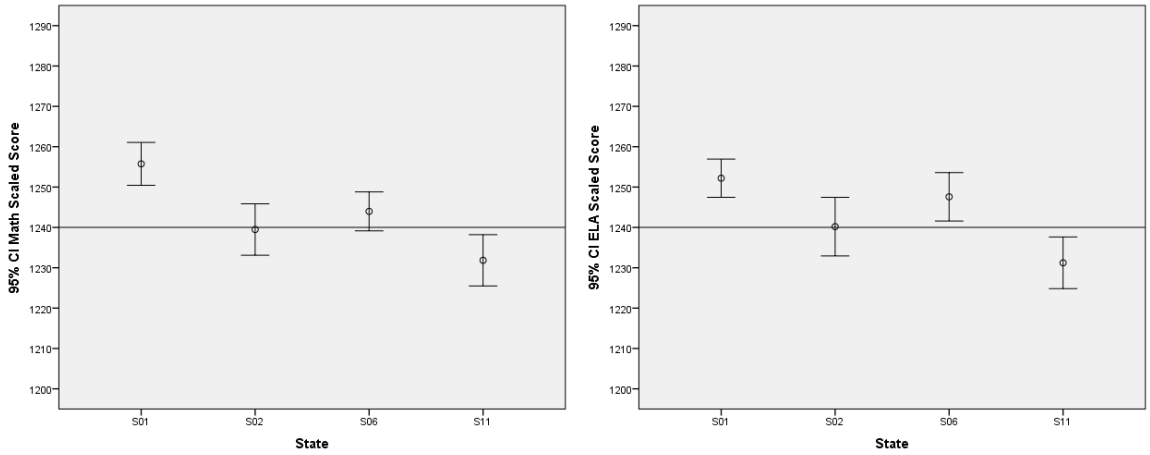
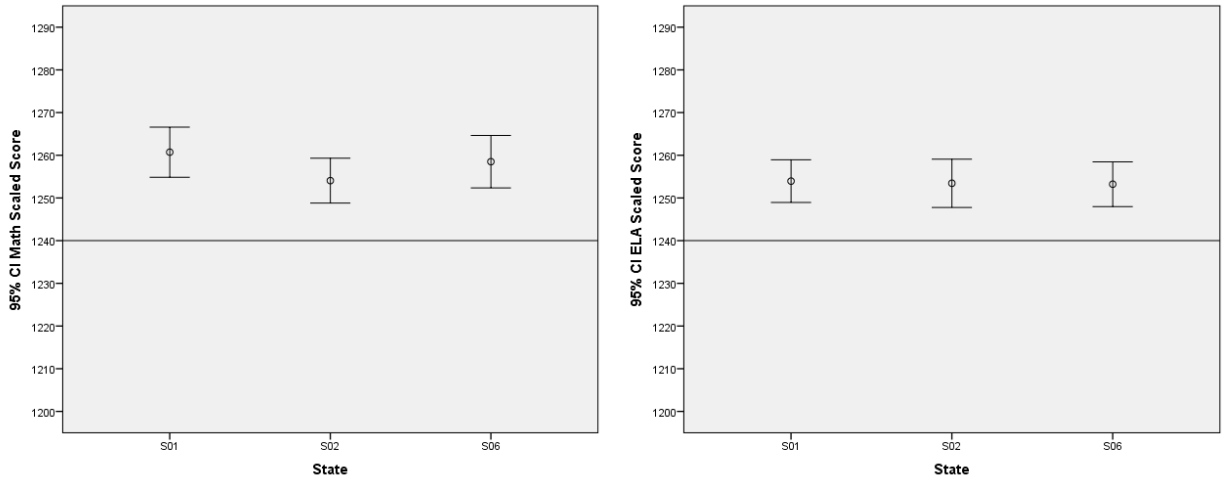


Figure 36. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 8 for Students with a Specific Learning Disability (LD)



Grade 11

Comparison of performance in the NCSC mathematics and English language arts (ELA) assessments by state for grade 11 with students with intellectual disability, multiple disabilities, autism, and who are deaf are shown in Figures 37 to 40, respectively. The 95% confidence intervals of the means are shown for each state that has the minimum number for statically valid comparisons.

Figure 37. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 11 for Students with Intellectual Disability

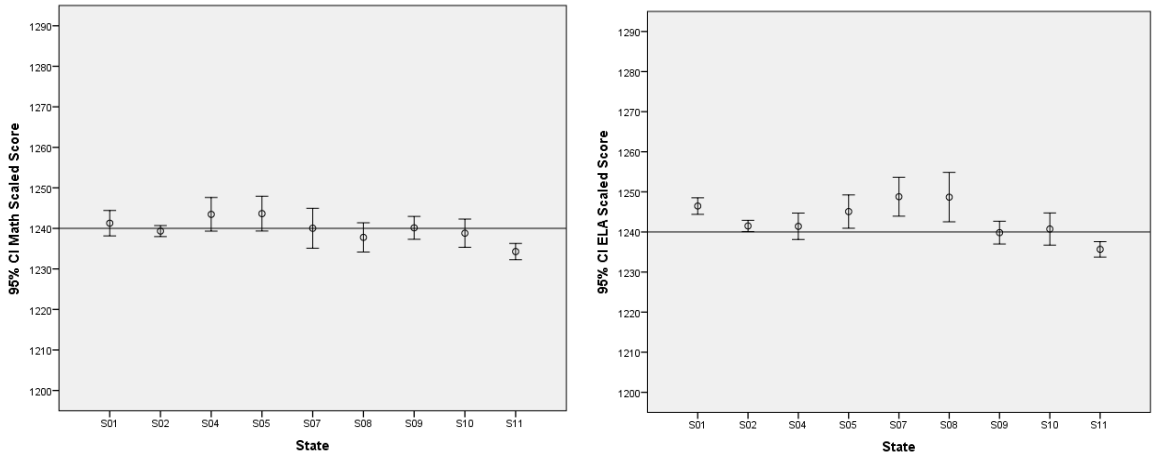


Figure 38. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 11 for Students with Multiple Disabilities

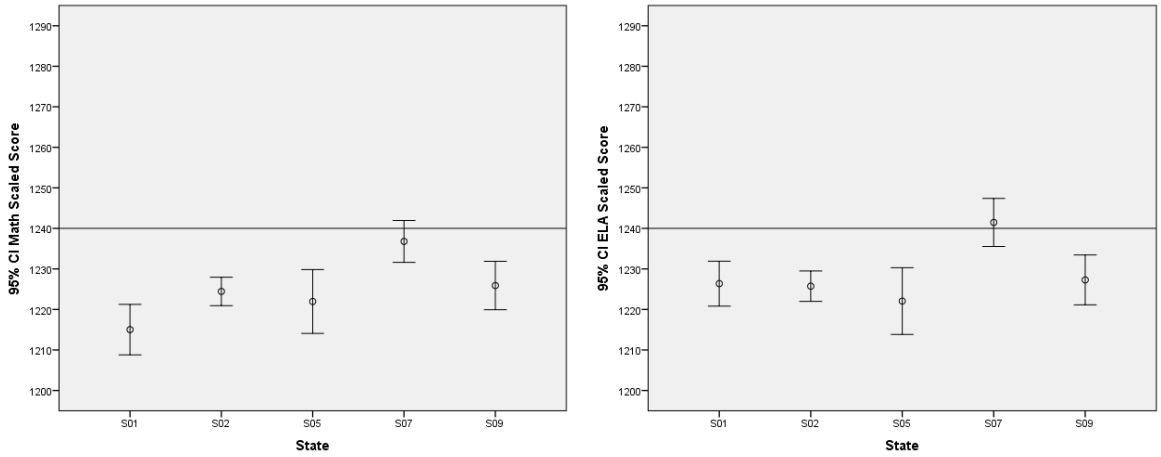


Figure 39. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 11 for Students with Autism

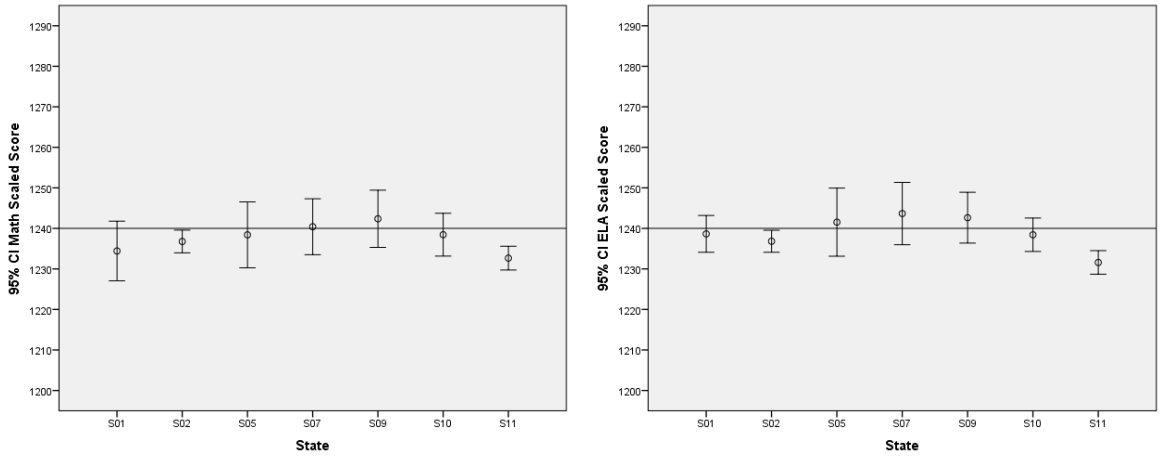
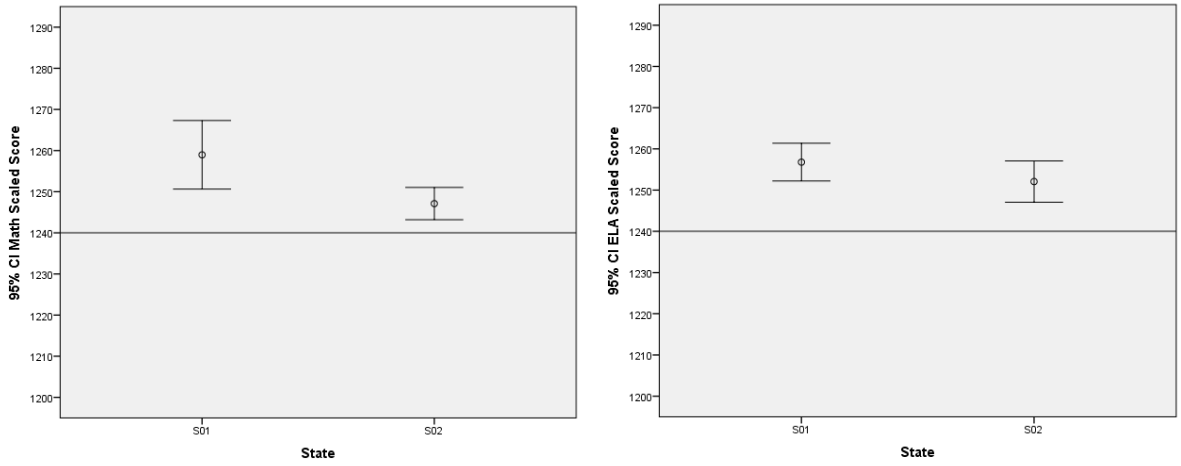


Figure 40. 95% Confidence Interval (CI) of the Mean Math and ELA Performance by State for Grade 11 for Students with a Specific Learning Disability (LD)



Characteristics of Students across States

To help examine the characteristics of students who took the NCSC assessment, we evaluated comparisons across states that showed statistically significant differences. Comparisons were made using a discriminant analysis to examine which characteristic differentiated between the states that showed a statistically significant difference on math or ELA by grade and by disability. Table 14 shows the grade, primary disability, and the state with the statistically significant differences as suggested in Figures 11 to 40. This represented 67 analyses to examine which characteristics could explain the differences between the higher and lower performing states. In order to make the analyses manageable, the grade, disability and pairs of states that had the largest mean

differences were used to perform the analysis. An indication of the grade, primary disability and pairs of states that showed the largest standardized mean difference[6] are shown in bold in Table 14.

Table 14. Indication of the Grade, Primary Disability and States Involved in Comparative Analyses

Grade	Primary Disability	Higher Performing State	Lower Performing State	Standardized Mean Difference
3	Intellectual Disability	S01	S11	**5.28**
		S05	S11	4.44
		S07	S11	5.23
	Multiple Disabilities	S07	S06	**4.53**
		S08	S06	2.70
	Autism	S09	S06	**4.15**
		S10	S06	3.05
		S08	S09	3.07
	Other Health	S01	S11	**4.39**
4	Intellectual Disability	S01	S11	**5.73**
		S02	S11	4.00
		S04	S11	3.89
		S05	S11	4.44
		S07	S11	4.33
		S09	S11	4.84
	Multiple Disabilities	S07	S02	6.14
		S07	S05	4.04
		S07	S06	**6.81**
		S07	S09	3.09
	Autism	S02	S06	**2.13**
5	Intellectual Disability	S01	S02	4.15
		S01	S11	**6.22**
		S02	S05	3.29
		S02	S10	3.71
		S02	S11	3.08
		S05	S11	5.13
		S09	S11	4.48
		S10	S11	4.93
	Multiple Disabilities	S02	S06	3.03
		S07	S06	**4.43**
	Autism	S01	S06	**3.01**
		S02	S06	2.80
		S05	S06	1.84

[6] Standardized mean difference is calculated by dividing the mean difference by the pooled standard error of the math and ELA scaled scores.

