MO MAP Early Tables to DESE_2013

Inter-Rater Reliability

Approximately 5% of the papers in Communication Arts, Mathematics, and Science were scored independently by a second reader. The statistics for the inter-rater reliability were calculated for all items at all grades. To determine the reliability of scoring, the percentage of perfect agreement and adjacent agreement between the two readers was examined.

For each item, a weighted kappa was calculated to reflect the level of improvement beyond the chance level in the consistency of scoring. These weighted kappa values are presented in Tables 5.1 to 5.3. To aid in the interpretation of Kappa, the following cutoffs have been suggested (Landis & Koch, 1977; Altman, 1991):

Kappa Value	Strength of Agreement
0	None
<0.20	Poor
0.21 – 0.40	Fair
0.41 – 0.60	Moderate
0.61 – 0.80	Good
0.81 – 1.00	Very Good

All Communication Arts, Mathematics, and Science items show good inter-rater agreement. As shown in Table 5.1, raters demonstrated at least 93% perfect and adjacent agreement for all Communication Arts items. Except for one item, the strength of the inter-rater agreement may be interpreted as good or very good as indicated by the weighted Kappa values. One Grade 7 item (Session 1, Item 6B) had a weighted Kappa value that indicated only moderate agreement between the raters.

As shown in Table 5.2, raters demonstrated at or above 98% perfect and adjacent agreement for all Mathematics items. The weighted Kappa values indicate that there was very good inter-rater agreement for all Mathematics items except for one item. One Grade 8 item (Session 3, Item 1) had a weighted Kappa value that indicated only good agreement between the raters.

As shown in Table 5.3, raters demonstrated at or above 92% perfect and adjacent agreement for all Science items. The weighted Kappa statistic indicates good or very good inter-rater agreement for all Science items except for three items. Two Grade 5 items (Session 3, Item 5 and Session 3, Item 8) and one Grade 8 item (Session 1, Item 1) had a weighted Kappa value that indicated only moderate agreement.

Table 5. 1: Inter-rater Reliability, Communication Arts

Grade	Session	Item #	# Points	% Perfect	% Adjacent	% Perfect & Adjacent*	Weighted Kappa
3	1	3	2	74	25	99	0.62
	1	4	2	82	17	99	0.74
	1	5	2	84	16	100	0.77
	1	6A	2	84	15	99	0.76
	1	6B	2	90	9	99	0.69
	2	1	4	65	34	99	0.64
4	1	3	2	83	17	100	0.86
	1	4	2	84	15	99	0.85
	1	5	2	77	21	98	0.77
	1	6A	2	79	20	99	0.80
	1	6B	2	85	15	99	0.69
5	1	3	2	70	28	98	0.70
	1	4	2	81	18	99	0.77
	1	5	2	72	24	95	0.67
	1	6A	2	92	7	100	0.92
	1	6B	1	94	6	100	0.86
6	1	3	2	86	14	99	0.81
	1	4	2	82	17	99	0.82
	1	5A	2	73	24	97	0.74
	1	5B	1	97	2	100	0.94
	1	6	2	74	24	98	0.73
7	1	3	2	73	20	93	0.72
	1	4	2	68	29	97	0.67
	1	5A	2	75	23	98	0.73
	1	5B	1	91	9	100	0.75
	1	6A	2	79	20	99	0.81
	1	6B	1	90	10	100	0.54
	2	1	4	73	27	100	0.66
8	1	3	2	92	1	93	0.86
	1	4	2	74	24	98	0.67
	1	5	2	72	26	98	0.66
	1	6A	2	83	16	99	0.83
	1	6B	1	96	3	100	0.93

* The percent perfect & adjacent may not add up to 100 for 1-point items due to the percent discrepant. The percent discrepant includes the cases where one rater assigned a score and the other rater assigned a condition code. With 2- or more point items, it also refers to the cases where the assigned score varied by more than 1 point.

Table 5.2: Inter-rater Reliability, Mathematics

Grade	Session	Item #	# Points	% Perfect	% Adjacent	% Perfect & Adjacent*	Weighted Kappa
3	3	1	2	91	8	100	0.91
	3	2	2	92	8	100	0.91
	3	3	2	92	7	100	0.95
	3	4	2	95	5	100	0.97
4	1	22	4	86	12	99	0.96
	3	1	2	97	3	100	0.97
	3	2	2	96	3	100	0.94
	3	3	2	93	6	100	0.90
	3	4	2	87	13	100	0.91
5	3	1	2	99	1	100	0.99
	3	2	2	87	11	98	0.85
	3	3	2	97	3	100	0.97
	3	4	2	97	3	100	0.97
6	3	1	2	91	9	100	0.90
	3	2	2	94	5	100	0.95
	3	3	2	89	11	100	0.88
	3	4	2	98	2	100	0.97
7	3	1	2	94	6	100	0.96
	3	2	2	93	7	100	0.95
	3	3	2	95	5	100	0.94
	3	4	2	98	2	100	0.98
8	1	20	4	78	20	98	0.89
	3	1	2	86	14	100	0.80
	3	2	2	94	5	99	0.96
	3	3	2	97	2	99	0.97
	3	4	2	98	2	100	0.99

* The percent perfect & adjacent may not add up to 100 for 1-point items due to the percent discrepant. The percent discrepant includes the cases where one rater assigned a score and the other rater assigned a condition code. With 2- or more point items, it also refers to the cases where the assigned score varied by more than 1 point.

