An Analysis of Academic Performance of Students Affected by Hurricane Katrina
March 24, 2010

Supplemental Information Added: April 7, 2010

Student Assessment Division
Department of Assessment, Accountability, and Data Quality
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Background

During the 2005–2006 school year, districts were asked to identify students based on the Texas Assessment of Knowledge and Skills (TAKS) answer documents who came to Texas from Louisiana, Mississippi, Alabama, or Florida after June 1, 2005, for reasons related to Hurricane Katrina. These students were enrolled in a Texas public school during the 2005–2006 school year and are referred to as Katrina students. An analysis has been conducted to evaluate academic performance of the Katrina students from 2006 to 2009 by comparing their performance to that of all Texas students who tested each year as well as to a matched group of students that were not identified as Katrina students. The goal of the analysis was to evaluate the performance of Katrina students over the four years compared with the performance of all Texas students and with similar students who were not affected by the hurricane.

Study Sample and Methods

Three cohorts of Katrina students were studied including cohorts of grade 3, grade 5, and grade 8 students. A cohort is a group of students with scores over the 2006 to 2009 school years. For example, the grade 3 cohort represents students with scores in grade 3 in 2006, grade 4 in 2007, grade 5 in 2008, and grade 6 in 2009. Data from Katrina students were included in the study if the students had reading/English language arts and mathematics scale scores in all four years (i.e., 2006 to 2009) and if those students had demographic information in 2006 for matching purposes. Once the sample of Katrina students was identified as those with four years of TAKS reading/English language arts and mathematics scores and 2006 demographic information, that sample of students was matched to students who were not affected by the hurricane. Students were matched on gender, ethnicity, economically disadvantaged status, geographical region (the region where Katrina students tested in 2009), and scale scores on the TAKS 2006 reading/English language arts and mathematics assessments.

Students included in the All Students who Tested in Texas groups were those who tested in the primary administration of each year of the study. For example, the Texas testers in 2006 were those who took the primary administration of the TAKS assessments. The Texas testers in 2007 were all students in Texas who took the primary administration in that year. Data for the Texas tester groups can be found on the Texas Education Agency Statewide TAKS Summary Reports website at http://www.tea.state.tx.us/index3.aspx?id=3234&menu_id=793.

Table 1 summarizes demographic and academic performance information on all Katrina students identified in 2006, all Texas testers in the state in those cohorts in 2006, the Katrina students included in the study, and the matched students included in the study. Note that the mean scale scores are from the primary administration.

Table 1. Demographic Comparison of All Katrina Students in 2006, All Texas Testers in 2006, Katrina Students In Study, and Matched-Samples of Non-Katrina Students In Study				
	All Katrina Students in 2006	**TX Testers in 2006***	**Katrina Students Included in Study**	**Matched Study Sample**
Grade 3 Cohort				
Number	2412	284987	675	675
Female (%)	48.1[1]	50.0	48.2	47.7
Native American (%)	<1.0[2]	<1.0	<1.0	<1.0
Asian (%)	2.2	3.7	2.4	2.8
African American (%)	86.5	15.4	78.1	77.5
Hispanic (%)	3.3	41.7	5.5	5.3
White (%)	7.9	38.8	13.9	14.2
Economic disadvantage (%)	89.5[3]	54.5	89.0	89.5
Reading Scale Score (Mean)	2128	2312	2236	2238
Mathematics Scale Score (Mean)	2057	2256	2168	2167
Grade 5 Cohort				
Number	2794	291992	800	800
Female (%)	49.5[4]	50.3	53.4	51.5
Native American (%)	<1.0[5]	<1.0	<1.0	<1.0
Asian (%)	2.7	3.3	3.6	3.5
African American (%)	84.9	14.5	78.6	78.4
Hispanic (%)	4.1	44.0	5.5	5.5
White (%)	8.0	37.7	12.0	12.6
Economic disadvantage (%)	90.3[6]	54.9	92.3	92.5
Reading Scale Score (Mean)	2063	2228	2137	2134
Mathematics Scale Score (Mean)	2076	2293	2157	2158
Grade 8 Cohort				
Number	2369	297866	509	509
Female (%)	55.3[7]	50.3	56.0	59.1
Native American (%)	<1.0[8]	<1.0	<1.0	<1.0
Asian (%)	2.5	3.2	4.3	4.1
African American (%)	86.0	14.4	75.8	75.8
Hispanic (%)	3.6	42.1	6.3	5.3
White (%)	7.9	39.9	13.4	14.7
Economic disadvantage (%)	91.8[9]	49.7	90.4	89.6
Reading Scale Score (Mean)	2112	2292	2216	2214
Mathematics Scale Score (Mean)	2018	2185	2097	2098

Note: *The numbers of testers and demographic information reflect students those who took the primary administration in reading. The information for students testing in mathematics was very similar. 1=17 missing values, 2=20 missing values, 3=56 missing values, 4=84 missing values, 5=81 missing values, 6=281 missing values, 7=312 missing values, 8=312 missing values, and 9=315 missing values.