Table 14 (cont'd). Indication of the Grade, Primary Disability and States Involved in Comparative Analyses

Grade	Primary Disability	Higher Performing State	Lower Performing State	Standardized Mean Difference
6	Intellectual Disability	S01	S11	**5.27**
		S04	S11	3.49
		S05	S11	4.32
		S06	S11	2.73
		S01	S10	3.55
		S04	S10	3.42
		S05	S10	3.21
		S01	S09	3.54
		S04	S09	2.79
		S05	S09	2.82
	Multiple Disabilities	S07	S06	**4.61**
	Autism	S06	S11	**2.04**
7	Intellectual Disability	S01	S11	**6.09**
		S02	S11	2.98
		S04	S11	3.33
		S06	S11	3.14
		S07	S11	4.41
	Multiple Disabilities	S07	S06	**3.72**
	Autism	S04	S06	2.08
		S04	S08	**2.63**
		S04	S09	2.28
		S04	S11	2.52
8	Intellectual Disability	S01	S11	**4.34**
		S04	S11	2.45
		S05	S11	3.35
		S06	S11	3.49
		S07	S11	3.10
		S08	S11	3.64
	Multiple Disabilities	S05	S06	2.28
		S07	S06	**4.49**
		S08	S06	2.32
	Other Health Impairments	S01	S11	**5.37**
11	Intellectual Disability	S01	S11	**7.55**
		S02	S11	4.82
	Multiple Disabilities	S07	S01	3.72
		S07	S02	**4.48**

The details of the discriminant analyses are presented in Appendix A. A summary of the results outlining the variables found to offer some level of importance in differentiating the higher versus the lower performing states are shown in Table 15.

Table 15. Summary of Importance of Variables in Differentiating Higher versus Lower Performing States

Grade	Primary Disability	Higher	Lower	Effect Size	Important Variables
3	Intellectual Disability	S01	S11	Small	Classroom Setting, Augmentative Communication System, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skills
	Multiple Disabilities	S07	S06	Small	Expressive Communication, Receptive Language, Motor Functioning, Reading Skill, and Mathematics Skill
	Autism	S09	S06	Small	Receptive Language and Mathematics Skill
	Other Health Impairments	S01	S11	Small	Classroom Setting, Augmentative Communication System, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skill
4	Intellectual Disability	S01	S11	Small	Classroom Setting, Expressive Communication, Receptive Language, Uses Speech to Communicate, Vision, Motor Functioning, Engagement, Reading Skill, and Mathematics Skill
	Multiple Disabilities	S07	S06	Small	*None*
	Autism	S02	S06	Small	*None*
5	Intellectual Disability	S01	S11	Small	Classroom Setting, Augmentative Communication System, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skill
	Multiple Disabilities	S07	S06	Small	*None*
	Autism	S01	S06	Small	*None*
6	Intellectual Disability	S01	S11	Small	Primary Language other than English, Classroom Setting, Motor Functioning, and Mathematics Skill
	Multiple Disabilities	S07	S06	Small	*None*
	Autism	S06	S11	Ext. Small	*None*
7	Intellectual Disability	S01	S11	Small	Primary Language other than English, Classroom Setting, Expressive Communication, Uses Speech to Communication, Motor Functioning, and Mathematics Skill
	Multiple Disabilities	S07	S06	Small	*None*
	Autism	S04	S08	Small	*None*
8	Intellectual Disability	S01	S11	Small	Augmentative Communication System, Health Issues/Attendance, and Mathematics Skill.
	Multiple Disabilities	S07	S06	Small	*None*
	Other Health Impairments	S01	S11	Moderate	Motor Functioning, Reading Skill, and Mathematics Skill
11	Intellectual Disability	S01	S11	Small	Classroom Setting, Reading Skill, and Mathematics Skill
	Multiple Disabilities	S07	S02	Small	Expressive Communication, Receptive Language, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skill

As can be seen in Table 15, most of the models showed a small effect size, suggesting these variables contributed to the differentiation between the two states to a small degree, and that other variables could be used in the future. Mathematics Skill was somewhat important in each of the models. But each grade, primary disability and pair of higher and lower performing states had different variables that contributed somewhat to the different analyses.

Participation Rate

Next, we examined the participation rate of each state in the 2015 operational administration of the NCSC assessments. We utilized the public school enrollment for 2014-2015 from NCES[7]. Table 15 shows the number of spring 2015 NCSC assessment participants, the total 2014-2015 enrollment, and the percent participation by state and by grade[8].

Table 16. Participation, Public School Enrollment, and Participation Rates by State by Grade

		Grade										
State		3	4	5	6	7	8	10	11	Total	UG	Total+UG
S01	Spring 2015 NCSC	558	530	567	598	620	542	-	554	3,969		3,969
	Enrollment	35,865	35,922	36,153	36,037	36,822	36,788		34,319	251,906	305	252,211
	% Participation	1.6%	1.5%	1.6%	1.7%	1.7%	1.5%		1.6%	1.6%		1.6%
S02	Spring 2015 NCSC	1,068	1,103	1,086	1,096	998	1,070	-	912	7,333		7,333
	Enrollment	86,422	85,426	85,080	84,902	84,310	84,442		78,441	589,023	237	589,260
	% Participation	1.2%	1.3%	1.3%	1.3%	1.2%	1.3%		1.2%	1.2%		1.2%
S04	Spring 2015 NCSC	58	72	66	72	89	66	-	54	477		477
	Enrollment	5,827	5,264	4,792	4,598	4,412	4,525		3,839	33,257	918	34,175
	% Participation	1.0%	1.4%	1.4%	1.6%	2.0%	1.5%		1.4%	1.4%		1.4%
S05	Spring 2015 NCSC	278	308	282	279	287	275	-	187	1,896		1,896
	Enrollment	22,702	22,799	22,468	22,236	22,401	22,407		20,604	155,617	193	155,810
	% Participation	1.2%	1.4%	1.3%	1.3%	1.3%	1.2%		0.9%	1.2%		1.2%
S06	Spring 2015 NCSC	946	961	1,020	1,054	1,156	1,378	1,476	-	7,991		7,991
	Enrollment	80,261	75,546	78,170	76,902	79,136	82,663	80,674		553,352	1,222	554,574
	% Participation	1.2%	1.3%	1.3%	1.4%	1.5%	1.7%	1.8%		1.4%		1.4%
S07	Spring 2015 NCSC	187	187	214	221	172	218	-	198	1,397		1,397
	Enrollment	13,290	13,443	13,494	13,263	13,440	13,705		13,016	93,651	-	93,651
	% Participation	1.4%	1.4%	1.6%	1.7%	1.3%	1.6%		1.5%	1.5%		1.5%
S08	Spring 2015 NCSC	116	132	124	138	122	112	-	91	835		835
	Enrollment	11,578	11,044	11,104	10,884	10,942	10,807		10,255	76,614	-	76,614
	% Participation	1.0%	1.2%	1.1%	1.3%	1.1%	1.0%		0.9%	1.1%		1.1%
S09	Spring 2015 NCSC	295	334	343	324	304	317	-	253	2,170		2,170
	Enrollment	25,807	25,562	25,286	24,883	25,145	25,193		22,536	174,412	-	174,412
	% Participation	1.1%	1.3%	1.4%	1.3%	1.2%	1.3%		1.1%	1.2%		1.2%
S10	Spring 2015 NCSC	133	144	127	149	134	159	-	146	992		992
	Enrollment	10,746	10,658	10,902	10,713	10,771	10,776		10,755	75,321	-	75,321
	% Participation	1.2%	1.4%	1.2%	1.4%	1.2%	1.5%		1.4%	1.3%		1.3%
S11	Spring 2015 NCSC	536	540	558	565	531	550	-	409	3,689		3,689
	Enrollment	57,394	55,741	55,214	55,429	55,949	57,025		49,966	386,718	-	386,718
	% Participation	0.9%	1.0%	1.0%	1.0%	0.9%	1.0%		0.8%	1.0%		1.0%
Total	Spring 2015 NCSC	4,175	4,311	4,387	4,496	4,413	4,687	1,476	2,804	30,749		30,749
	Enrollment	344,065	336,141	337,871	335,249	338,916	343,806	80,674	239,892	2,356,614	2,875	2,359,489
	% Participation	1.2%	1.3%	1.3%	1.3%	1.3%	1.4%	1.8%	1.2%	1.3%		1.3%

As can be seen in Table 15, the participation rate in the 2015 NCSC assessment was at approximately 1% of the public school enrollment, as expected. However, there were some slight variations across the states. For example, S01 showed a 1.6% participation rate overall with S11 showed a 1.0% participation rate.

[7] 2014-2015 Common Core of Data, http://nces.ed.gov.

[8] Enrollment for each grade was used. The total represented the sum of each of the grades shown. For some states, there were a number of students classified as ungraded (UG). A second total number was calculated that included the UG students.

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Appendix A – Results Comparing Characteristics of Examinees between States

Methodology: Discriminant analysis[9] used to evaluate which student characteristics were able to statistically differentiate between two states that showed statistically significant differences in performance (ELA or Math) on the 2015 NCSC assessment in a specific grade and for a primary disability (see Figure 11). The grade, primary disability, and states showing the statistically significant difference in performance are as follows:

Grade: 3
Primary Disability: Intellectual Disability
Higher Performing State: S01 (n = 192)
Lower Performing State: S11 (n = 189)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis, only14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.21 showing a statistically significant function ($\Lambda = .824$, $\chi^2 (13) = 72.195$, $p < .001$) with a canonical correlation squared of 0.18 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 66% of the students, suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.46 for S01 and -0.47 for S11.

The following six of 14 variables representing the student characteristics used in the analysis shown in Table A-1 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

[9] Discriminant analysis is an analysis that generates a set of weighted linear combinations of variables that best differentiates groups. We use the discriminant analysis in an exploratory way (see Huberty, 1994; Stevens, 2009) to determine the importance of student characteristic variables (as available in existing data) between students in states that show statistically higher versus lower performance on the 2015 NCSC assessment in either ELA or mathematics.

Because we will use the six variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Classroom Setting represents the degree of inclusion of the classroom environment. 1 = Special School; 2 = Regular school self-contained; 3 = Regular school primarily self-contained; 4 = regular school resource room; 5 = Regular school general education.
- Augmentative Communication System represents a system available in addition to or in place of oral speech with 1 = No and 2 – Yes.
- Uses Speech to Communicate represents whether or not student can communicate using speech. 1 = No; 2 = Yes.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-1. Variables that Differentiated between States (*N* = 381)

Variable	Λ	F^a	Sig.	*r*	b^*
Primary Language other than English	.995	1.978		.16	.22
Classroom Setting	.948	20.658	*	.51	.32
Expressive Communication	.982	6.930		-.29	.39
Augmentative Communication System	.968	12.651	*	-.40	-.28
Receptive Language	.993	2.652		-.18	.27
Uses Speech to Communicate	.968	12.698	*	.40	.01
Braille[b]	.				
Vision	.988	4.712		.24	.30
Hearing	.997	1.064		.12	.14
Motor Functioning	.947	21.132	*	-.51	-.60
Engagement	.990	3.765		-.22	.05
Health Issues / Attendance	1.000	.098		-.04	.08
Reading Skill	.948	20.649	*	-.51	-.21
Mathematics Skill	.928	29.381	*	-.60	-.61

Notes: [a] $df_1 = 1$ and $df_2 = 379$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[10]

As seen in Table A-1, the six variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were

[10] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Classroom Setting, Augmentative Communication System, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skills.