Table 5.3: Inter-rater Reliability, Science

Grade	Session	Item #	# Points	% Perfect	% Adjacent	% Perfect & Adjacent*	Weighted Kappa
5	1	1	2	98	1	99	0.97
	1	2	2	75	22	97	0.76
	1	3	2	98	1	99	0.98
	1	4	2	82	18	100	0.81
	1	5	2	88	12	99	0.84
	1	6	2	92	8	100	0.93
	1	7	2	83	16	99	0.86
	1	8	2	84	15	99	0.81
	1	9	2	80	20	99	0.79
	1	10	2	92	8	99	0.91
	1	11	2	86	13	99	0.76
	1	12	2	96	4	100	0.95
	1	13	2	90	9	100	0.91
	3	1	2	93	6	99	0.94
	3	2	4	79	13	92	0.88
	3	3	1	87	13	100	0.72
	3	4	1	99	1	100	0.99
	3	5	2	66	30	95	0.58
	3	6	1	99	1	100	0.96
	3	7	1	88	12	100	0.69
	3	8	1	82	17	100	0.53
	3	9	1	97	3	100	0.94

* The percent perfect & adjacent may not add up to 100 for 1-point items due to the percent discrepant. The percent discrepant includes the cases where one rater assigned a score and the other rater assigned a condition code. With 2- or more point items, it also refers to the cases where the assigned score varied by more than 1 point.

Table 5.3: Inter-rater Reliability, Science (Cont'd)

Grade	Session	Item #	# Points	% Perfect	% Adjacent	% Perfect & Adjacent*	Weighted Kappa
8	1	1	2	80	19	100	0.55
	1	2	2	82	17	99	0.88
	1	3	2	81	17	98	0.78
	1	4	2	86	14	99	0.87
	1	5	2	92	8	100	0.94
	1	6	2	87	12	99	0.85
	1	7	2	79	18	98	0.81
	1	8	2	87	13	100	0.87
	1	9	2	83	16	99	0.75
	1	10	2	89	10	100	0.84
	1	11	2	77	21	98	0.78
	1	12	2	98	2	100	0.97
	1	13	2	92	8	99	0.86
	3	1	2	93	6	99	0.95
	3	2	2	78	20	99	0.79
	3	3	1	87	12	100	0.74
	3	4	1	85	14	100	0.63
	3	5	1	99	0	99	0.99
	3	6	4	76	21	97	0.88
	3	7	1	89	10	100	0.79
	3	8	2	92	7	99	0.94
	3	9	2	86	13	99	0.89

* The percent perfect & adjacent may not add up to 100 for 1-point items due to the percent discrepant. The percent discrepant includes the cases where one rater assigned a score and the other rater assigned a condition code. With 2- or more point items, it also refers to the cases where the assigned score varied by more than 1 point.

Cross-year, Cross-sectional Comparisons

It is often desirable to examine the scores of students across time. The data in this section compare student performance on the MAP using census data from 2006 through 2013. It should be noted that beginning in 2008, students with invalid test scores were assigned to the LOSS and to the *Below Basic* achievement level. Prior to 2008, invalidated students did not receive a scale score.

Table 7.13 shows the state-level means for all grades from 2006 through 2013 for Communication Arts and Mathematics and from 2008 through 2013 for Science. The Science MAP was administered for the first time in 2008. As shown in Table 7.13, the mean scale scores increased from 2012 to 2013 for all grades in Communication Arts except for Grade 7 which decreased slightly (by less than one scale score point). For Mathematics, the mean scale score increased for Grade 6, decreased slightly for Grades 3 through 5, and decreased by more than one scale score point for Grades 7 and 8 which is due in part to some of the higher ability students taking an Algebra End-of-Course test instead of the MAP test in 2013.

Table 7.14 shows the percentage of students in each achievement level in 2006 through 2013 on the Communication Arts test. The percentages at or above *Proficient* increased from 2012 to 2013 except for Grade 7 where the percentage of students at or above *Proficient* decreased slightly.

Table 7.15 shows the percentage of students in each achievement level in 2006 through 2013 on the Mathematics test. As compared to 2012, an increase in the percentage of students at or above *Proficient* was observed in Grade 6 in 2013. The percentage of students at or above *Proficient* decreased slightly in Grades 4 and 5 and the percentage of students at or above *Proficient* decreased by more than one percent in Grades 3, 7, and 8.

