



DATA REPORT

Losing Ground: Longitudinal Trends in Hawai'i DOE Test Scores for Major Ethnic Groups

Background:

Examination of cross-sectional test scores suggests that DOE student performance improves in the elementary years only to deteriorate at the secondary school level. Tables 1 and 2 below report the results for students in grades 3, 6, and 8 in Spring 1998. The percentile rank of the average reading score was 38 for students in grade 3, 47 for students in grade 6, and 40 for students in grade 8. A similar pattern is observed in the math scores. Popular explanations for this pattern include a failure of the public secondary schools, a “brain drain” as public school students move to the private schools for secondary school, and changes stemming from the developmental characteristics of adolescents.

This report addresses three questions. First, if we look at only the same students over time, do test scores change for students between grades 3 and 8 and is this same for all major ethnic groups? Second, is there evidence of an exodus of higher achieving students out of the public school system? Third, are changes in test scores due to the developmental characteristics of adolescents?

Table 1. SAT-8 Reading Comprehension- DOE Cross-Sectional Data - Spring 1998¹

Grade	Percentile Ranks Of Average Score For Major Ethnic Groups					
	Hawaiian	Caucasian	Filipino	Japanese	All Others	Total
Grade 3	27	51	33	54	37	38
Grade 6	37	62	40	65	46	47
Grade 8	29	57	30	59	40	40

Table 2. SAT-8 Total Math - DOE Cross-Sectional Data - Spring 1998

Grade	Percentile Ranks Of Average Score For Major Ethnic Groups					
	Hawaiian	Caucasian	Filipino	Japanese	All Others	Total
Grade 3	37	62	49	73	51	52
Grade 6	42	63	50	78	54	55
Grade 8	34	55	39	75	41	48

¹ 1998 data are reported here because in Spring 1999 the State DOE introduced the SAT-9 at some schools, in 2000 the SAT-9 was used statewide but the tests were changed from total reading and total math to reading comprehension and math problem solving, and in 2001 testing was suspended because of the teachers' strike.

Methods:

The use of different standardized tests makes longitudinal comparisons difficult. Moreover, unlike height or weight or family income, the nature of what is measured changes over grade levels. A test of reading at grade 3 does not define and measure reading in the same way that it is defined and measured at grade 8. Also, it is likely that the match between test content and the curriculum will vary from one grade level to the next. While we cannot overcome the challenge of differences inherent in testing at different grades, we are able to restrict our analyses to a single test version. The DOE graduating class of 2002 took the Stanford Achievement Test - Version 8 at grade 3 in 1992-93, grade 6 in 1995-96, and at grade 8 in 1997-98. (No other recent class of students took the same version of the test over so many grade levels.)

To address Question 1 (do test scores change over time), we included only students tested at all grade levels studied. This excluded from this portion of the study: students who left the DOE for another educational program between grades 3 and 8 and those with missing information because of absences. It also excluded any students not tested at any grade level because they qualified for an exemption from testing (some but not all special education and SLEP students) and any students who were retained in grade after third grade.

A total of 7,939 students (58%) of the 13,689 students enrolled in grade 8 in 1997-98 took the SAT-8 in grades 3, 6 and 8.

Findings:

Question 1A. If we look at the same students over time, do reading test scores change for students between grades 3 and 8?

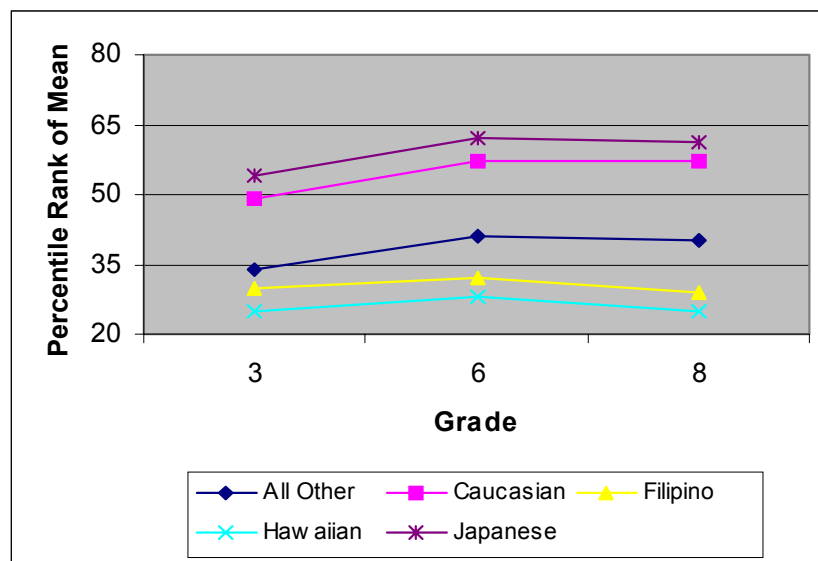


Figure 1. Longitudinal trends in SAT-8 Total Reading scores

Yes. As shown in Table 3 and Figure 1 below, reading scores for the total study sample increased between grade 3 and grade 6 from the 35th to the 41st percentile and declined at grade 8 to the 38th percentile.