Figure A-1. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

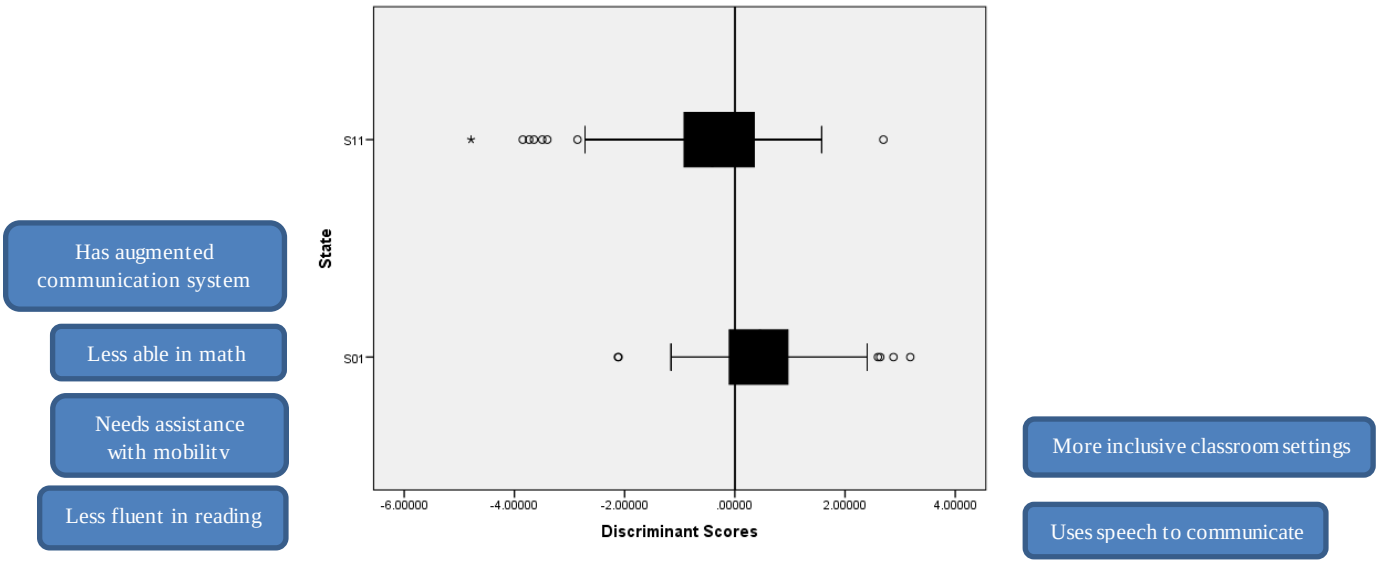


Figure A-1 shows the relationship of the six variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significant), these variables do not differentiate the two states well suggesting that these variables do not help explain the performance differences between S01 and S11. However, there was a small tendency of S01 (where students performed statistically significantly higher in mathematics and ELA) for students to be in more inclusive classroom settings and using speech to communicate. Additionally, there was a small tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to have an augmented communication system, be less able in math, need assistance with mobility, and be less fluent in reading.

Grade: 3
Primary Disability: Multiple Disabilities
Higher Performing State: S07 (n = 45)
Lower Performing State: S06 (n = 112)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.21 showing a statistically significant function ($\Lambda = .832$, $\chi^2 (14) = 27.228$, $p = .018$) with a canonical correlation squared of 0.17 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 71% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.28 for S06 and -0.70 for S07.

The following five of 14 variables representing the student characteristics used in the analysis shown in Table A-2 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the five variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Expressive Communication represents the extent to which language can be expressed. 1 = Uses symbolic language; 2 = Uses intentional communication; 3 = Student communicates primarily through cries, facial expressions, or change in muscle tone.
- Receptive Language represents the extent to which directions are followed and responses to sensory input. 1 = Independently follows 1-2 step directions; 2 = Requires additional cues to follow 1-2 step directions; 3 = Alerts to sensory input but requires physical assistance; 4 = Uncertain response to sensory stimuli.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-2. Variables that Differentiated between States (N = 157)

Variable	Λ	F^a	Sig.	r	b^*
Primary Language other than English	.996	.626		.14	.053
Classroom Setting	.999	.201		-.08	.373
Expressive Communication	.931	11.491	*	.61	.348
Augmentative Communication System	1.000	.054		-.04	-.115
Receptive Language	.923	12.840	*	.64	.428
Uses Speech to Communicate	.965	5.691		-.43	.337
Braille	.997	.400		.11	.255
Vision	.978	3.490		.33	-.173
Hearing	.975	3.982		.36	.221
Motor Functioning	.920	13.553	*	.66	.147
Engagement	.967	5.326		.41	-.332
Health Issues / Attendance	.946	8.791		.53	.490
Reading Skill	.929	11.761	*	.61	.148
Mathematics Skill	.926	12.378	*	.63	.504

Notes: [a] $df_1 = 1$ and $df_2 = 155$
* $p < .004$[11]

[11] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

As seen in Table A-2, the five variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Expressive Communication, Receptive Language, Motor Functioning, Reading Skill, and Mathematics Skill.

Figure A-2. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

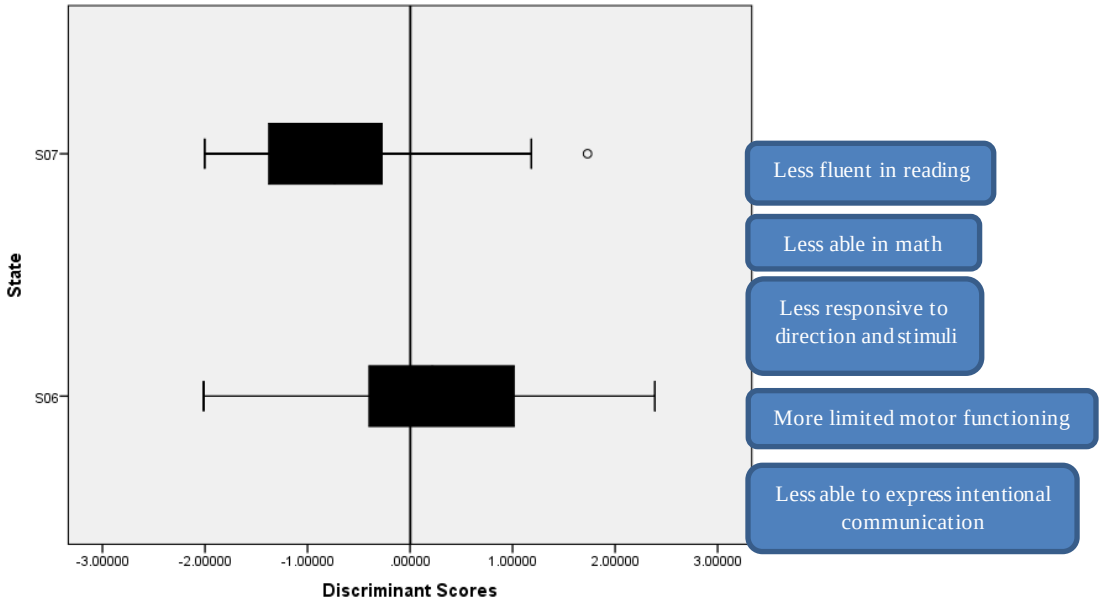


Figure A-2 shows the relationship of the five variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significant), these variables do not differentiate the two states well, suggesting that these variables do not helpi explain the performance differences between S06 and S07. However, there was a small tendency of S06 (where students performed statistically significantly lower in mathematics and ELA) for students to be less fluent in reading, less able in math, less responsive to direction and stimuli, less able to express intentional communication and have more limited motor functioning.

Grade: 3
Primary Disability: Autism
Higher Performing State: S09 (n = 65)
Lower Performing State: S06 (n = 251)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

The discriminant function was found not to account for the variables representing. An eigenvalue of 0.06 showing the function not to be statistically significant ($\Lambda = .943$, $\chi^2 (14) = 18.164$, $p = .20$) with a canonical correlation squared of 0.06 (suggesting the effect size was miniscule). As a result of this finding, no further exploration was undertaken to examine the relationship of the variables in differentiating between the two states.

Grade: 3
Primary Disability: Other Health Impairment
Higher Performing State: S01 (n = 59)
Lower Performing State: S11 (n = 22)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.41 showing a statistically significant function ($\Lambda = .711$, $\chi^2 (13) = 24.757$, $p = .025$) with a canonical correlation squared of 0.29 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 83% of the students suggesting a moderately accurate result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of -0.39 for S01 and 1.03 for S11.

The following two of 14 variables representing the student characteristics used in the analysis shown in Table A-3 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the two variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Receptive Language represents the extent to which directions are followed and responses to sensory input. 1 = Independently follows 1-2 step directions; 2 = Requires additional cues to follow 1-2 step directions; 3 = Alerts to sensory input but requires physical assistance; 4 = Uncertain response to sensory stimuli.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-3. Variables that Differentiated between States (N = 81)

Variable	Λ	F^a	Sig.	r	b^*
Primary Language other than English	.959	3.366		-.32	-.326
Classroom Setting	.993	.595		.14	.353
Expressive Communication	.932	5.777		.42	.591
Augmentative Communication System	.906	8.168		.50	.354
Receptive Language	.895	9.280	*	.54	.261
Uses Speech to Communicate	.931	5.871		-.43	.048
Braille[b]					-.104
Vision	.983	1.400		-.21	-.216
Hearing	.994	.448		-.12	-.139
Motor Functioning	.995	.389		.11	-.545
Engagement	.984	1.246		.20	-.049
Health Issues / Attendance	.995	.376		.11	-.217
Reading Skill	.957	3.563		.33	.668
Mathematics Skill	.844	14.645	*	.68	-.326

Notes: [a] $df_1 = 1$ and $df_2 = 79$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[12]

As seen in Table A-3, the two variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Receptive Language and Mathematics Skill.

[12] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-3. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

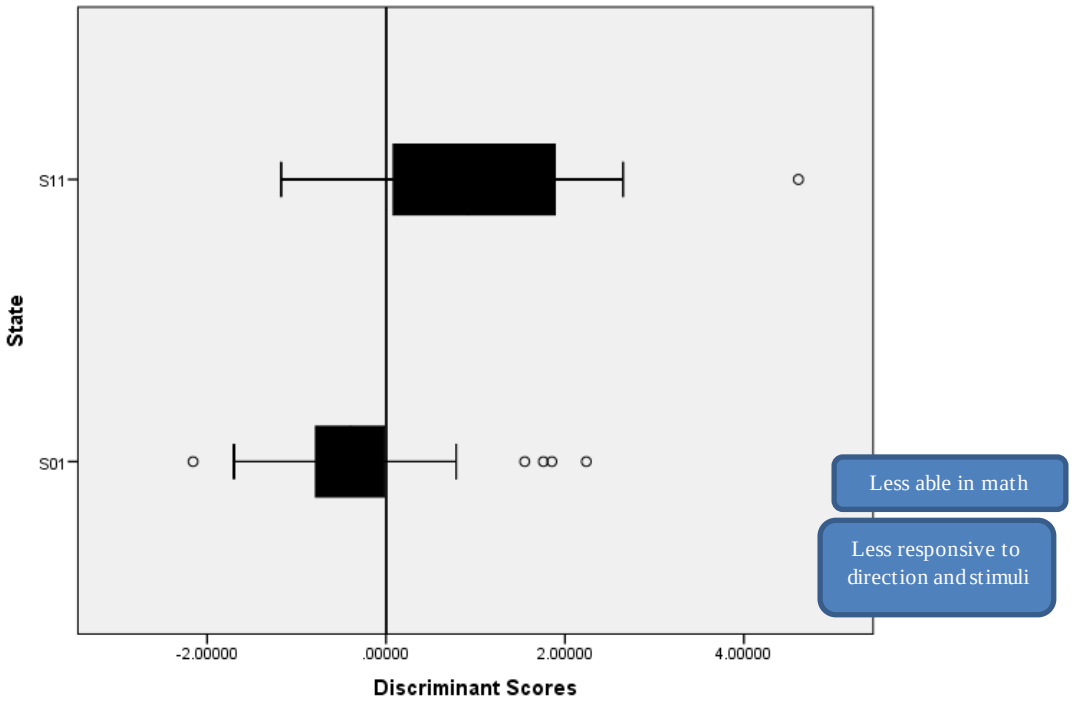


Figure A-3 shows the relationship of the two variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statisticallysignificant), these variables do not differentiate the two states well, suggesting that these variables donot help explain the performance differences between S01 and S11. However, there was a small tendency of S11 (where students performed statistically significantly lower in mathematics and ELA) for students to be less able in math and less responsive to direction and stimuli.

Grade: 4
Primary Disability: Intellectual Disability
Higher Performing State: S01 (n = 192)
Lower Performing State: S11 (n = 189)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.21 showing a statistically significant function ($\Lambda = .824$, χ^2 (13) 72.195, $p < .001$) with a canonical correlation squared of 0.18 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 66% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.46 for S01 and -0.47 for S11.

The following six of 14 variables representing the student characteristics used in the analysis shown in Table A-4 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the six variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Classroom Setting represents the degree of inclusion of the classroom environment. 1 = Special School; 2 = Regular school self-contained; 3 = Regular school primarily self-contained; 4 = regular school resource room; 5 = Regular school general education.
- Augmentative Communication System represents a system available in addition to or in place of oral speech with 1 = No and 2 – Yes.
- Uses Speech to Communicate represents whether or not student can communicate using speech. 1 = No; 2 = Yes.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-4. Variables that Differentiated between States (N = 381)

Variable	Λ	F[a]	Sig.	r	b*
Primary Language other than English	.995	1.978		.16	.215
Classroom Setting	.948	20.658	*	.51	.324
Expressive Communication	.982	6.930		-.29	.392
Augmentative Communication System	.968	12.651	*	-.40	-.279
Receptive Language	.993	2.652		-.18	.274
Uses Speech to Communicate	.968	12.698	*	.40	.011
Braille[b]	.				.304
Vision	.988	4.712		.24	.140
Hearing	.997	1.064		.12	-.595
Motor Functioning	.947	21.132	*	-.51	.050
Engagement	.990	3.765		-.22	.075
Health Issues / Attendance	1.000	.098		-.04	-.213
Reading Skill	.948	20.649	*	-.51	-.607
Mathematics Skill	.928	29.381	*	-.60	.215

Notes: [a] $df_1 = 1$ and $df_2 = 379$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[13]

As seen in Table A-4, the six variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were

[13] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Classroom Setting, Augmentative Communication System, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skill.