The changes in both the Mathematics scale scores and the proficiency levels are expected and are likely the result of the MAP wavier option implemented this year. While, we cannot identify the students who waived the MAP test, we can see we have approximately 15,000 fewer grade 8 students taking the MAP test. As seen in tables 7.13, we see a decrease in mean Mathematics scale score and variance, which support the assumption that more high ability students would take the EOC Algebra test. Further, this is supported by the achievement level summary in table 7.15, 22.5% of the students have no reported MAP Achievement level and there is a decrease in the percentage of students testing in the *Proficient* and *Advanced* levels, while the percentages of students testing in *Below Basic* and *Basic* remain consistent with prior years. It should be noted that a few students in Grades 6 and 7 were also given the option to waive the MAP Mathematics portion, however, changes scores were not as drastic.

Table 7.16 shows the percentage of students in each achievement level in 2008 through 2013 on the Science test. In Grade 5, the percentage of students at or above *Proficient* decreased slightly from 2012 to 2013 and in Grade 8, the percentage of students at or above *Proficient* increased. The decrease in Grades 7 and 8 is due in part to some of the higher ability students taking an Algebra test and not the MAP test in 2013.

Table 7. 13: Comparison of State-Level Means, 2006 through 2013 Census Data

		Communication Arts			Mathematics			Science		
Grade	**Year**	**N**	**Mean SS**	**S.D. SS**	**N**	**Mean SS**	**S.D. SS**	**N**	**Mean SS**	**S.D. SS**
3	2006	64,486	639.86	36.84	64,763	621.59	39.11			
	2007	66,347	639.58	38.04	66,640	622.40	38.72			
	2008	66,179	637.60	37.54	66,258	621.65	36.92			
	2009	67,163	637.43	38.18	67,232	621.67	36.76			
	2010	66,751	640.27	36.63	66,814	624.89	39.28			
	2011	66,196	641.19	36.52	66,258	627.03	39.69			
	2012	66,147	641.78	37.66	66,213	628.65	39.78			
	2013	66,562	643.49	37.67	66,625	627.88	39.63			
4	2006	65,179	654.55	38.56	65,306	643.88	37.07			
	2007	65,274	656.11	39.51	65,363	644.47	36.56			
	2008	66,873	655.61	33.63	66,944	644.18	34.19			
	2009	66,490	656.77	33.41	66,587	644.20	33.89			
	2010	67,301	661.34	38.95	67,394	647.59	34.01			
	2011	66,748	662.18	38.23	66,881	649.68	34.87			
	2012	65,828	662.31	39.33	65,909	649.36	34.88			
	2013	65,903	662.70	39.15	65,994	648.97	33.86			
5	2006	66,007	668.18	37.09	66,123	660.06	39.99			
	2007	65,461	671.01	37.14	65,498	663.21	41.50			
	2008	65,544	671.48	33.71	65,636	661.43	40.73	65,586	661.64	31.52
	2009	67,083	671.58	32.84	67,155	662.07	40.52	67,118	662.22	30.40
	2010	66,500	673.65	35.33	66,580	667.70	41.74	66,558	664.76	32.48
	2011	67,052	673.68	34.85	67,124	669.05	42.48	67,196	666.04	33.43
	2012	66,470	674.16	35.44	66,524	670.61	42.80	66,492	667.99	34.23
	2013	65,776	674.52	35.60	65,862	670.18	42.84	65,850	667.54	33.03
6	2006	66,948	666.85	33.70	67,017	673.30	39.80			
	2007	66,247	667.99	34.63	66,332	676.31	41.75			
	2008	65,672	671.27	33.50	65,716	678.46	41.13			
	2009	65,716	671.67	33.04	65,755	678.87	39.56			
	2010	67,260	674.18	33.12	67,315	683.36	39.48			
	2011	66,443	675.02	32.81	66,476	684.95	39.80			
	2012	67,173	674.33	32.83	67,237	684.43	40.19			
	2013	66,497	674.89	32.76	66,515	685.01	39.89			

Table 7. 13: Comparison of State-Level Means, 2006 through 2013 Census Data (Cont'd)