However the overall data obscure variations in the patterns of change by ethnic group. Scores for Hawaiian and Filipino students increased 3 percentile points and 2 percentile points respectively between grade 3 to grade 6, compared to an 8 percentile point increase for students of Japanese ancestry. Between grades 6 and 8 scores for Hawaiian and Filipino students declined by 3 points while scores for Japanese and Caucasian students remained essentially unchanged. The gap in scores between Hawaiian and Japanese students (the group with the highest average scores) increased by 23%, from 16.3 to 20.1 normal curve equivalent (nce) points.

Due to the large number of students in the study, the relationship between grade, ethnicity, and scores is statistically significant as are all comparisons. Using guidelines suggested by Cohen (1988), all effect sizes for grade are “small effects” (d=0.2 to 0.5). We find moderate effects for ethnicity at every grade level (d=0.5 to 0.8) and these increase as students age.

Table 3. SAT-8 Total Reading - DOE Longitudinal Data - Grade 8 in 1998

Grade	Percentile Ranks Of Average Score For Major Ethnic Groups							effect size (d)
	Year	Hawaiian	Filipino	Caucasian	Japanese	All Others	Total	
# Students		2,097	1,649	954	1,315	1,924	7,939	
Grade 3	1992-93	25	30	49	54	34	35	.67
Grade 6	1995-96	28	32	57	62	41	41	.77
Grade 8	1997-98	25	29	57	61	40	38	.78
effect size (d)		0.11	0.11	0.23	0.23	0.19	0.14	

Table 4. SAT-8 Total Math - DOE Longitudinal Data - Grade 8 in 1998

Grade	Percentile Ranks Of Average Scores For Major Ethnic Groups							effect size (d)
	Year	Hawaiian	Filipino	Caucasian	Japanese	All Others	Total	
# Students		2,097	1,649	954	1,315	1,924	7,939	
Grade 3	1992-93	44	51	62	74	56	56	.57
Grade 6	1995-96	40	48	58	75	54	53	.69
Grade 8	1997-98	34	41	55	75	50	49	.75
effect size (d)		0.28	0.27	0.18	0.03	0.14	0.17	

Question 1B. If we look at the same students over time, do math test scores change for students between grades 3 and 8?

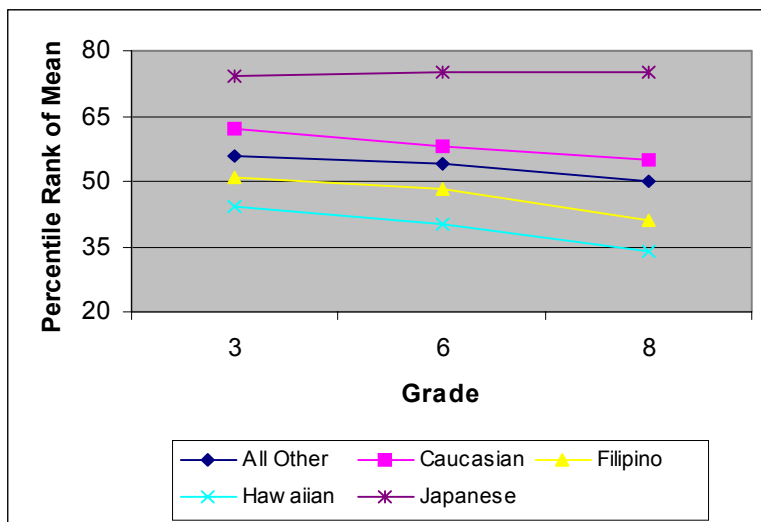


Figure 2. Longitudinal trends in SAT-8 Total Math scores

Yes. As shown in Table 4 and Figure 2, math scores for the total study sample decreased between grade 3 and grade 6 and between grade 6 and 8. The declining pattern is observed for all ethnic groups except Japanese. Among the groups with declining scores, the magnitudes of the changes vary by ethnicity. Scores for Hawaiian and Filipino students declined by 10 percentile points from grade 3 to grade 8. Average scores for Caucasian students declined by 7 points and “Other” students declined by 6 points. At the same time, scores for Japanese students increased by 1 point. The gap in scores between Hawaiian and Japanese students increased by 37%, from 16.5 to 22.6 percentile points.

Again, the relationships between grade, ethnicity, and scores are statistically significant. Small effect sizes emerge for the effects of grade ($d=0.2$ to 0.5) and moderate effect sizes emerge for ethnicity at every grade level ($d=0.5$ to 0.8), increasing as students age.

Question 2. Is there evidence of an exodus of higher achieving students out of the public school system between grades 3 and 8?