Figure A-4. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

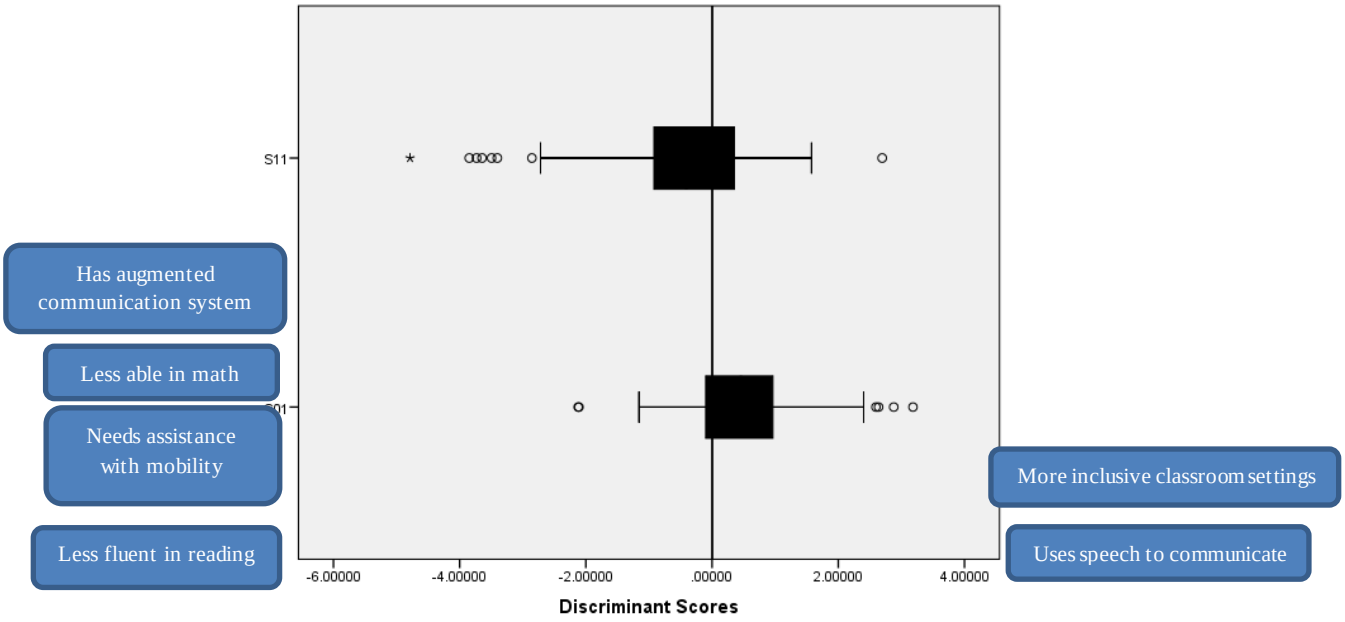


Figure A-4 shows the relationship of the six variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significant), these variables do not differentiate the two states well suggesting that these variables donot help explain the performance differences between S01 and S11. However, there was a small tendency of S01 (where students performed statistically significantly higher in mathematics and ELA) for students to be in more inclusive classroom settings and using speech to communicate. Additionally, there was a small tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to have an augmented communication system, be less able in math, need assistance with mobility, and be less fluent in reading.

Grade: 4
Primary Disability: Multiple Disabilities
Higher Performing State: S07 (n = 37)
Lower Performing State: S06 (n = 135)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.28 showing a statistically significant function ($\Lambda = .781$, χ^2 (13) 40.418, $p < .001$) with a canonical correlation squared of 0.22 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 71% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of -1.01 for S07 and 0.28 for S06.

The following eight of 14 variables representing the student characteristics used in the analysis shown in Table A-5 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the nine variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Classroom Setting represents the degree of inclusion of the classroom environment. 1 = Special School; 2 = Regular school self-contained; 3 = Regular school primarily self-contained; 4 = regular school resource room; 5 = Regular school general education.
- Expressive Communication represents the extent to which language can be expressed. 1 = Uses symbolic language; 2 = Uses intentional communication; 3 = Student communicates primarily through cries, facial expressions, or change in muscle tone.
- Receptive Language represents the extent to which directions are followed and responses to sensory input. 1 = Independently follows 1-2 step directions; 2 = Requires additional cues to follow 1-2 step directions; 3 = Alerts to sensory input but requires physical assistance; 4 = Uncertain response to sensory stimuli.
- Uses Speech to Communicate represents whether or not student can communicate using speech. 1 = No; 2 = Yes.
- Vision represents degree of vision function. 1 = Vision within normal limits; 2 = Corrected vision within normal limits; 3 = Low vision; 4 = No function use of vision.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Engagement represents degree of social interactions. 1 = Initiates and sustains social interactions; 2 = Responds with social interactions but does not initiate or sustain social interactions; 3 = Alert to others; 4 = Does not alert to others.

- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-5. Variables that Differentiated between States (*N* = 172)

Variable	Λ	F^a	Sig.	*r*	b^*
Primary Language other than English	.999	.164		.06	.018
Classroom Setting	.943	10.245	*	-.46	-.148
Expressive Communication	.866	26.327	*	.74	.285
Augmentative Communication System	.998	.373		.09	-.079
Receptive Language	.893	20.371	*	.65	-.074
Uses Speech to Communicate	.888	21.414	*	-.67	-.203
Braille[b]	.				
Vision	.949	9.168	*	.44	.227
Hearing	.982	3.056		.25	-.024
Motor Functioning	.873	24.681	*	.72	.313
Engagement	.927	13.323	*	.53	-.370
Health Issues / Attendance	.959	7.307		.39	.220
Reading Skill	.838	32.745	*	.83	.847
Mathematics Skill	.890	21.038	*	.66	-.411

Notes: [a] $df_1 = 1$ and $df_2 = 170$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[14]

As seen in Table A-5, the nine variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Classroom Setting, Expressive Communication, Receptive Language, Uses Speech to Communicate, Vision, Motor Functioning, Engagement, Reading Skill, and Mathematics Skill.

[14] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-5. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

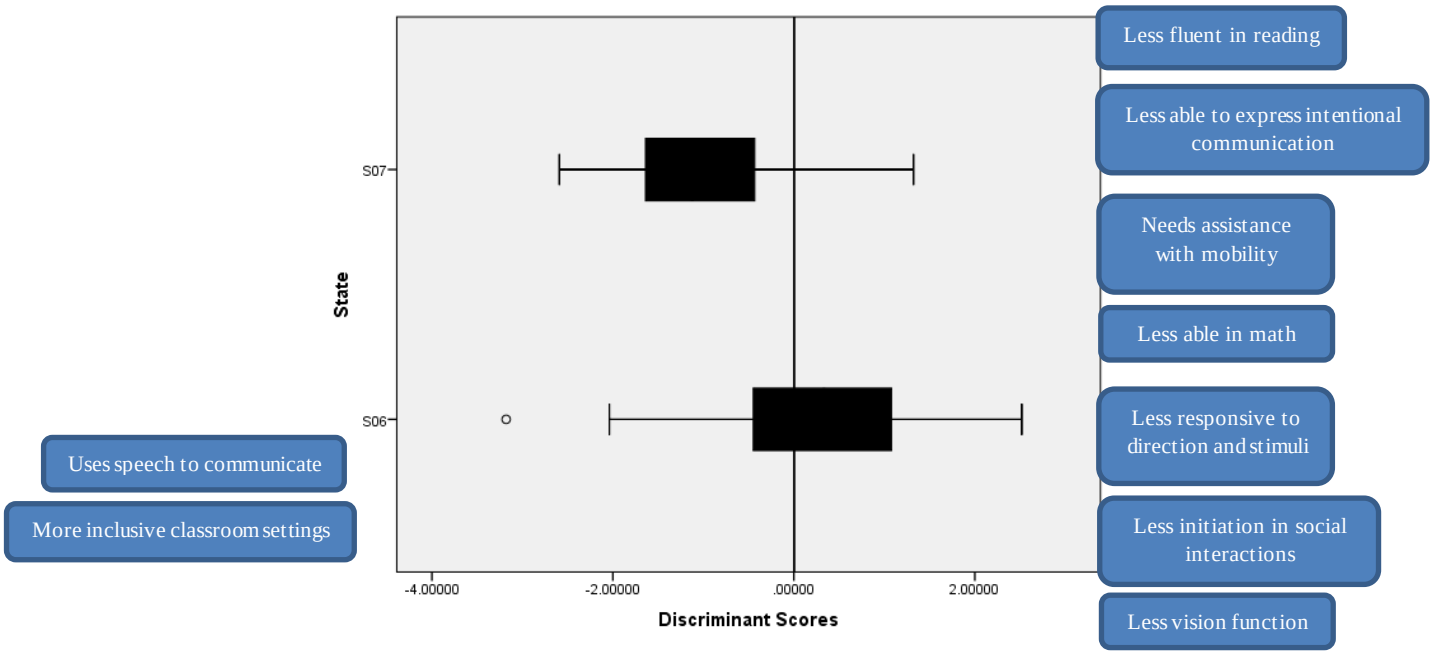


Figure A-5 shows the relationship of the nine variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significant), these variables do not differentiate the two states well suggesting that these variables do not help explain the performance differences between S07 and S06. However, there was a small tendency of S07 (where students performed statistically significantly higher in mathematics and ELA) for students to be in more inclusive classroom settings and using speech to communicate. Additionally, there was a small tendency for students in S06 (where students performed statistically significantly lower in mathematics and ELA) to be less fluent in reading, less able to express intentional communication, need assistance with mobility, less able in math, less responsive to direction and stimuli, take less initiative in social interaction, and have less vision function.

Grade: 4
Primary Disability: Autism
Higher Performing State: S02 (n = 290)
Lower Performing State: S06 (n = 226)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.06 showing a statistically significant function (Λ = .943, χ^2 (14) 29.682, p = .008) with a canonical correlation squared of 0.06 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 59% of the students suggesting a poor result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and poor level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.22 for S02 and -0.28 for S06.

None of the14 variables representing the student characteristics used in the analysis shown in Table A-6 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states.

Table A-6. Variables that Differentiated between States (N = 516)

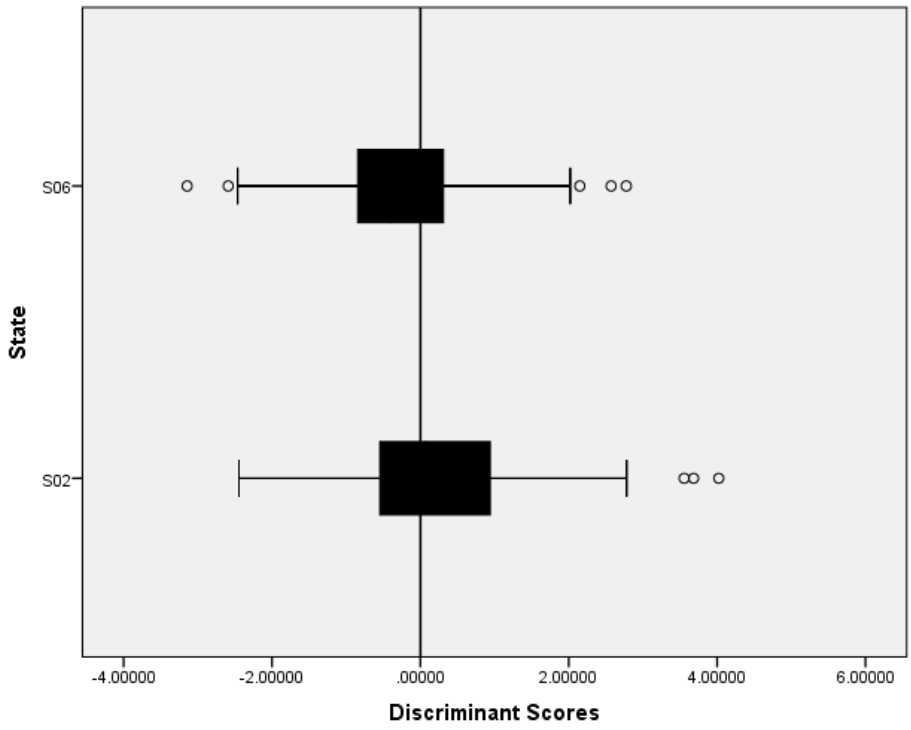
Variable	Λ	F^a	Sig.	r	b^*
Primary Language other than English	.986	7.205		.48	.512
Classroom Setting	1.000	.196		-.08	-.106
Expressive Communication	.997	1.366		.21	.324
Augmentative Communication System	.990	5.078		.41	.493
Receptive Language	.989	5.810		.43	.510
Uses Speech to Communicate	1.000	.160		.07	.581
Braille	1.000	.031		-.03	-.068
Vision	.999	.373		-.11	-.119
Hearing	1.000	.014		-.02	.043
Motor Functioning	.999	.594		.14	.096
Engagement	.992	3.912		.36	.314
Health Issues / Attendance	.996	2.029		-.26	-.311
Reading Skill	1.000	.073		.05	-.099
Mathematics Skill	1.000	.000		.00	-.453

Notes: [a] df_1 = 1 and df_2 = 514
* p < .004[15]

[15] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the

Figure A-6 shows the distribution of discriminant function values for each of the two states. As indicated by the small effect size (even though the overall analysis was statistically significant), there is not much difference in the distribution of the discriminant scores. And, because none of the 14 variables were statistically significant in their contribution to the difference between the two states, none of the student characteristics accounted for any difference in the mean performance in mathematics and ELA between these two states.