		Communication Arts			Mathematics			Science		
Grade	**Year**	**N**	**Mean SS**	**S.D. SS**	**N**	**Mean SS**	**S.D. SS**	**N**	**Mean SS**	**S.D. SS**
7	2006	70,290	671.63	37.06	70,698	675.38	41.27			
	2007	67,167	672.11	36.26	67,554	677.41	42.62			
	2008	66,701	675.87	35.08	66,727	681.15	41.38			
	2009	66,316	677.68	34.75	66,330	683.63	40.72			
	2010	66,034	678.85	36.25	66,052	686.51	40.28			
	2011	67,257	680.56	36.61	67,294	687.53	40.73			
	2012	66,620	681.73	36.19	66,654	691.18	41.51			
	2013	67,102	681.30	36.31	66,307	689.63	41.28			
8	2006	72,483	686.85	37.87	72,542	697.73	40.37			
	2007	70,187	686.90	37.54	70,204	698.33	41.98			
	2008	67,278	691.05	33.57	67,312	701.30	39.40	67,209	694.36	30.67
	2009	66,741	692.56	33.31	66,770	703.60	38.63	66,702	695.65	30.94
	2010	66,139	694.28	34.01	66,166	707.98	40.04	66,101	698.28	31.07
	2011	65,905	695.11	34.10	65,956	708.40	40.12	65,828	700.05	30.98
	2012	66,755	695.89	33.52	66,808	709.57	40.20	66,724	700.18	31.92
	2013*	66,397	696.22	33.24	51,729	699.82	36.09	66,418	699.92	31.71

*While there are 66,397 students in Grades 8, those students taking Algebra in were given the option of taking the Algebra End-of-Course Test instead of the MAP. The number of students who could have taken the EOC test instead of MAP could be as high as 15,000 students in Grade 8.

Table 7. 14: Comparison of Percentage of Students in each Achievement Level, Communication Arts 2006 through 2013 Census Data

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof & Adv
3	2006	65,344	1.3	8.8	47.5	25.7	16.7	42.4
	2007	67,259	1.4	9.4	46.6	25.8	16.8	42.6
	2008	66,357	0.3	9.3	50.2	25.2	15.1	40.3
	2009	67,357	0.3	9.6	49.8	25.1	15.2	40.3
	2010	66,947	0.3	8.2	48.4	26.9	16.2	43.1
	2011	66,487	0.4	7.6	48.4	27.0	16.6	43.6
	2012	66,323	0.3	8.0	46.5	27.2	18.1	45.3
	2013	66,754	0.3	7.8	44.2	27.7	20.1	47.8
4	2006	65,849	1.0	10.6	44.5	28.8	15.0	43.8
	2007	65,982	1.1	10.5	43.4	28.2	16.8	45.1
	2008	67,049	0.3	8.0	46.7	33.4	11.7	45.1
	2009	66,709	0.3	7.6	45.8	33.6	12.7	46.3
	2010	67,510	0.3	8.6	40.2	31.2	19.7	50.9
	2011	67,049	0.4	8.2	39.5	31.6	20.2	51.9
	2012	65,996	0.3	8.3	39.3	31.2	20.9	52.2
	2013	66,085	0.3	8.2	38.8	31.6	21.2	52.8
5	2006	66,704	1.0	9.1	44.8	29.6	15.4	45.0
	2007	66,098	1.0	8.3	42.9	29.8	18.0	47.8
	2008	65,734	0.3	6.4	45.1	32.2	15.9	48.1
	2009	67,307	0.3	6.3	44.6	33.9	14.9	48.8
	2010	66,730	0.3	7.1	41.5	32.1	18.9	51.0
	2011	67,461	0.6	6.9	41.4	32.4	18.7	51.1
	2012	66,675	0.3	7.0	40.9	32.3	19.6	51.8
	2013	65,980	0.3	7.1	40.3	32.2	20.1	52.3
6	2006	67,709	1.1	11.9	44.8	31.6	10.6	42.2
	2007	67,045	1.2	11.2	44	31.8	11.7	43.6
	2008	65,830	0.2	9.0	43.5	34	13.4	47.4
	2009	65,908	0.3	8.6	43.4	33.8	13.9	47.7
	2010	67,476	0.3	7.8	42.3	33.9	15.7	49.6
	2011	66,633	0.3	7.3	41.9	34.3	16.2	50.5
	2012	67,342	0.3	7.5	42.0	34.7	15.5	50.2
	2013	66,731	0.4	7.2	41.4	34.9	16.1	51.0

Table 7. 14: Comparison of Percentage of Students in each Achievement Level, Communication Arts 2006 through 2013 Census Data (Cont'd)

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof & Adv
7	2006	71,632	1.9	13.7	41.8	30.5	12.2	42.7
	2007	68,404	1.8	13.1	40.7	32.8	11.6	44.4
	2008	66,923	0.3	10.0	40.7	36.1	12.9	49.0
	2009	66,531	0.3	8.7	40.3	37.2	13.6	50.8
	2010	66,279	0.4	9.8	38.1	35.2	16.5	51.7
	2011	67,517	0.4	9.0	36.9	36.0	17.8	53.8
	2012	66,845	0.3	8.7	35.8	36.6	18.7	55.2
	2013	67,319	0.3	9.0	35.7	36.5	18.4	55.0
8	2006	73,516	1.4	9.1	48.0	26.6	15.0	41.5
	2007	71,200	1.4	8.7	48.3	26.9	14.6	41.6
	2008	67,574	0.4	5.7	45.8	33.1	15.0	48.1
	2009	67,077	0.5	5.3	44.5	33.4	16.3	49.7
	2010	66,463	0.5	4.9	42.8	34.3	17.4	51.8
	2011	66,205	0.5	4.6	42.5	33.9	18.5	52.5
	2012	67,037	0.4	4.3	42.0	34.3	19.0	53.3
	2013	66,710	0.5	4.1	41.5	34.9	19.0	53.9

