Linking the North Carolina EOG Assessments to NWEA MAP Tests

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Northwest Evaluation Association

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Introduction

Northwest Evaluation Association™ (NWEA™) is committed to providing partners with useful tools to help make inferences from the Measures of Academic Progress® (MAP®) interim assessment scores. One important tool is the concordance table between MAP and state summative assessments. Concordance tables have been used for decades to relate scores on different tests measuring similar but distinct constructs. These tables, typically derived from statistical linking procedures, provide a direct link between scores on different tests and serve various purposes. Aside from describing how a score on one test relates to performance on another test, they can also be used to identify benchmark scores on one test corresponding to performance categories on another test, or to maintain continuity of scores on a test after the test is redesigned or changed. Concordance tables are helpful for educators, parents, administrators, researchers, and policy makers to evaluate and formulate academic standing and growth.

Recently, NWEA completed a concordance study to connect the scales of the North Carolina End-of-Grade (EOG) English language arts (ELA) and math with those of the MAP Reading and MAP for Mathematics assessments. In this report, we present the 3rd through 8th grade cut scores on MAP reading and mathematics scales that correspond to the benchmarks on the EOG ELA and math tests. Information about the consistency rate of classification based on the estimated MAP cut scores is also provided, along with a series of tables that predict the probability of receiving a Level 3 (i.e., "Proficient") or higher performance designation on the EOG assessments, based on the observed MAP scores taken during the same school year. A detailed description of the data and analysis method used in this study is provided in the Appendix.

Overview of Assessments

North Carolina EOG assessments include a series of achievement tests aligned to the Common Core State Standards (CCSS) in ELA and math for grades 3-8 and high school. EOG tests are delivered in the paper-and-pencil form. For each grade and subject, there are four cut scores that distinguish between performance levels into five levels with Level 1 as the lowest and Level 5 as the highest. The Level 3 cut score demarks the minimum level of performance considered to be "Proficient" for accountability purposes.

MAP tests are interim assessments that are administered in the form of a computerized adaptive test (CAT). MAP tests are constructed to measure student achievement from Grades K to 12 in math, reading, language usage, and science and aligned to the CCSS. Unlike EOG tests, MAP assessments are vertically scaled across grades, a feature that supports direct measurement

of academic growth and change. MAP scores are reported on a **R**asch Un**it** (RIT) scale with a range from 100 to 350. Each subject has its own RIT scale.

To aid interpretation of MAP scores, NWEA periodically conducts norming studies of student and school performance on MAP. For example, the 2015 RIT Scale norming study (Thum & Hauser, 2015) employed multi-level growth models on nearly 500,000 longitudinal test scores from over 100,000 students that were weighted to create large, nationally representative norms for math, reading, language usage, and general science.

Estimated MAP Cut Scores Associated with EOG Readiness Levels

Tables 1 to 4 report the EOG scaled scores associated with each of the five performance levels, as well as the estimated cut scores on the MAP tests associated with the EOG performance levels. Specifically, Tables 1 and 2 apply to MAP scores obtained during the spring testing season for reading and math, respectively. Tables 3 and 4 apply to MAP tests taken in a prior testing season (fall or winter) for reading and math, respectively. The tables also report the percentile rank (based on the *NWEA 2015 MAP Norms*) associated with each estimated MAP cut score. The MAP cut scores can be used to predict students' most probable EOG performance level, based on their observed MAP scores. For example, a 3rd grade student who obtained a MAP math score of 202 in the spring testing season is likely to be at the very high end of Level 3 (Proficient) on the EOG test taken during that same testing season (see Table 2). Similarly, a 6th grade student who obtained a MAP reading score of 230 in the fall testing season is likely to be at Level 5 on the EOG test taken in the spring of 6th grade (see Table 3).

TABLE 1. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN EOG ELA AND MAP READING (WHEN MAP IS TAKEN IN SPRING)

Grade	EOG				
	Level 1	Level 2	Level 3	Level 4	Level 5
3	406-431	432-438	**439**-441	442-451	452-462
4	412-438	439-444	**445**-447	448-459	460-468
5	419-442	443-449	**450**-452	453-463	464-472
6	418-441	442-450	**451**-453	454-464	465-478
7	419-444	445-453	**454**-456	457-468	469-482
8	422-448	449-457	**458**-461	462-472	473-487

Grade	MAP									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-187	1-23	188-197	24-47	**198**-201	48-57	202-214	58-85	215-350	86-99
4	100-196	1-26	197-205	27-48	**206**-209	49-59	210-225	60-90	226-350	91-99
5	100-203	1-28	204-212	29-51	**213**-216	52-62	217-231	63-90	232-350	91-99
6	100-200	1-14	201-213	15-43	**214**-217	44-54	218-230	55-84	231-350	85-99
7	100-203	1-16	204-216	17-45	**217**-220	46-56	221-235	57-87	236-350	88-99
8	100-207	1-21	208-220	22-51	**221**-225	52-63	226-240	64-90	241-350	91-99

Notes. 1. %ile=percentile.

2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.