Figure A-6. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables



exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Grade: 5
Primary Disability: Intellectual Disability
Higher Performing State: S01 (n = 144)
Lower Performing State: S11 (n = 199)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.15 showing a statistically significant function ($\Lambda = .866$, χ^2 (13) 47.955, $p < .001$) with a canonical correlation squared of 0.13 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 66% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.46 for S01 and -0.33 for S11.

The following six of 14 variables representing the student characteristics used in the analysis shown in Table A-7 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the six variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Classroom Setting represents the degree of inclusion of the classroom environment. 1 = Special School; 2 = Regular school self-contained; 3 = Regular school primarily self-contained; 4 = regular school resource room; 5 = Regular school general education.
- Expressive Communication represents the extent to which language can be expressed. 1 = Uses symbolic language; 2 = Uses intentional communication; 3 = Student communicates primarily through cries, facial expressions, or change in muscle tone.
- Uses Speech to Communicate represents whether or not student can communicate using speech. 1 = No; 2 = Yes.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-7. Variables that Differentiated between States (*N* = 343)

Variable	Λ	F^a	Sig.	*r*	b^*
Primary Language other than English	.977	8.005		.39	.410
Classroom Setting	.971	10.208	*	.44	.395
Expressive Communication	.964	12.552	*	-.49	-.101
Augmentative Communication System	.988	4.174		-.28	-.077
Receptive Language	.984	5.631		-.33	.255
Uses Speech to Communicate	.955	15.952	*	.55	.345
Braille[b]	.				.286
Vision	1.000	.072		.04	-.041
Hearing	.998	.628		-.11	-.643
Motor Functioning	.938	22.434	*	-.65	.225
Engagement	.991	3.268		-.25	-.140
Health Issues / Attendance	.995	1.837		-.19	.033
Reading Skill	.975	8.681	*	-.41	-.205
Mathematics Skill	.967	11.723	*	-.47	.410

Notes: [a] $df_1 = 1$ and $df_2 = 341$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[16]

[16] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

As seen in Table A-7, the six variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Classroom Setting, Augmentative Communication System, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skill.

Figure A-7. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

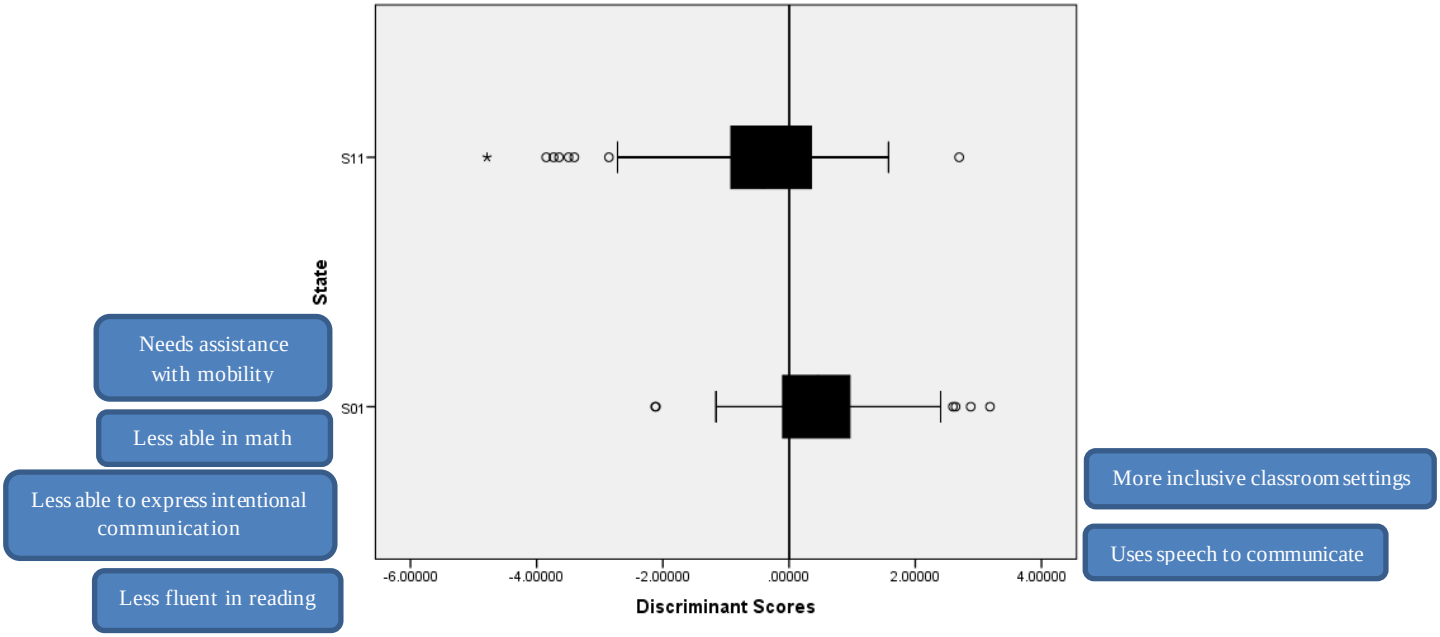


Figure A-7 shows the relationship of the six variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significant), these variables do not differentiate the two states well suggesting that these variables do not help explain the performance differences between S01 and S11. However, there was a small tendency of S01 (where students performed statistically significantly higher in mathematics and ELA) for students to be in more inclusive classroom settings and using speech to communicate. Additionally, there was a small tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to need assistance with mobility, be less able in math, be less able to express intentional communication, and be less fluent in reading.

Grade: 5
Primary Disability: Multiple Disabilities
Higher Performing State: S07 (n = 26)
Lower Performing State: S06 (n = 112)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

The one discriminant function was found not to be statistically significant based on an eigenvalue of 0.15 (Λ = .857, χ^2 (13) 19.942, p = .097) with a canonical correlation squared of 0.14 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 62% of the students suggesting a mediocre result. In light of the small effect size and mediocre classification rate, the possible reason for not achieving statistically significance is the small sample size used[17]. As a result of this finding, no further exploration was undertaken to examine the relationship of the variables in differentiating between the two states.

[17] According to Stevens (2009), the ratio of the total sample size to the number of variables should be at least 20. In this case it was 10 (i.e., 138/14).

Grade: 5
Primary Disability: Autism
Higher Performing State: S01 (n = 83)
Lower Performing State: S06 (n = 217)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

The one discriminant function was found not to be statistically significant based on an eigenvalue of 0.04 (Λ = .959, χ^2 (14) 12.196, p = .591) with a canonical correlation squared of 0.04 (suggesting the effect size was extremely small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 61% of the students suggesting a poor result. As a result of this finding, no further exploration was undertaken to examine the relationship of the variables in differentiating between the two states.

Grade: 6
Primary Disability: Intellectual Disability
Higher Performing State: S01 (n = 149)
Lower Performing State: S11 (n = 191)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.15 showing a statistically significant function ($\Lambda = .869$, χ^2 (14) 46.440, $p < .001$) with a canonical correlation squared of 0.13 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 63% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.44 for S01 and -0.34 for S11.

The following four of 14 variables representing the student characteristics used in the analysis shown in Table A-8 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the four variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Primary Language other than English represents whether the primary language is English or not. 1 = No; 2 = Yes.
- Classroom Setting represents the degree of inclusion of the classroom environment. 1 = Special School; 2 = Regular school self-contained; 3 = Regular school primarily self-contained; 4 = regular school resource room; 5 = Regular school general education.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-8. Variables that Differentiated between States (N = 340)

Variable	Λ	F^a	Sig.	r	b^*
Primary Language other than English	.952	17.081	*	.58	.552
Classroom Setting	.956	15.584	*	.55	.415
Expressive Communication	.988	4.234		-.29	.061
Augmentative Communication System	.986	4.965		-.31	-.218
Receptive Language	.996	1.453		-.17	.264
Uses Speech to Communicate	.989	3.895		.28	-.089
Braille	.998	.780		-.12	-.114
Vision	.999	.185		-.06	.164
Hearing	.998	.578		-.11	.007
Motor Functioning	.957	15.087	*	-.54	-.631
Engagement	.997	1.040		-.14	.162
Health Issues / Attendance	.993	2.399		-.22	-.159
Reading Skill	.989	3.879		-.28	.191
Mathematics Skill	.976	8.486	*	-.41	-.402

Notes: [a] $df_1 = 1$ and $df_2 = 338$
* $p < .004$[18]

As seen in Table A-8, the four variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Primary Language other than English, Classroom Setting, Motor Functioning, and Mathematics Skill.

[18] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-8. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

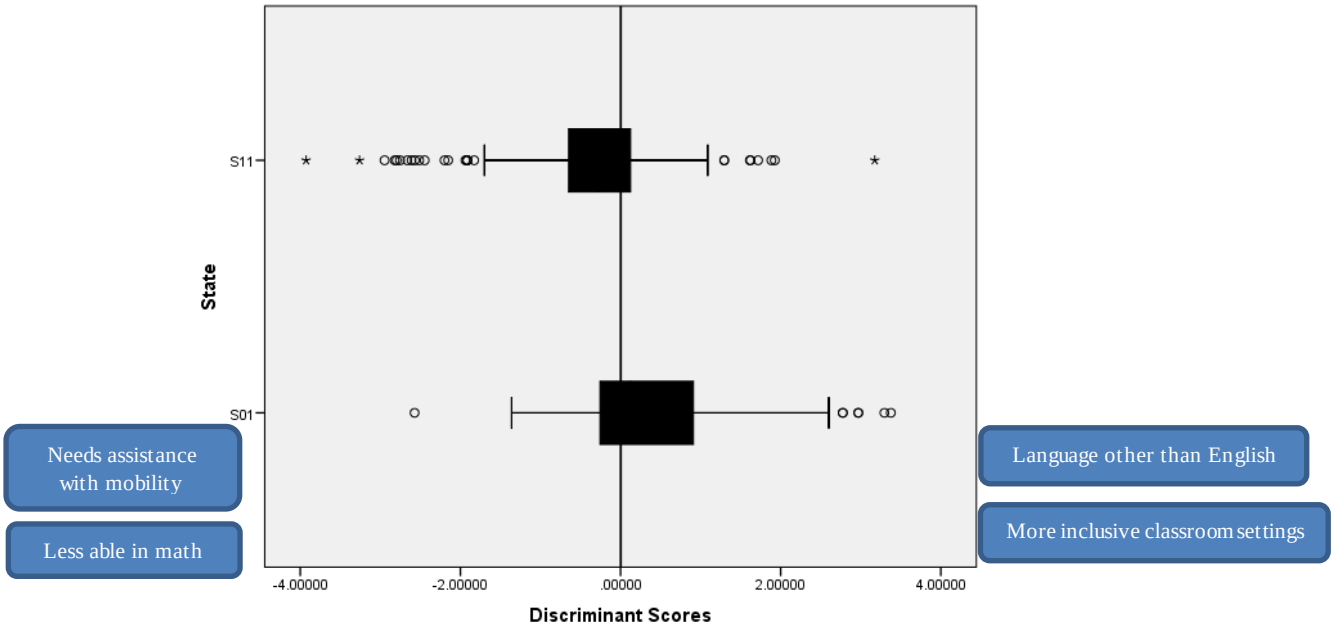


Figure A-8 shows the relationship of the four variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significant), these variables do not differentiate the two states well suggesting that these variables donot helpexplain the performance differences between S01 and S11. However, there was a small tendency of S01 (where students performed statistically significantly higher in mathematics and ELA) for students to be more likely to have a primary language other than English and be in more inclusive classroom settings. Additionally, there was a small tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to need assistance with mobility and be less able in math.

Grade: 6
Primary Disability: Multiple Disabilities
Higher Performing State: S07 (n = 27)
Lower Performing State: S06 (n = 92)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.26 showing a statistically significant function (Λ = .793, χ^2 (13) 25.577, p = .019) with a canonical correlation squared of 0.21 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 78% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of -0.93 for S07 and 0.27 for S06.

The following four of 14 variables representing the student characteristics used in the analysis shown in Table A-7 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the four variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Expressive Communication represents the extent to which language can be expressed. 1 = Uses symbolic language; 2 = Uses intentional communication; 3 = Student communicates primarily through cries, facial expressions, or change in muscle tone.
- Receptive Language represents the extent to which directions are followed and responses to sensory input. 1 = Independently follows 1-2 step directions; 2 = Requires additional cues to follow 1-2 step directions; 3 = Alerts to sensory input but requires physical assistance; 4 = Uncertain response to sensory stimuli.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-9. Variables that Differentiated between States (*N* = 119)

Variable	Λ	F^a	Sig.	*r*	b^*
Primary Language other than English	.996	.438		.12	.124
Classroom Setting	.963	4.471		-.38	-.306
Expressive Communication	.905	12.299	*	.64	.416
Augmentative Communication System	.992	.951		-.18	-.332
Receptive Language	.895	13.779	*	.67	.427
Uses Speech to Communicate	.971	3.540		-.34	.157
Braille[b]	.				
Vision	.995	.569		.14	-.096
Hearing	1.000	.001		.00	-.471
Motor Functioning	.882	15.653	*	.72	.618
Engagement	.974	3.076		.32	-.233
Health Issues / Attendance	.983	1.982		.26	-.134
Reading Skill	.930	8.808		.54	-.249
Mathematics Skill	.919	10.302	*	.58	.208

Notes: [a] $df_1 = 1$ and $df_2 = 117$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[19]

As seen in Table A-9, the four variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Classroom Setting, Augmentative Communication System, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skill.