Table 7. 15: Comparison of Percentage of Students in each Achievement Level, Mathematics 2006 through 2013 Census Data

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof & Adv
3	2006	65,325	0.9	7.2	48.7	33.3	10.0	43.3
	2007	67,257	0.9	7.2	46.9	35.0	10.0	45.0
	2008	66,357	0.1	6.5	49.6	35.0	8.8	43.8
	2009	67,357	0.2	6.8	48.5	35.6	8.8	44.4
	2010	66,947	0.2	6.2	46.6	37.0	10.1	47.1
	2011	66,487	0.3	5.6	44.7	38.1	11.3	49.4
	2012	66,323	0.2	5.4	42.6	39.9	11.9	51.9
	2013	66,754	0.2	5.3	43.8	39.2	11.4	50.7
4	2006	65,845	0.8	8.3	47.5	34.4	9.0	43.4
	2007	65,975	0.9	8.1	46.5	35.2	9.3	44.5
	2008	67,049	0.2	7.6	48.0	36.0	8.2	44.2
	2009	66,709	0.2	7.3	48.2	36.6	7.8	44.4
	2010	67,510	0.2	6.1	45.4	39.3	9.1	48.4
	2011	67,049	0.3	5.6	43.7	39.9	10.5	50.5
	2012	65,996	0.1	5.7	43.7	40.5	10.0	50.5
	2013	66,085	0.1	5.5	44.2	40.7	9.4	50.1
5	2006	66,703	0.9	8.1	47.8	32.7	10.6	43.3
	2007	66,075	0.9	7.6	44.9	33.1	13.4	46.6
	2008	65,734	0.1	7.5	46.5	34.4	11.4	45.8
	2009	67,307	0.2	7.5	45.1	35.6	11.6	47.2
	2010	66,730	0.2	6.2	41.9	36.7	15.1	51.7
	2011	67,461	0.5	6.1	40.9	36.3	16.2	52.5
	2012	66,675	0.2	5.8	39.7	35.9	18.4	54.3
	2013	65,980	0.2	5.9	40.1	35.9	18.0	53.9
6	2006	67,706	1.0	11.1	44.1	34.4	9.5	43.9
	2007	67,039	1.1	11.1	40.0	35.5	12.3	47.8
	2008	65,830	0.2	9.5	39.6	37.8	12.9	50.7
	2009	65,908	0.2	8.9	40.7	37.5	12.6	50.1
	2010	67,476	0.2	7.8	36.6	40.3	15.0	55.4
	2011	66,633	0.2	7.5	35.4	40.5	16.4	56.9
	2012	67,342	0.2	7.4	36.7	39.7	16.0	55.7
	2013	66,731	0.3	7.1	36.4	39.9	16.3	56.2

Table 7. 15: Comparison of Percentage of Students in each Achievement Level, Mathematics 2006 through 2013 Census Data (Cont'd)

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof & Adv
7	2006	71,575	1.2	17.4	38.5	32.7	10.2	42.9
	2007	68,405	1.2	16.7	37.1	33.2	11.7	44.9
	2008	66,923	0.3	13.9	36.3	36.7	12.8	49.5
	2009	66,531	0.3	12.5	35.2	37.6	14.3	51.9
	2010	66,279	0.3	10.8	34.3	38.8	15.7	54.5
	2011	67,517	0.3	10.5	33.5	39.2	16.6	55.8
	2012	66,845	0.3	9.8	30.3	40.0	19.6	59.6
	2013*	67,319	1.5	10.1	31.1	39.1	18.2	57.3
8	2006	73,523	1.3	21.1	37.8	27.6	12.2	39.8
	2007	71,190	1.4	21.4	36.6	26.6	14.0	40.6
	2008	67,574	0.4	18.0	37.7	29.9	13.9	43.8
	2009	67,077	0.5	16.4	36.8	31.5	14.9	46.4
	2010	66,463	0.4	14.9	33.3	32.1	19.2	51.3
	2011	66,205	0.4	15.0	33.9	31.0	19.8	50.8
	2012	67,037	0.3	14.1	33.6	31.8	20.2	52.0
	2013*	66,710	22.5	13.5	32.3	23.7	8.0	31.8

* In 2013 the omit rate for MAP Mathematics tests were high due to the number of students opting to take the EOC Algebra test. Students with waivers cannot be identified.