Table 1 illustrates that in 2006, the numbers of students identified as Katrina students were 2412 in grade 3, 2794 in grade 5, and 2369 in grade 8. Of those students, the numbers with sufficient data for study participation included 675 in grade 3, 800 in grade 5, and 509 in grade 8. Students identified as Katrina students in 2006 were excluded from the study

mostly due to not having scores across all four years of the study. Some of the Katrina students without scores in later years likely returned home. The demographic and academic performance of the Katrina students included in the study compared with all of the students identified as Katrina students in 2006 indicated that the Katrina study students were slightly less likely to be African American, more likely to be white, were similarly likely to be economically disadvantaged, and were higher performing.

The demographic makeup and academic performance of the matched sample were highly similar to the study sample of Katrina students. The similarity in the demographic and academic performance data for the Katrina study students and the matched students illustrates that the matching procedure worked well. In other words, the non-Katrina students to whom the Katrina students were compared were very similar in 2006.

Compared with all statewide testers, the sample of Katrina students was more likely to be African American and economically disadvantaged. Furthermore, the study sample of Katrina students demonstrated poorer performance in both reading and mathematics in 2006 compared with statewide testers.

The passing percentages for 2006 to 2009 for the Katrina study students, the matched samples, and all statewide testers were calculated and compared.

Results

Results of the analyses were interpreted by evaluating the Katrina study students' performance across the four years of the study, comparing the Katrina study students' performance to their matched peers, and comparing the Katrina study students' performance to all student testers in the state. Table 2 presents the analysis results.

Katrina Study Student Performance

Results indicated that the percentages of Katrina students in the study passing TAKS reading/English language arts in 2006 were 80% for the grade 3 cohort, 63% for the grade 5 cohort, and 71% for the grade 8 cohort. With a few exceptions, the percentages of Katrina study students passing TAKS reading/English language arts increased each year. Exceptions include from grade 3 to grade 4 in the grade 3 cohort, grade 6 to grade 7 for the grade 5 cohort, and grade 9 to grade 10 for the grade 8 cohort. After four years of Texas education, the percentages of Katrina students in the study passing TAKS reading/English language arts in 2009 was 93% for the grade 3 cohort, 94% for the grade 5 cohort, and 91% for the grade 8 cohort.

Results indicated that the percentages of Katrina students in the study passing TAKS mathematics in 2006 were 67% for the grade 3 cohort, 61% for the grade 5 cohort, and 48% for the grade 8 cohort. With a few exceptions, the percentages of Katrina study students passing TAKS mathematics increased each year. Exceptions include from grade 5 to grade 6 in the grade 3 cohort and grade 9 to grade 10 for the grade 8 cohort. After four years of Texas education, the percentages of Katrina students in the study passing TAKS mathematics in 2009 was 75% for the grade 3 cohort, 73% for the grade 5 cohort, and 69% for the grade 8 cohort.

Performance of Katrina Study Students and Matched Students

Results indicated that in general, the performance of Katrina students across the four years in which those students were educated in Texas was slightly better than the performance over time of their peers who performed similarly in 2006, the first year of the cohort. In

particular, the percentages of students who passed TAKS reading and mathematics in 2006 were the same for the Katrina study students and the matched sample in each cohort (due to the matching). The percentages of Katrina study students passing reading and mathematics were greater than the percentages of students in the matched sample in all years and cohorts with one exception. The exception was grade 10 English language arts (for the grade 8 cohort) in which 84% of Katrina study students passed, whereas 85% of students in the matched sample passed. The differences in pass rates for Katrina study students and the matched students were slightly greater for mathematics than for reading. In other words, the three cohorts of Katrina study students outperformed their matched peers in reading and mathematics in all but one year of the study.