[19] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-9. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

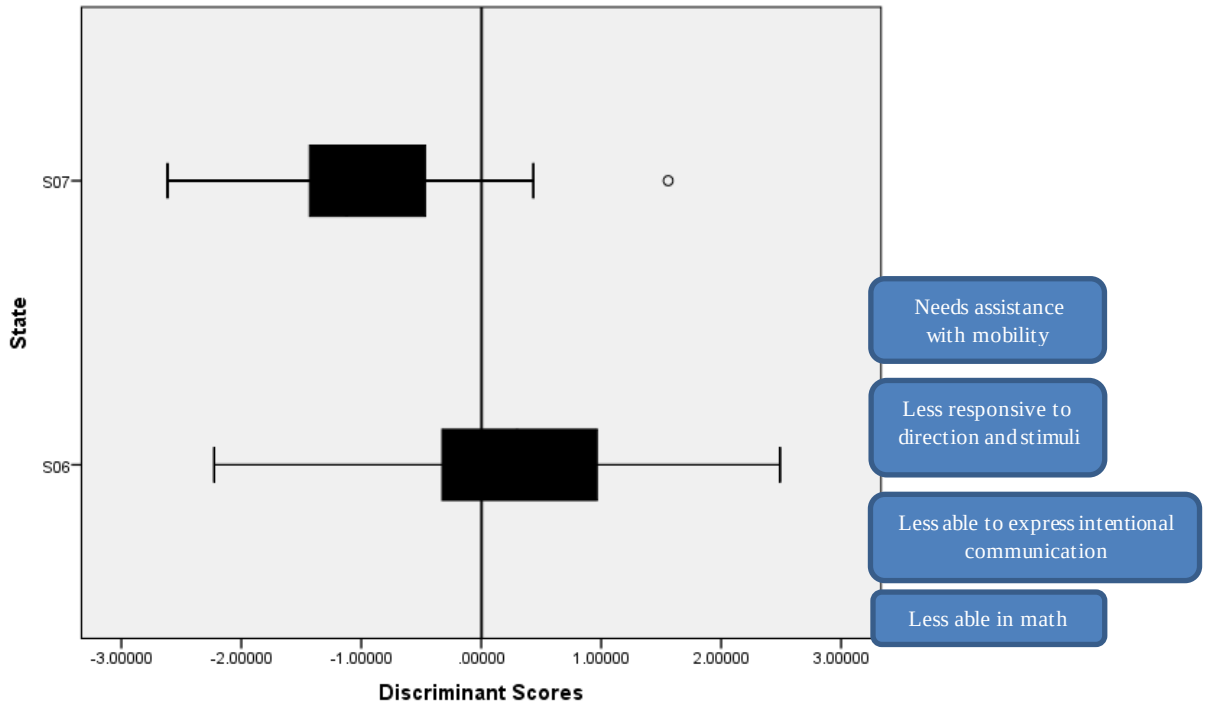


Figure A-9 shows the relationship of the four variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statisticallysignificant), these variables do not differentiate the two states well suggesting that these variables donot help explain the performance differences between S07 and S06. However, there was a small tendency for students in S06 (where students performed statistically significantly lower in mathematics and ELA) to need assistance with mobility, be less responsive to direction and stimuli, be less able to express intentional communication, and be less able in math.

Grade: 6
Primary Disability: Autism
Higher Performing State: S06 (n = 157)
Lower Performing State: S11 (n = 33)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

The one discriminant function was found not to be statistically significant based on an eigenvalue of 0.09 (Λ = .920, χ^2 (14) 15.099, p = .371) with a canonical correlation squared of 0.08 (suggesting the effect size was extremely small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 67% of the students suggesting a mediocre result. As a result of this finding, no further exploration was undertaken to examine the relationship of the variables in differentiating between the two states.

Grade: 7
Primary Disability: Intellectual Disability
Higher Performing State: S01 (n = 176)
Lower Performing State: S11 (n = 167)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.24 showing a statistically significant function ($\Lambda = .805$, χ^2 (14) 72.631, $p < .001$) with a canonical correlation squared of 0.20 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 65% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.48 for S01 and -0.50 for S11.

The following six of 14 variables representing the student characteristics used in the analysis shown in Table A-10 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the six variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Primary Language other than English represents whether the primary language is English or not. 1 = No; 2 = Yes.
- Classroom Setting represents the degree of inclusion of the classroom environment. 1 = Special School; 2 = Regular school self-contained; 3 = Regular school primarily self-contained; 4 = regular school resource room; 5 = Regular school general education.
- Expressive Communication represents the extent to which language can be expressed. 1 = Uses symbolic language; 2 = Uses intentional communication; 3 = Student communicates primarily through cries, facial expressions, or change in muscle tone.
- Uses Speech to Communicate represents whether or not student can communicate using speech. 1 = No; 2 = Yes.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-10. Variables that Differentiated between States (*N* = 343)

Variable	Λ	F^a	Sig.	*r*	b^*
Primary Language other than English	.961	13.782	*	.41	.486
Classroom Setting	.956	15.700	*	.44	.453
Expressive Communication	.963	12.937	*	-.40	.060
Augmentative Communication System	.992	2.902		-.19	.044
Receptive Language	.993	2.232		-.16	.272
Uses Speech to Communicate	.900	37.691	*	.68	.710
Braille	.994	1.908		.15	.113
Vision	.999	.439		-.07	.116
Hearing	.992	2.585		-.18	-.119
Motor Functioning	.960	14.135	*	-.41	-.263
Engagement	.989	3.924		-.22	.112
Health Issues / Attendance	.990	3.323		-.20	-.132
Reading Skill	.985	5.197		-.25	.195
Mathematics Skill	.961	13.862	*	-.41	-.270

Notes: [a] $df_1 = 1$ and $df_2 = 341$
* $p < .004$[20]

As seen in Table A-10, the six variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Primary Language other than English, Classroom Setting, Expressive Communication, Uses Speech to Communication, Motor Functioning, and Mathematics Skill.

[20] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-10. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

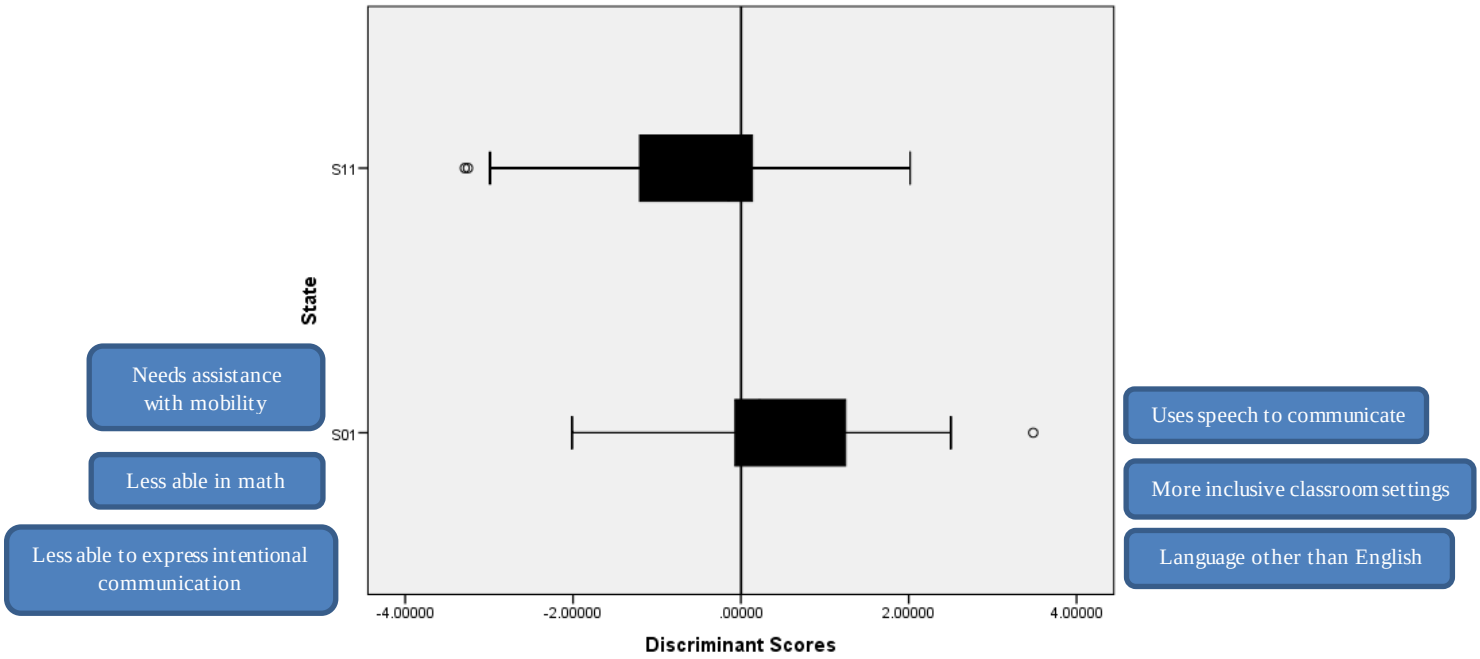


Figure A-10 shows the relationship of the six variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statisticallysignificant), these variables do not differentiate the two states well suggesting that these variables donot help explain the performance differences between S01 and S11. However, there was a small tendency of S01 (where students performed statistically significantly higher in mathematics and ELA) for students to use speech to communicate, be in more inclusive classroom settings, and be more likely have a primary language other than English. Additionally, there was a small tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to need assistance with mobility, be less able in math, and less able to express intentional communication.

Grade: 7
Primary Disability: Multiple Disabilities
Higher Performing State: S07 (n = 38)
Lower Performing State: S06 (n = 84)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.34 showing a statistically significant function (Λ = .748, χ^2 (13) 32.960, p = .002) with a canonical correlation squared of 0.25 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 69% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and a mediocre level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.86 for S07 and -0.39 for S06.

None of the14 variables representing the student characteristics used in the analysis shown in Table A-11 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states.

Table A-11. Variables that Differentiated between States (N = 122)

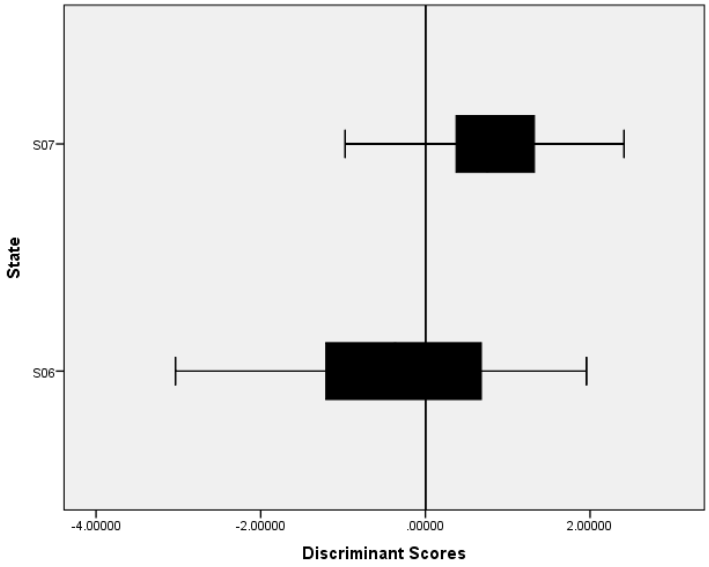
Variable	Λ	F[a]	Sig.	r	b*
Primary Language other than English	.965	4.330		-.33	-.444
Classroom Setting	.999	.095		.05	-.162
Expressive Communication	.960	5.045		-.35	.004
Augmentative Communication System	.999	.172		.07	.403
Receptive Language	.964	4.441		-.33	.030
Uses Speech to Communicate	.954	5.815		.38	.418
Braille[b]	.				.635
Vision	.967	4.037		.32	.059
Hearing	.999	.070		-.04	-.242
Motor Functioning	.964	4.517		-.33	.546
Engagement	.998	.283		-.08	-.261
Health Issues / Attendance	.969	3.780		-.31	-.045
Reading Skill	.950	6.370		-.40	-.866
Mathematics Skill	.945	6.928		-.41	-.444

Notes: [a] df_1 = 1 and df_2 = 120; [b] no students used Braille and was not included in the analysis.
* p < .004[21]

[21] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the

Figure A-11 shows the distribution of discriminant function values for each of the two states. As indicated by the small effect size (even though the overall analysis was statistically), there is not much difference in the distribution of the discriminant scores. And, because none of the 14 variables were statistically significant in their contribution to the difference between the two states, none of the student characteristics accounted for any difference in the mean performance in mathematics and ELA between these two states.