Table 7. 16: Comparison of Percentage of Students in each Achievement Level, Science 2008 through 2013 Census Data

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof & Adv
5	2008	65,734	0.2	11.2	44.0	29.6	14.9	44.5
	2009	67,307	0.3	10.6	44.1	30.3	14.8	45.1
	2010	66,730	0.3	10.4	40.5	29.6	19.3	48.9
	2011	67,461	0.4	10.0	39.1	29.5	21.0	50.5
	2012	66,675	0.3	9.8	38.5	27.2	24.3	51.4
	2013	65,980	0.2	9.6	39.0	28.1	23.1	51.3
8	2008	67,574	0.5	19.3	37.0	36.7	6.5	43.2
	2009	67,077	0.6	18.2	36.5	37.2	7.6	44.8
	2010	66,463	0.5	16.4	35.1	38.4	9.6	48.0
	2011	66,205	0.6	15.7	33.7	38.6	11.4	50.0
	2012	67,037	0.5	16.1	33.8	37.0	12.6	49.6
	2013	66,710	0.4	15.7	33.8	38.4	11.6	50.0

Evaluating Bias through Impact Analysis

The impact of achievement testing on minorities can be determined and reported in the form of average scores and also in terms of test score reliability. Tables 10.4 through 10.9 present the scale score means and standard deviations, numbers of students, effect size (Cohen's D), and test form reliability statistics (Coefficient Alpha) for various subgroups of interest.

Reliability

Tables 10.4 through 10.9 show the test reliability for the various subgroups of interest. This analysis shows that the test reliability is of acceptable magnitude for all of the subgroups.

Effect Size

One way to evaluate the magnitude of the differences is to calculate the effect size. Cohen's *d* was used to calculate the effect size. Cohen's *d* is given by the formula:

$$d = \frac{\overline{x_a} - \overline{x_b}}{\sqrt{\frac{(n_a - 1)s_a^2 + (n_b - 1)s_b^2}{(n_a + n_b) - 2}}},$$

where $\overline{x_a}$ is the mean score of group A, $\overline{x_b}$ is the mean score of group B, s_a^2 is the variance of group A, s_b^2 is the variance of group B, n_a is the number of students in group A, and n_b is the number of students in group B.

Cohen's *d,* then, expresses the difference in group means in terms of the standard deviation. For example if *d*=.34 for two groups, then it may be interpreted that the mean difference between the two groups is .34 of the pooled standard deviation. Cohen (1988) offered guidelines for interpreting the meaning of the *d* statistic: *d*=.20 is a small effect size, *d*=.50 is a medium effect size, and *d*=.80 is a large effect size.

Using Cohen's (1988) guidelines, certain trends become apparent in Tables 10.4 through 10.9. On the Communication Arts test in all grades, there are small effect sizes in mean test scores between girls and boys where girls outperform boys. On the Communication Arts, Mathematics, and Science tests in all grades, there is a large difference between the mean test scores of accommodated and non-accommodated students where accommodated students underperform non-accommodated students.

There is a moderate difference in mean Communication Arts test scores of Black students compared to White students where Black students underperform white students in all grades. There is a small difference between the mean test scores of Hispanic and White students where Hispanics underperform White students on Communication Arts in all grades. Similarly, there is a small difference between the mean test scores of Native Americans and White students where Native Americans underperform White students on Communication Arts in Grades 5 and 8.

There is a small difference in the mean Communication Arts test scores where Asian/Pacific Islander students outperform White students in Grades 4, 5, 7, and 8.

There is a medium difference between the mean Mathematics tests scores of Black and White students where Black students underperform White students in all grades. There is a small difference in mean Mathematics test scores of Hispanic students compared to White students in all grades where Hispanic students underperform White students. There is a small difference between the mean test scores of Native American students compared to White students where Native American students underperform White students in all grades except Grade 3. Finally, there is a small difference between the mean Mathematics test scores of Asian/Pacific Islander students where Asian/Pacific Islander students outperform White students in all grades except Grade 8.

There is a large difference between the mean Science test scores of Black students compared to White students in Grades 5 and 8 where Black students underperform White students. There is a medium difference between mean Science test scores of Hispanic students compared to White students in Grade 5 and a small difference in Grade 8 where Hispanic students underperform White students. There is a small difference between the mean Science test scores of Native American students compared to White students in Grade 8 where Native American students underperform White students.