Performance of Katrina Study Students Compared with All Texas Testers

Results comparing Katrina study students to all Texas students in these cohorts are presented in Table 2. Findings indicate that Katrina study students performed poorer on average compared with all Texas testers in the initial study year in both reading and mathematics. Comparing passing percentages across the four years of the study illustrates that the gap in passing percentages between Katrina study students and all state testers closes for all three cohorts in reading. In fact, despite having a passing percentage that ranged from 9 to 17 percentage points below the state passing percentage the first year of the study, the Katrina study students' passing percentages exceeded those of the state in the fourth study year (i.e., 2009) for the grades 3 and 5 cohorts. The grade 8 Katrina study cohort closed the passing percentage gap to within one percentage point by 2009, ending the fourth study year with 91% of students passing reading compared with 92% at the state level. The narrowing of the gap in reading performance between state testers and Katrina study students was most evident from the first to the second year of the study.

In mathematics, the gaps in passing percentages between Katrina study students and state testers were substantial the first year that Katrina students tested in Texas, ranging from 15 to 20 percentage points below the state passing percentages. The gaps between passing percentages for the three cohorts and the passing percentages for the state testers were reduced over the four years. For example, for the grade 5 cohort, the passing percentage for state testers was 20 percentage points higher than for the Katrina study students in 2006. The difference in 2009 was 6 percentage points higher for the state testers. Though the passing percentage gap between all state testers and the Katrina study students was not closed in mathematics across the four years of the study, the gap was reduced substantially. As was found with reading, the narrowing of the gap in mathematics performance between state testers and Katrina study students was most evident from the first to the second year of the study.

Table 2. Passing Percentages of reading for Three Cohorts of Katrina Students and Matched-Samples of Non-Katrina Students.

Grade	Year	Met Standard Katrina Study Sample (Percentage)	Met Standard Matched Study Sample (Percentage)	Met Standard TX Testers (Percentage)	Percentage Difference (Katrina Minus Matched)	Percentage Difference (Katrina Minus All Testers)
GRADE 3 COHORT						
3	2006	80	80	89	0	-9
4	2007	76	73	84	3	-8
5	2008	82	77	83	5	-1
6	2009	93	86	91	7	2
GRADE 5 COHORT						
5	2006	63	63	80	0	-17
6	2007	90	86	92	4	-2
7	2008	85	78	84	7	1
8	2009	94	91	93	3	1
GRADE 8 COHORT						
8	2006	71	71	83	0	-12
9	2007	85	85	86	0	-1
10	2008	84	85	86	-1	-2
11	2009	91	91	92	0	-1

Table 3. Passing Percentages of mathematics for Three Cohorts of Katrina Students and Matched-Samples of Non-Katrina Students.

Grade	Year	Met Standard Katrina Study Sample (Percentage)	Met Standard Matched Study Sample (Percentage)	Met Standard TX Testers (Percentage)	Percentage Difference (Katrina Minus Matched)	Percentage Difference (Katrina Minus All Testers)
GRADE 3 COHORT						
3	2006	67	67	82	0	-15
4	2007	79	75	86	4	-7
5	2008	80	76	83	4	-3
6	2009	75	68	80	7	-5
GRADE 5 COHORT						
5	2006	61	61	81	0	-20
6	2007	67	62	79	5	-12
7	2008	70	63	76	7	-6
8	2009	73	66	79	7	-6
GRADE 8 COHORT						
8	2006	48	48	67	0	-19
9	2007	54	45	60	9	-6
10	2008	53	48	63	5	-10
11	2009	69	67	81	2	-12

Summary

Results of these analyses indicate that students who relocated to Texas because of Hurricane Katrina and who tested in Texas in 2006 on average performed below the average for all state testers. For those Katrina students who were educated in Texas from 2006 to 2009, their performance over the four study years was slightly better compared with the performance of their matched peers in reading and mathematics in all but one comparison. The slightly better performance of the Katrina study students over the four years of the study compared with their matched peers may be attributed to the time at which the matching of the students was conducted. The matching was conducted in 2006, the year most of the Katrina students experienced the hurricane. The timing of the hurricane may have resulted in many of the Katrina students being educated less than a full year in Texas and the stress of the experience may have led those students to perform poorly that first year. In other words, though the Katrina study students started in 2006 with similar performance to their matched peers, their performance that first year may have been artificially depressed and not truly representative of their performance at that time because these students were still suffering from the aftereffects of the hurricane that first year in Texas schools. The improved performance of the Katrina study students over the last three years of the study relative to their matched peers may also reflect the recovery of these students, the increased stability in their schooling, the commitment of additional state and federal funding to meet the needs of students and families impacted by Hurricane Katrina and the focused attention of Texas educators on this specific population of students.