Figure A-11. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables



exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Grade: 7
Primary Disability: Autism
Higher Performing State: S04 (n = 26)
Lower Performing State: S08 (n = 14)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

The one discriminant function was found not to be statistically significant based on an eigenvalue of 0.41 (Λ = .707, χ^2 (13) 10.922, p = .617) with a canonical correlation squared of 0.29 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 73% of the students suggesting a mediocre result. As a result of this finding, no further exploration was undertaken to examine the relationship of the variables in differentiating between the two states. In light of the small effect size and mediocre classification rate, the possible reason for not achieving statistically significance is the small sample size used[22].

[22] According to Stevens (2009), the ratio of the total sample size to the number of variables should be at least 20. In this case it was 3 (i.e., 40/14).

Grade: 8
Primary Disability: Intellectual Disability
Higher Performing State: S01 (n = 156)
Lower Performing State: S11 (n = 154)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.12 showing a statistically significant function (Λ = .893, χ^2 (13) 34.191, p = .001) with a canonical correlation squared of 0.11 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 63% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of -0.34 for S01 and 0.35 for S11.

The following three of 14 variables representing the student characteristics used in the analysis shown in Table A-12 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the three variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Augmentative Communication System represents a system available in addition to or in place of oral speech with 1 = No and 2 = Yes.
- Attendance represents extent to which student attends school. 1 = Attends at least 90%; 2 = Attends approximately 75%; 3 = Attends approximately 50%; 4 = Receives homebound instruction due to health issues; 5 = Highly irregular or homebound due to issues other than health.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-12. Variables that Differentiated between States (N = 310)

Variable	Λ	F[a]	Sig.	r	b*
Primary Language other than English	.984	4.892		-.36	-.342
Classroom Setting	.980	6.355		-.42	-.367
Expressive Communication	.978	6.890		.43	.026
Augmentative Communication System	.968	10.268	*	.53	.387
Receptive Language	.981	6.035		.40	-.062
Uses Speech to Communicate	.974	8.070		-.47	-.077
Braille[b]	.				
Vision	1.000	.005		.01	-.051
Hearing	.992	2.614		.27	.258
Motor Functioning	.974	8.275		.47	.198
Engagement	.984	5.070		.37	-.043
Health Issues / Attendance	.973	8.693	*	.49	.414
Reading Skill	.978	6.809		.43	-.125
Mathematics Skill	.966	10.697	*	.54	.381

Notes: [a] $df_1 = 1$ and $df_2 = 308$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[23]

As seen in Table A-12, the three variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Augmentative Communication System, Health Issues/Attendance, and Mathematics Skill.

[23] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-12. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

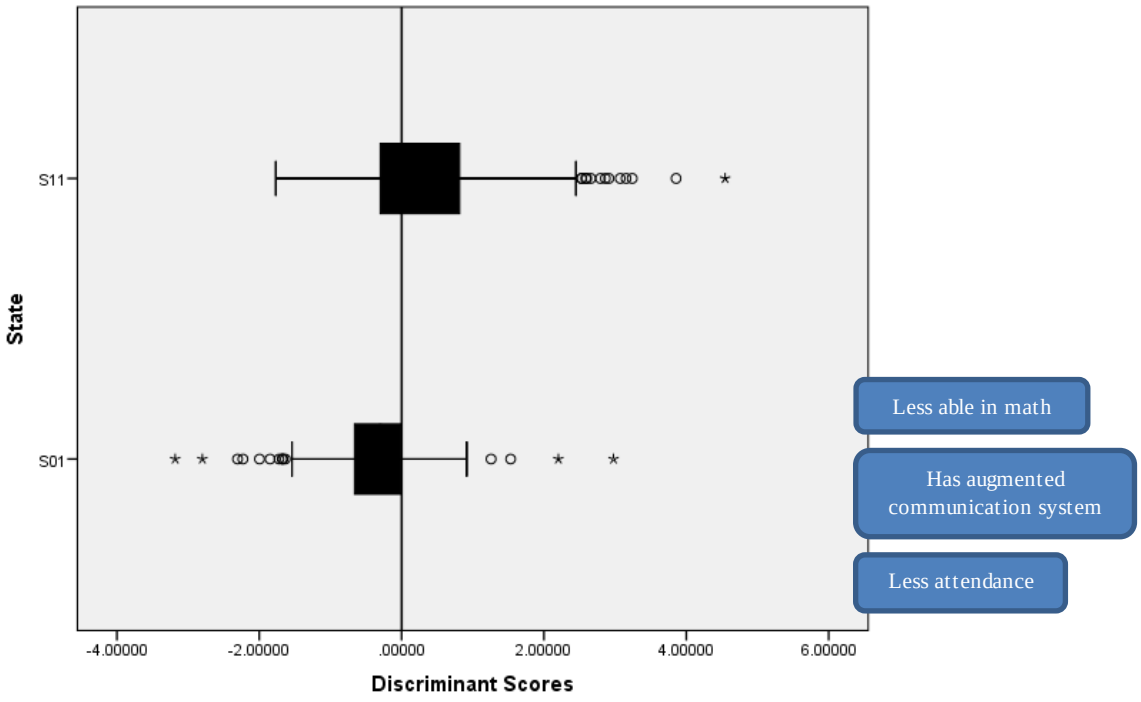


Figure A-12 shows the relationship of the three variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significante), these variables do not differentiate the two states well suggesting that these variables donot help explain the performance differences between S01 and S11. However, there was a small tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to be less able in math, have an augmented communication system, and be less likely to attend.

Grade: 8
Primary Disability: Multiple Disabilities
Higher Performing State: S07 (n = 31)
Lower Performing State: S06 (n = 104)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.22 showing a statistically significant function (Λ = .820, χ^2 (13) 25.174, p = .022) with a canonical correlation squared of 0.18 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 72% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and a mediocre level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.85 for S07 and -0.25 for S06.

None of the14 variables representing the student characteristics used in the analysis shown in Table A-11 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states.

Table A-13. Variables that Differentiated between States (N = 135)

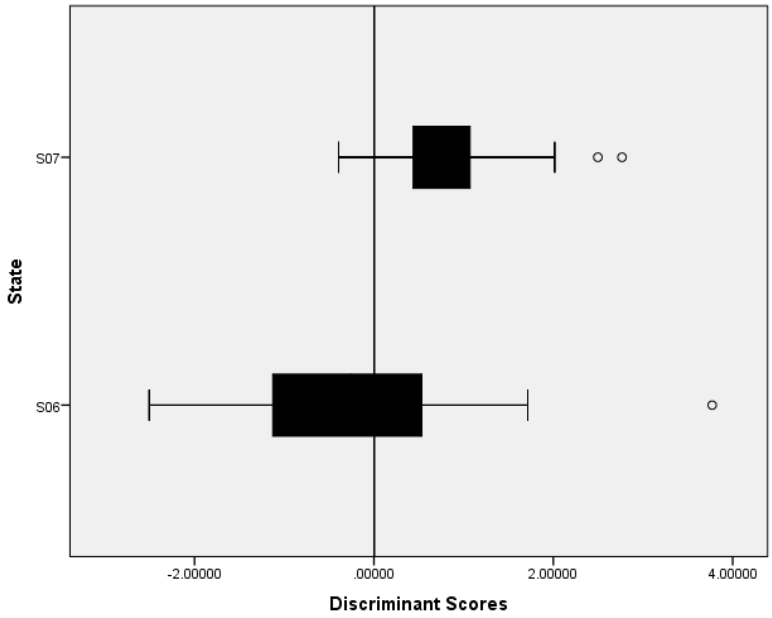
Variable	Λ	F[a]	Sig.	r	b*
Primary Language other than English	.999	.124		.07	.108
Classroom Setting	.984	2.156		.27	.122
Expressive Communication	.973	3.709		-.36	-.069
Augmentative Communication System	.966	4.671		.40	.711
Receptive Language	.986	1.934		-.26	.497
Uses Speech to Communicate	.964	4.939		.41	.679
Braille[b]	.				-.076
Vision	.975	3.448		-.34	-.299
Hearing	.983	2.288		-.28	-.488
Motor Functioning	.942	8.123		-.53	.144
Engagement	.987	1.816		-.25	.081
Health Issues / Attendance	.995	.692		-.15	-.851
Reading Skill	.956	6.160		-.46	.695
Mathematics Skill	.980	2.648		-.30	.108

Notes: [a] df_1 = 1 and df_2 = 133; [b] no students used Braille and was not included in the analysis.
* p < .004[24]

[24] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the

Figure A-13 shows the distribution of discriminant function values for each of the two states. As indicated by the small effect size (even though the overall analysis was statistically significant), there is not much difference in the distribution of the discriminant scores. And, because none of the 14 variables were statistically significant in their contribution to the difference between the two states, none of the student characteristics accounted for any difference in the mean performance in mathematics and ELA between these two states.

Figure A-31. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables



exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Grade: 8
Primary Disability: Other Health Impairment
Higher Performing State: S01 (n = 41)
Lower Performing State: S11 (n = 12)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 1.259 showing a statistically significant function (Λ = .443, χ^2 (13) 36.266, p = .001) with a canonical correlation squared of 0.56 (suggesting the effect size was moderate). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 89% of the students suggesting a substantial result. These variables showed a statistically significant relationship in differentiating between the two states, and because of the moderate effect size and substantial level of classification accuracy, these variables account for the differences in performance between the two states. The variables produced a mean discriminant function of -0.60 for S01 and 2.04 for S11.

The following three of 14 variables representing the student characteristics used in the analysis shown in Table A-14 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the three variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-14. Variables that Differentiated between States (N = 310)

Variable	Λ	F[a]	Sig.	r	b*
Primary Language other than English	.987	.690		.10	.234
Classroom Setting	.994	.296		.07	.236
Expressive Communication	.869	7.691		.35	-.112
Augmentative Communication System	.934	3.627		.24	-.088
Receptive Language	.905	5.351		.29	-.067
Uses Speech to Communicate	.917	4.616		-.27	.523
Braille[b]	.				
Vision	.990	.503		-.09	-.212
Hearing	.934	3.587		.236	.579
Motor Functioning	.721	19.726	*	.55	.589
Engagement	.851	8.906		.37	-.061
Health Issues / Attendance	.964	1.913		.17	.131
Reading Skill	.828	10.595	*	.41	.045
Mathematics Skill	.699	21.918	*	.58	1.162

Notes: [a] $df_1 = 1$ and $df_2 = 308$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[25]

As seen in Table A-14, the three variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Motor Functioning, Reading Skill, and Mathematics Skill.

[25] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-14. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

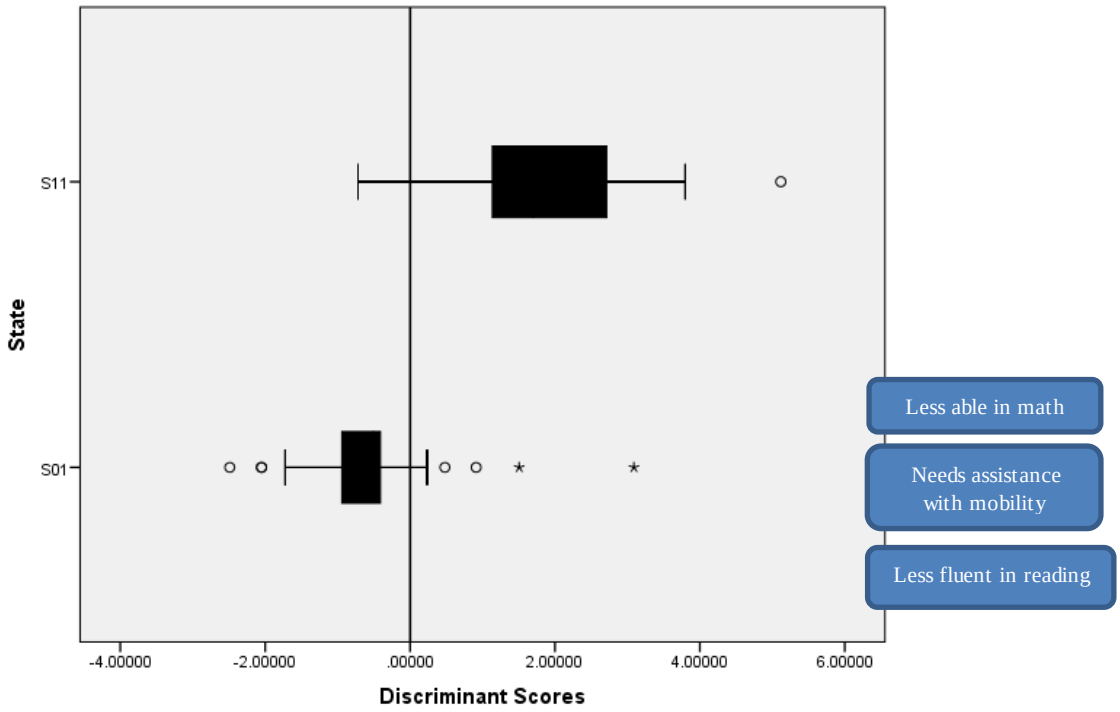


Figure A-12 shows the relationship of the three variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the moderate effect size and statistical significance, these variables differentiate the two states moderately well. There was a moderate tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to be less able in math, need assistance with mobility, and be less fluent in reading.