Table 10.4: Impact Analysis, Grade 3

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size	Coefficient Alpha
Communication Arts	Ethnicity	White (not Hispanic)	48438	648.72	35.00		0.90
		Black (not Hispanic)	11036	623.96	39.55	0.69	0.92
		Hispanic	3678	633.48	35.64	0.43	0.91
		Asian/Pacific Islander	1406	654.40	38.31	-0.16	0.91
		Native American	294	643.05	36.97	0.16	0.91
		Other	1529	642.90	34.33	0.17	0.90
	Gender	Male	33998	638.48	37.25		0.92
		Female	32400	649.20	36.27	-0.29	0.91
	Accommo-dations	No	59051	648.51	33.88		0.89
		Yes	7440	605.37	39.86	1.25	0.92
Mathematics	Ethnicity	White (not Hispanic)	48474	633.03	38.10		0.90
		Black (not Hispanic)	11058	606.48	38.69	0.69	0.93
		Hispanic	3704	619.89	36.02	0.35	0.91
		Asian/Pacific Islander	1436	644.58	41.76	-0.30	0.90
		Native American	294	628.38	38.49	0.12	0.91
		Other	1532	626.38	38.12	0.17	0.91
	Gender	Male	34072	627.76	40.13		0.92
		Female	32442	628.15	38.89	-0.01	0.91
	Accommo-dations	No	58847	632.18	37.65		0.90
		Yes	7762	595.62	38.58	0.97	0.92

Table 10.5: Impact Analysis, Grade 4

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size	Coefficient Alpha
Communication Arts	Ethnicity	White (not Hispanic)	48234	667.76	36.97		0.90
		Black (not Hispanic)	10736	642.27	39.72	0.68	0.92
		Hispanic	3553	653.26	36.89	0.39	0.91
		Asian/Pacific Islander	1493	675.96	41.62	-0.22	0.91
		Native American	273	661.30	37.47	0.17	0.91
		Other	1488	662.63	38.53	0.14	0.92
	Gender	Male	33677	657.87	39.64		0.92
		Female	32109	668.07	37.29	-0.26	0.90
	Accommo-dations	No	58034	668.28	35.01		0.89
		Yes	7825	622.41	41.95	1.28	0.92
Mathematics	Ethnicity	White (not Hispanic)	48274	653.44	31.81		0.91
		Black (not Hispanic)	10755	629.17	34.99	0.75	0.92
		Hispanic	3587	643.04	31.17	0.33	0.91
		Asian/Pacific Islander	1526	666.52	37.55	-0.41	0.92
		Native American	273	647.18	32.28	0.20	0.91
		Other	1489	645.55	33.28	0.25	0.92
	Gender	Male	33757	648.22	34.63		0.92
		Female	32157	649.82	32.94	-0.05	0.91
	Accommo-dations	No	57891	653.04	31.50		0.91
		Yes	8100	619.95	35.73	1.03	0.92

Table 10.6: Impact Analysis, Grade 5

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size	Coefficient Alpha
Communication Arts	**Ethnicity**	White (not Hispanic)	48055	679.34	33.36		0.90
		Black (not Hispanic)	10874	655.40	35.92	0.71	0.91
		Hispanic	3465	665.44	32.86	0.42	0.90
		Asian/Pacific Islander	1434	689.62	38.30	-0.31	0.91
		Native American	310	669.73	33.04	0.29	0.89
		Other	1418	674.79	32.69	0.14	0.90
	Gender	Male	33615	671.05	36.10		0.91
		Female	31946	678.57	33.65	-0.22	0.90
	Accommo-dations	No	57884	679.63	31.67		0.89
		Yes	7830	638.26	38.00	1.27	0.90
Mathematics	**Ethnicity**	White (not Hispanic)	48105	675.86	40.65		0.91
		Black (not Hispanic)	10897	644.99	42.60	0.75	0.92
		Hispanic	3502	662.46	39.51	0.33	0.91
		Asian/Pacific Islander	1464	694.22	47.21	-0.45	0.92
		Native American	311	664.11	39.56	0.29	0.91
		Other	1421	668.57	42.17	0.18	0.91
	Gender	Male	33693	669.81	44.60		0.92
		Female	32012	670.64	40.89	-0.02	0.91
	Accommo-dations	No	57776	675.71	39.81		0.90
		Yes	8085	630.67	42.91	1.12	0.91
Science	**Ethnicity**	White (not Hispanic)	48095	673.64	29.86		0.90
		Black (not Hispanic)	10892	642.36	34.23	1.02	0.91
		Hispanic	3501	658.68	30.33	0.50	0.90
		Asian/Pacific Islander	1465	678.37	35.58	-0.16	0.92
		Native American	311	665.42	29.00	0.28	0.89
		Other	1421	666.70	30.79	0.23	0.90
	Gender	Male	33680	668.01	34.11		0.92
		Female	32009	667.11	31.76	0.03	0.91
	Accommo-dations	No	58114	671.21	30.95		0.90
		Yes	7732	640.02	34.80	0.99	0.90