Furthermore, the first year Katrina students tested in Texas, the percentages of these students passing was below the passing percentage of all Texas students in reading and mathematics. Over the four study years, however, the average reading performance of Katrina students increased such that the performance was similar to or better than the average performance of all testers in 2009. The increased reading performance of Katrina students from 2006 to 2009 closed the gap in passing percentages between the students affected by the hurricane and all other Texas students in the three cohorts. In mathematics, the gap in passing percentages between Katrina study students and all Texas testers was even larger in 2006 than found in reading. The mathematics performance of the Katrina students in the study increased from 2006 to 2009. The increase the Katrina students made narrowed the gap in passing percentages substantially.

Rosenbaum PR, Rubin DB. The central role of the propensity score in observational studies for causal effects. Biometrika 1983;70:41–55.

Rubin DB (1997). “Estimating Causal Effects from Large Data Sets Using Propensity Scores.” Annals of Internal Medicine, 127(8S), 757–763.

Supplemental Information Added April 7, 2010

The study that TEA conducted was not designed nor intended to reflect on the quality of education in Louisiana. The study did not make any comparisons between the students included in the study and Louisiana students. The study focused on those students identified as being affected by the hurricane who were educated in Texas the four years from 2006 to 2009.

The Katrina students in the study only represent those students in their respective cohorts that remained enrolled in Texas schools for four years and tested all four years. These students differed demographically and academically from all students identified as Katrina students in 2006 and from all Texas statewide testers as shown by Table 1 in the report. Because the Katrina study students differed demographically and academically from all Texas statewide testers, TEA implemented a sophisticated statistical approach to match Katrina students to a similar set of students in Texas. The approach, called propensity score matching, identified Texas students for whom a fair comparison of Katrina study students and Texas students could be made. Ensuring the two groups of students matched very closely on initial test scores was important given the analysis goal was to make a fair comparison of the performance of students who came to Texas due to the hurricane with those who were in Texas not due to the hurricane. The information on the state testers was provided to help interpret the results of the Katrina students in the study.

The study did not evaluate students in their individual schools given there were too few students at each school to draw legitimate conclusions at the school level. Furthermore, TEA did not match students within a school for two reasons. First, the goal was a strong match. Restricting the matching to a particular school had the potential of reducing the quality of the match and the fairness of the comparison. Second, the mobility of the Katrina study students across schools made it difficult to match them to non-Katrina study students with the same mobility pattern. Therefore, the match focused on geographical region instead of school.

Because percentages of students passing do not fully capture changes in academic performance of students over time, TEA is also including on the following pages the scale score values across the four years of the study for Katrina study students, the matched samples, and the statewide testers. See Tables A1 and A2 for results. Furthermore, Figures A1-A6 graphically display the scale score values. Note that the scale score values for the study groups can be compared within a year and content area, but scale scores are not comparable across years.

Tables A1 and A2 show the mean TAKS scale scores for the Katrina study students, the matched samples, and all statewide testers. Scale score comparisons across the four years of the study show similar patterns as the results from the passing percentages across the four years of the study. Figures A1-A6 graphically display the scale score values. Note that the scale score values for the study groups can be compared within a year and content area, but scale scores are not comparable across years.

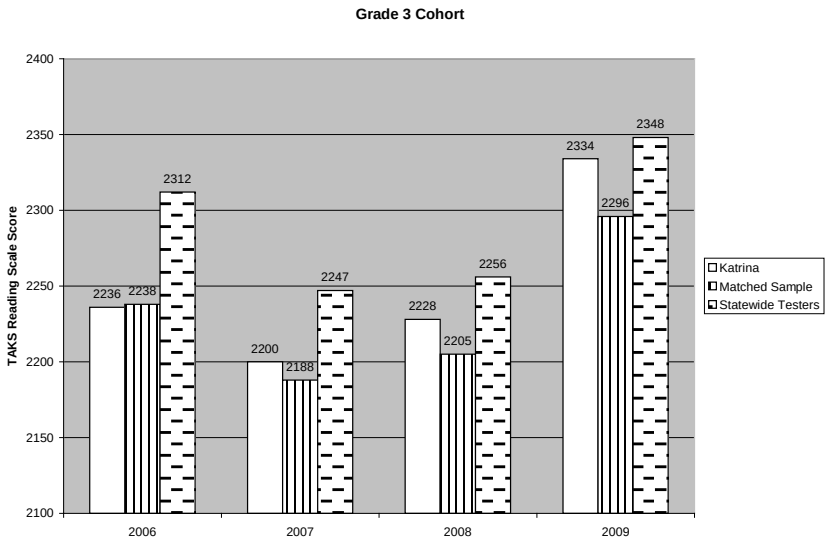
Table A1. Mean TAKS Reading/English Language Arts Scale Scores for Katrina Study Students and Matched Texas Students