Grade: 11
Primary Disability: Intellectual Disability
Higher Performing State: S01 (n = 170)
Lower Performing State: S11 (n = 163)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.18 showing a statistically significant function ($\Lambda = .847$, χ^2 (14) 53.876, $p < .001$) with a canonical correlation squared of 0.15 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 64% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of 0.42 for S01 and -0.43 for S11.

The following three of 14 variables representing the student characteristics used in the analysis shown in Table A-15 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the three variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Classroom Setting represents the degree of inclusion of the classroom environment. 1 = Special School; 2 = Regular school self-contained; 3 = Regular school primarily self-contained; 4 = regular school resource room; 5 = Regular school general education.
- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-15. Variables that Differentiated between States (N = 333)

Variable	Λ	F^a	Sig.	r	b^*
Primary Language other than English	.988	3.932		.26	.408
Classroom Setting	.961	13.392	*	.47	.333
Expressive Communication	.993	2.296		-.20	.649
Augmentative Communication System	.982	6.136		-.32	-.293
Receptive Language	.981	6.355		-.33	.193
Uses Speech to Communicate	.985	5.045		.29	.196
Braille	.997	.959		.13	.200
Vision	.997	.940		-.13	-.077
Hearing	.996	1.259		-.15	.033
Motor Functioning	.976	8.063		-.37	-.269
Engagement	.978	7.530		-.36	-.176
Health Issues / Attendance	.996	1.198		-.14	-.019
Reading Skill	.935	23.094	*	-.62	-.495
Mathematics Skill	.936	22.536	*	-.61	-.450

Notes: [a] $df_1 = 1$ and $df_2 = 331$
* $p < .004$[26]

As seen in Table A-15, the three variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Classroom Setting, Reading Skill, and Mathematics Skill.

[26] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-15. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

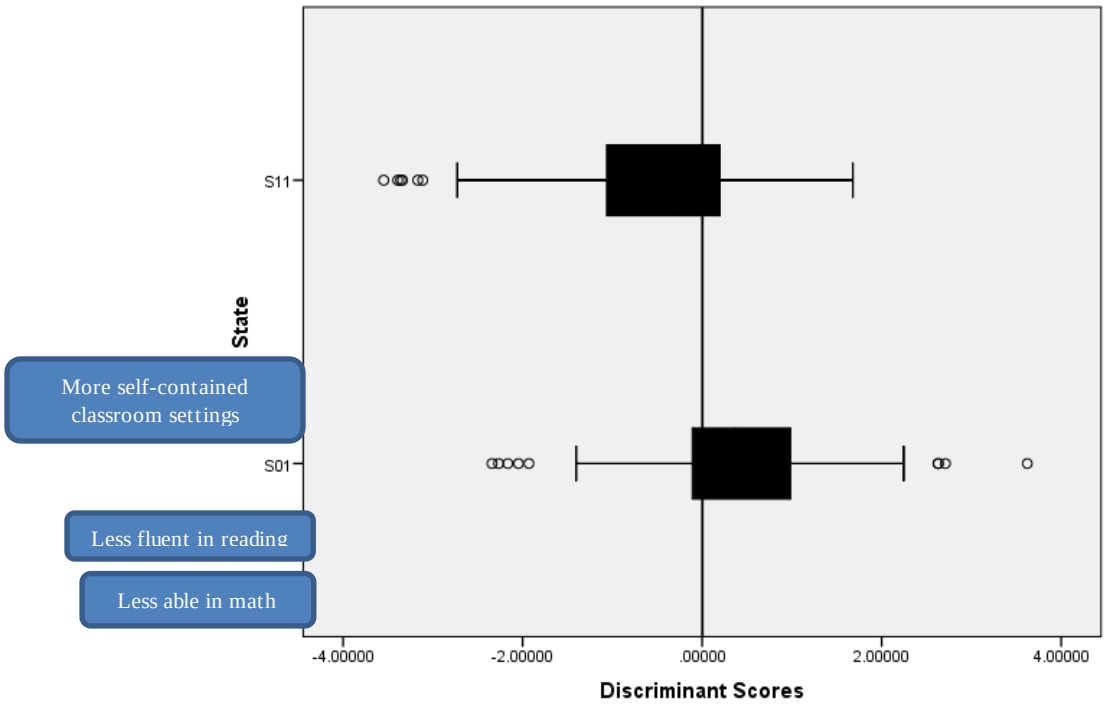


Figure A-15 shows the relationship of the three variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statisticallysignificant), these variables do not differentiate the two states well, suggesting that these variables donot help explain the performance differences between S01 and S11. However, there was a small tendency for students in S11 (where students performed statistically significantly lower in mathematics and ELA) to be in more self-contained classroom settings, less fluent in reading, and less able in math.

Grade: 11
Primary Disability: Multiple Disabilities
Higher Performing State: S07 (n = 47)
Lower Performing State: S02 (n = 101)

The characteristics of the students in each state were based on information collected using the *Learner Characteristics Inventory* (LCI) (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006) and provided in the data set used in this study. There were 17 variables representing these student characteristics including one that represents the primary disability and two representing the type of primary language. In this analysis 14 were used because the primary disability variable was used to segment the data to make these comparisons and the other two representing the type of primary language and other primary disability did not have sufficient information.

One discriminant function was found to account for the variables representing an eigenvalue of 0.39 showing a statistically significant function ($\Lambda = .719$, χ^2 (13) 46.005, $p < .001$) with a canonical correlation squared of 0.28 (suggesting the effect size was small). Additionally, when these variables were used to classify students in one state or the other, they were able to correctly classify 76% of the students suggesting a mediocre result. While the variables showed a statistically significant relationship in differentiating between the two states, because of the small effect size and moderate level of classification accuracy, these variables alone were insufficient to adequately account for the differences in performance between the two states. The variables produced a mean discriminant function of -0.91 for S07 and 0.42 for S02.

The following six of 14 variables representing the student characteristics used in the analysis shown in Table A-16 were found to be statistically significant in differentiating between the higher and lower performing state. The correlation coefficients (r) shown indicate how well the variable correlate with the discriminant function that differentiates the two states. It is important to understand the nature of the scale for each variable.

Because we will use the six variables that are statistically significant in characterizing the factor that differentiates the two states, we will describe the scale of each

- Expressive Communication represents the extent to which language can be expressed. 1 = Uses symbolic language; 2 = Uses intentional communication; 3 = Student communicates primarily through cries, facial expressions, or change in muscle tone.
- Receptive Language represents the extent to which directions are followed and responses to sensory input. 1 = Independently follows 1-2 step directions; 2 = Requires additional cues to follow 1-2 step directions; 3 = Alerts to sensory input but requires physical assistance; 4 = Uncertain response to sensory stimuli.
- Uses Speech to Communicate represents whether or not student can communicate using speech. 1 = No; 2 = Yes.
- Motor Functioning represents degree of motor adaptation needed. 1 = No significant motor dysfunction that requires adaptations; 2= requires adaptations to support motor functioning; 3 = Uses wheelchair or positioning equipment or assistance; 4 = needs personal assistance for most/all motor activities.
- Reading Skill represents degree of reading skill of the student. 1 = Reads fluently with critical understanding; 2 = Reads fluently with basic understanding; 3 = Reads basic words and simple sentences; 4 = Aware of text or Braille and follows directionality; 5 = No observable awareness of print or Braille.
- Mathematics Skill represents degree of mathematics skills of the student. 1 = Applies computational procedures; 2 = Does computational procedures with or without a calculator; 3 = Counts with correspondence; 4 = Counts by rote to 5; 5 = No observable awareness or use of numbers.

Table A-16. Variables that Differentiated between States (N = 148)

Variable	Λ	F[a]	Sig.	r	b*
Primary Language other than English	.991	1.379		.16	.239
Classroom Setting	.952	7.293		-.36	-.391
Expressive Communication	.892	17.593	*	.56	.216
Augmentative Communication System	.995	.766		.12	-.138
Receptive Language	.938	9.698	*	.41	-.142
Uses Speech to Communicate	.906	15.064	*	-.51	-.279
Braille[b]	.				
Vision	.959	6.310		.33	.128
Hearing	.963	5.560		.31	.201
Motor Functioning	.840	27.821	*	.70	.407
Engagement	.952	7.340		.36	-.648
Health Issues / Attendance	.954	6.961		.35	.367
Reading Skill	.854	24.894	*	.66	.739
Mathematics Skill	.909	14.699	*	.51	-.275

Notes: [a] $df_1 = 1$ and $df_2 = 146$; [b] no students used Braille and was not included in the analysis.
* $p < .004$[27]

As seen in Table A-16, the six variables that are statistically important in differentiating the two states (based on their statistical significance and magnitude of the correlation coefficient to the discriminant function) were Expressive Communication, Receptive Language, Uses Speech to Communicate, Motor Functioning, Reading Skill, and Mathematics Skill.

[27] The level of significance used was corrected to maintain the type I error rate for the analysis at 0.05 by using a Bonferroni correction represented by .05/14 variables involved. This is a conservative correction, but due to the exploratory nature of this analysis, we wanted to be sure to include variables that have a high chance of contributing to the differentiation.

Figure A-16. Distribution of Discriminant Scores by State and Location on the Discriminant Score Scale for each of the Statistically Significant Variables

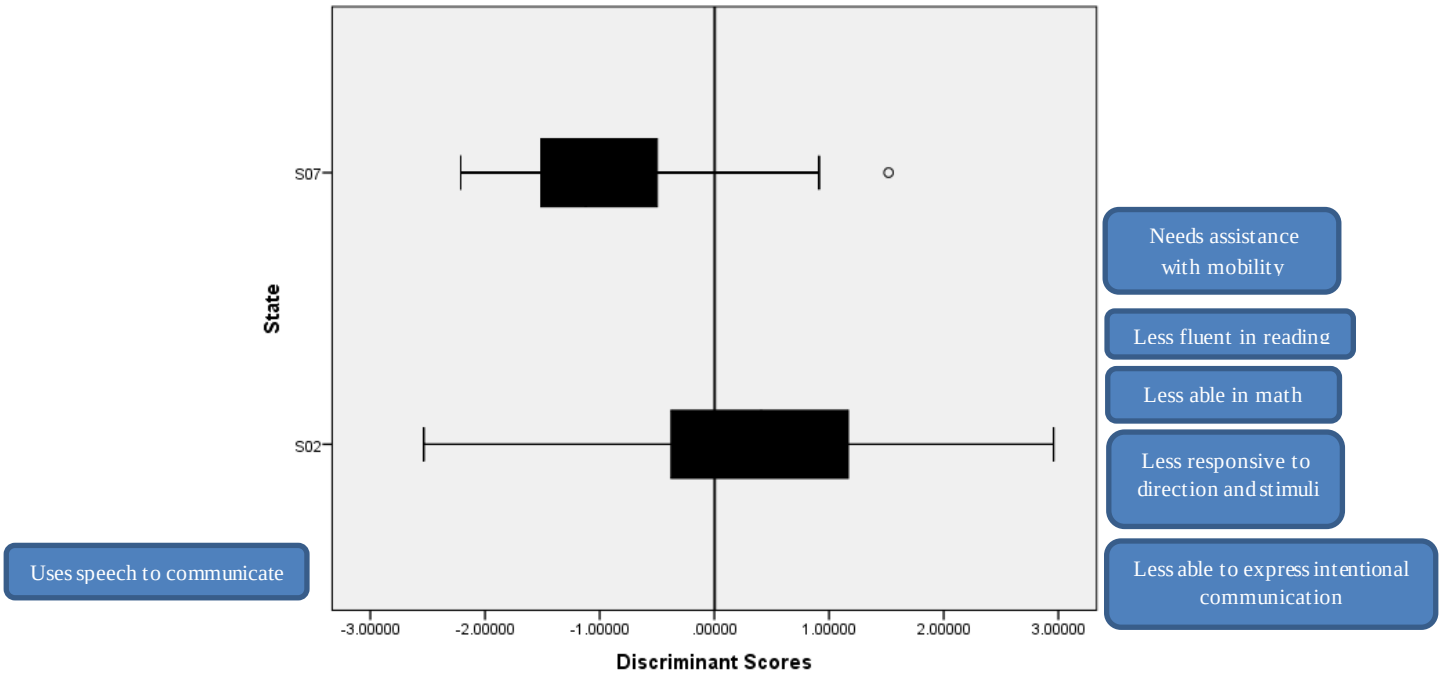


Figure A-10 shows the relationship of the six variables in representing the discriminant function that attempts to differentiate across the two states. The distribution of discriminant function values for each of the two states is also shown. As indicated by the small effect size (even though the overall analysis was statistically significant), these variables do not differentiate the two states well suggesting that these variables do not help explain the performance differences between S07 and S02. However, there was a small tendency of S07 (where students performed statistically significantly higher in mathematics and ELA) for students to use speech to communicate. Additionally, there was a small tendency for students in S02 (where students performed statistically significantly lower in mathematics and ELA) to need assistance with mobility, be less fluent in reading, be less able in math, less responsive to direction and stimuli, and less able to express intentional communication.