Table 10.7: Impact Analysis, Grade 6

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size	Coefficient Alpha
Communication Arts	Ethnicity	White (not Hispanic)	49164	679.15	31.02		0.90
		Black (not Hispanic)	10847	658.27	31.82	0.67	0.90
		Hispanic	3352	666.72	31.23	0.40	0.90
		Asian/Pacific Islander	1361	684.66	35.21	-0.18	0.91
		Native American	290	673.12	32.15	0.19	0.90
		Other	1342	674.11	32.90	0.16	0.91
	Gender	Male	33610	670.63	33.28		0.91
		Female	32742	679.67	30.61	-0.28	0.90
	Accommo-dations	No	58826	679.85	28.39		0.88
		Yes	7604	637.96	36.69	1.42	0.89
Mathematics	Ethnicity	White (not Hispanic)	49188	690.23	37.87		0.90
		Black (not Hispanic)	10862	662.45	39.52	0.73	0.91
		Hispanic	3393	676.07	37.56	0.37	0.91
		Asian/Pacific Islander	1357	704.78	47.30	-0.38	0.93
		Native American	291	679.73	36.79	0.28	0.90
		Other	1342	682.20	39.27	0.21	0.91
	Gender	Male	33650	683.34	41.30		0.92
		Female	32779	686.81	38.22	-0.09	0.91
	Accommo-dations	No	58641	690.45	36.64		0.90
		Yes	7868	644.57	39.58	1.24	0.90

Table 10.8: Impact Analysis, Grade 7

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size	Coefficient Alpha
Communication Arts	Ethnicity	White (not Hispanic)	49739	685.93	34.22		0.90
		Black (not Hispanic)	11152	661.82	36.64	0.70	0.91
		Hispanic	3165	673.96	34.94	0.35	0.90
		Asian/Pacific Islander	1347	695.72	42.26	-0.28	0.93
		Native American	295	680.67	35.69	0.15	0.91
		Other	1258	680.41	36.14	0.16	0.91
	Gender	Male	34431	674.43	36.97		0.91
		Female	32526	688.81	33.60	-0.41	0.90
	Accommo-dations	No	59765	686.72	32.15		0.89
		Yes	7300	637.77	37.15	1.50	0.89
Mathematics	Ethnicity	White (not Hispanic)	49156	695.47	38.77		0.91
		Black (not Hispanic)	11079	664.87	42.18	0.78	0.91
		Hispanic	3167	680.87	39.65	0.38	0.91
		Asian/Pacific Islander	1259	708.04	44.96	-0.32	0.93
		Native American	292	686.01	38.94	0.24	0.91
		Other	1238	686.51	38.71	0.23	0.91
	Gender	Male	34032	687.57	42.79		0.92
		Female	32160	691.92	39.40	-0.11	0.92
	Accommo-dations	No	58722	695.28	37.54		0.91
		Yes	7578	646.07	42.64	1.29	0.88

Table 10.9: Impact Analysis, Grade 8

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size	Coefficient Alpha
Communication Arts	**Ethnicity**	White (not Hispanic)	49506	700.73	30.83		0.90
		Black (not Hispanic)	11059	677.48	34.09	0.74	0.90
		Hispanic	2981	689.36	32.19	0.37	0.90
		Asian/Pacific Islander	1233	708.45	39.95	-0.25	0.93
		Native American	327	691.73	37.08	0.29	0.92
		Other	1158	697.17	31.61	0.12	0.90
	Gender	Male	33921	692.45	34.56		0.91
		Female	32352	700.48	30.56	-0.25	0.90
	Accommo-dations	No	59526	700.76	29.00		0.89
		Yes	6823	657.75	39.51	1.42	0.90
Mathematics	**Ethnicity**	White (not Hispanic)	37841	705.08	33.66		0.90
		Black (not Hispanic)	9554	680.19	37.78	0.72	0.89
		Hispanic	2362	694.74	33.17	0.31	0.89
		Asian/Pacific Islander	696	710.47	45.32	-0.16	0.93
		Native American	269	694.59	38.98	0.31	0.90
		Other	918	697.19	35.04	0.23	0.90
	Gender	Male	26938	699.07	37.42		0.91
		Female	24707	700.76	34.38	-0.05	0.90
	Accommo-dations	No	44864	704.86	32.87		0.89
		Yes	6858	666.99	38.51	1.12	0.86
Science	**Ethnicity**	White (not Hispanic)	49532	705.76	28.19		0.91
		Black (not Hispanic)	11048	674.93	34.10	1.05	0.92
		Hispanic	3002	693.10	29.74	0.45	0.91
		Asian/Pacific Islander	1259	710.06	33.48	-0.15	0.94
		Native American	328	695.02	33.09	0.38	0.93
		Other	1159	699.25	29.17	0.23	0.92
	Gender	Male	33952	699.37	33.16		0.93
		Female	32384	700.58	30.01	-0.04	0.92
	Accommo-dations	No	59474	703.72	29.02		0.92
		Yes	6940	667.48	34.87	1.22	0.91