In part, yes, but only for students of Japanese ancestry between grades 6 and 8. The results presented in Table 5 show that, for all ethnic groups, students who tested in grade 3 but not grade 6 had lower grade 3 test scores than students who were tested at both points. This may be due to movement of students out of the DOE, the identification of special education students after the testing period, or retention of students, which would move them to another testing cohort. Effect sizes are below or within the range of small effects. Effect sizes for Hawaiian students are double that of any other group.

In contrast, the comparison of grade 6 scores for students who were tested in grade 6 but not in grade 8 was statistically significant for students of Japanese ancestry but not for any other ethnic group. Effect sizes are near zero except for students of Japanese ancestry. (Note: statistically significant differences [$p < 0.05$] are italicized.) We don’t know that these higher achieving Japanese students left for private schools, but it is unlikely that they moved into special

education, were retained in grade, or were absent on testing days at rates higher than that of the general population.

Table 5. Grade 3 SAT-8 Scores for Students tested in Grade 6 compared to Students not tested in Grade 6

Test	Percentile Ranks Of Average Scores For Major Ethnic Groups							
	Group	N (total)	Hawaiian	Caucasian	Filipino	Japanese	All Others	Total
Total Reading	in Grade 6	10,035	27	48	31	55	35	36
	Leavers	3,668	17	46	27	47	33	36
effect size (d)			.44	.06	.20	.22	.05	.04
Total Math	in Grade 6	10,149	42	62	50	74	55	55
	Leavers	3,724	27	59	41	68	46	48
effect size (d)			.47	.10	.24	.20	.22	.16

Table 6. Grade 6 SAT-8 Scores for Students tested in Grade 8 compared to Students not tested in Grade 8

Grade	Percentile Ranks Of Average Scores For Major Ethnic Groups							
	Group	N (total)	Hawaiian	Caucasian	Filipino	Japanese	All Others	Total
Total Reading	in Grade 8	7,690	29	56	33	60	41	41
	Leavers	1,763	29	59	34	69	44	45
effect size (d)			.00	-.09	-.03	-.30	-.09	-.13
Total Math	in Grade 8	7,679	40	57	48	75	54	53
	Leavers	1,750	40	61	46	84	56	56
effect size (d)			-.01	-.11	.05	-.35	-.06	-.09

Question 3. Are changes in test scores due to the developmental characteristics of adolescents?

Probably not. The percentile ranks reported and other scores used in the analyses are based on national norms developed for each grade level.

Unless the developmental paths of Hawai‘i students are different from those of the national norm group, there is no reason to believe that these factors affect their ranking relative to the norm group.

Summary:

This study is limited to descriptive statistics for one cohort of students. We did examine the test scores of students in the cohorts preceding and following the class of 2002. We found that the test scores for this group are consistent with the scores of the other cohorts leading us to believe that the results reported here are likely to be typical.

This study reveals that test scores for Hawaiian and Filipino students show an overall pattern of decline from grade 3 to 8. This occurs in both reading and math and it occurs while reading test scores for Caucasian and Japanese students are increasing and math test scores for Japanese students remain stable.

It was found that ethnicity is significantly related to test scores and that differences between scores of students of Hawaiian ancestry and those of Japanese ancestry increase between grades 3 and 8 by 23% for reading and 37% for math.

The study is structured so that an exodus of high achieving students to private secondary schools is not responsible for any longitudinal patterns observed in the scores. First, the longitudinal study of survivors excludes students who left the system between grades 3 and 8, thus changes in scores are not due to attrition.

Second, we compared test scores of *all* students present for one test administration and not the next. We found that students tested in grade 3 and not in grade 6 had lower grade 3 scores than students tested at both points. We also found that students tested at grade 6 and not grade 8 had the same average test scores as students tested at both points, *except* for students of Japanese ancestry, where leavers had significantly higher grade 6 test scores.

Finally, we note that, unless Hawai'i adolescents are unique, these changes are not due to the normal developmental characteristics of adolescents.

This study leaves us with unanswered questions about the reasons for the differences in longitudinal patterns of achievement by different ethnic groups, a pattern not unique to Hawaiian and Filipino students or to Hawai'i. A recent report by the National Center for Educational Statistics (NCES, 2001) found that the gap between scores for black and white students also tends to increase over grade levels. The NCES report suggests that "the reasons for black-white disparities... may include differences in family background not captured by parental SES, as well as differences in peer group characteristics, school resources, and the manner in which children are treated in their classrooms." (U.S. Dept. of Ed., 2001, p. 42).

Research has repeatedly demonstrated that family and school characteristics are related to student achievement. A study conducted by the Hawai'i State Department of Education (Gans, 1995) showed that as much as 75% of the variance in average school test scores may be related to SES. Hawaiian and Filipino students tend to be concentrated in poor and more remote communities, to come from lower income families, and to have parents with lower levels of education. Previous studies by PASE have documented higher rates of poverty, retention, low test scores, and absenteeism in schools with greater numbers or proportions of Hawaiian students.

Further research is needed to understand why Hawaiian students lose ground relative to both the national norm group and students from other ethnic backgrounds in Hawai'i.

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