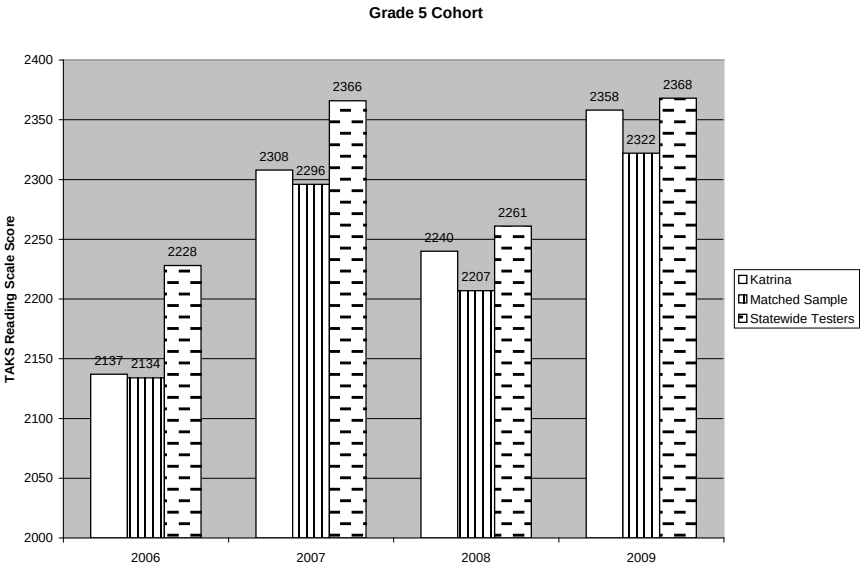
	2006	**2007**	**2008**	**2009**
Grade 3 in 2006 (n =675 Katrina Students in Study)				
Katrina	2236	2200	2228	2334
Matched Sample	2238	2188	2205	2296
Statewide Testers	2312	2247	2256	2348
Grade 5 in 2006 (n = 800 Katrina Students in Study)				
Katrina	2137	2308	2240	2358
Matched Sample	2134	2296	2207	2322
Statewide Testers	2228	2366	2261	2368
Grade 8 in 2006 (n =509 Katrina Students in Study)				
Katrina	2216	2224	2236	2268
Matched Sample	2214	2221	2225	2250
Statewide Testers	2292	2241	2261	2300

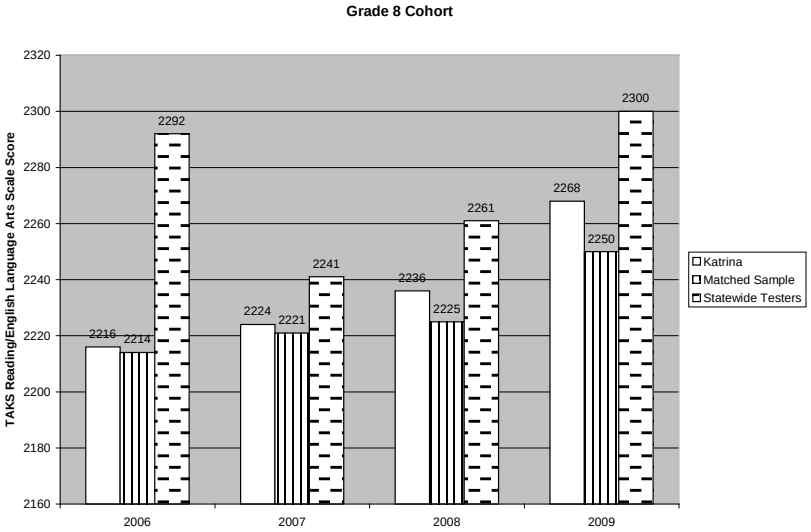
Table A2. Mean TAKS Mathematics Scale Scores for Katrina Study Students and Matched Texas Students

	2006	**2007**	**2008**	**2009**
Grade 3 in 2006 (n =675 Katrina Students in Study)				
Katrina	2168	2221	2267	2236
Matched Sample	2167	2197	2241	2201
Statewide Testers	2256	2279	2311	2295
Grade 5 in 2006 (n = 800 Katrina Students in Study)				
Katrina	2157	2191	2177	2193
Matched Sample	2158	2173	2143	2158
Statewide Testers	2293	2291	2219	2241
Grade 8 in 2006 (n =509 Katrina Students in Study)				
Katrina	2097	2123	2125	2194
Matched Sample	2098	2101	2109	2182
Statewide Testers	2185	2163	2173	2264

Figures A1-A3. Scale Scores in Reading







Figures A4-A6. Scale Scores in Mathematics