TABLE 2. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN EOG AND MAP MATH (WHEN MAP IS TAKEN IN SPRING)

Grade	EOG				
	Level 1	Level 2	Level 3	Level 4	Level 5
3	422-439	440-447	**448**-450	451-459	460-472
4	424-440	441-448	**449**-450	451-459	460-473
5	426-440	441-448	**449**-450	451-459	460-475
6	428-443	444-450	**451**-452	453-460	461-476
7	428-443	444-450	**451**-452	453-460	461-476
8	426-443	444-451	**452**-453	454-462	463-477

Grade	MAP									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-189	1-15	190-199	16-38	**200**-202	39-47	203-213	48-76	214-350	77-99
4	100-202	1-23	203-212	24-47	**213**-215	48-55	216-227	56-82	228-350	83-99
5	100-209	1-23	210-221	24-50	**222**-224	51-57	225-237	58-84	238-350	85-99
6	100-216	1-29	217-227	30-55	**228**-230	56-62	231-241	63-83	242-350	84-99
7	100-221	1-34	222-232	35-58	**233**-235	59-65	236-248	66-86	249-350	87-99
8	100-223	1-34	224-238	35-65	**239**-242	66-72	243-256	73-90	257-350	91-99

Notes. 1. %ile=percentile.

2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.

TABLE 3. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN EOG ELA AND MAP READING (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING EOG TESTS)

Grade	EOG				
	Level 1	Level 2	Level 3	Level 4	Level 5
3	406-431	432-438	**439**-441	442-451	452-462
4	412-438	439-444	**445**-447	448-459	460-468
5	419-442	443-449	**450**-452	453-463	464-472
6	418-441	442-450	**451**-453	454-464	465-478
7	419-444	445-453	**454**-456	457-468	469-482
8	422-448	449-457	**458**-461	462-472	473-487

Grade	MAP FALL									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-175	1-20	176-186	21-45	**187**-191	46-58	192-207	59-88	208-350	89-99
4	100-187	1-24	188-197	25-48	**198**-202	49-60	203-220	61-92	221-350	93-99
5	100-196	1-27	197-206	28-52	**207**-211	53-64	212-228	65-93	229-350	94-99
6	100-193	1-12	194-208	13-43	**209**-213	44-56	214-228	57-87	229-350	88-99
7	100-197	1-13	198-212	14-44	**213**-217	45-57	218-233	58-89	234-350	90-99
8	100-202	1-17	203-217	18-50	**218**-223	51-65	224-238	66-91	239-350	92-99

Grade	MAP WINTER									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-183	1-21	184-194	22-47	**195**-198	48-57	199-212	58-86	213-350	87-99
4	100-193	1-24	194-203	25-49	**204**-207	50-60	208-224	61-91	225-350	92-99
5	100-201	1-28	202-210	29-51	**211**-214	52-62	215-230	63-92	231-350	93-99
6	100-198	1-13	199-211	14-42	**212**-216	43-56	217-229	57-85	230-350	86-99
7	100-201	1-15	202-215	16-46	**216**-219	47-56	220-234	57-87	235-350	88-99
8	100-205	1-18	206-219	19-51	**220**-224	52-63	225-239	64-90	240-350	91-99

Notes. 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.

TABLE 4. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN EOG AND MAP MATH (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING EOG TESTS)

Grade	EOG				
	Level 1	Level 2	Level 3	Level 4	Level 5
3	422-439	440-447	**448**-450	451-459	460-472
4	424-440	441-448	**449**-450	451-459	460-473
5	426-440	441-448	**449**-450	451-459	460-475
6	428-443	444-450	**451**-452	453-460	461-476
7	428-443	444-450	**451**-452	453-460	461-476
8	426-443	444-451	**452**-453	454-462	463-477

Grade	MAP FALL									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-175	1-12	176-186	13-38	**187**-189	39-47	190-201	48-80	202-350	81-99
4	100-190	1-20	191-200	21-45	**201**-203	46-54	204-216	55-85	217-350	86-99
5	100-199	1-20	200-211	21-50	**212**-214	51-58	215-227	59-86	228-350	87-99
6	100-208	1-27	209-219	28-54	**220**-222	55-62	223-234	63-86	235-350	87-99
7	100-215	1-33	216-226	34-59	**227**-229	60-66	230-242	67-88	243-350	89-99
8	100-218	1-33	219-234	34-67	**235**-238	68-75	239-252	76-92	253-350	93-99

Grade	MAP WINTER									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-183	1-13	184-194	14-39	**195**-197	40-47	198-208	48-78	209-350	79-99
4	100-197	1-21	198-207	22-46	**208**-210	47-54	211-222	55-83	223-350	84-99
5	100-205	1-22	206-217	23-50	**218**-220	51-58	221-233	59-85	234-350	86-99
6	100-213	1-29	214-224	30-56	**225**-227	57-63	228-238	64-84	239-350	85-99
7	100-219	1-34	220-230	35-60	**231**-233	61-66	234-246	67-88	247-350	89-99
8	100-221	1-33	222-236	34-65	**237**-240	66-73	241-254	74-91	255-350	92-99

Notes. 1. %ile=percentile.

2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.

Consistency Rate of Classification

Consistency rate of classification (Pommerich, Hanson, Harris, & Sconing, 2004), expressed in the form of a rate between 0 and 1, provides a means to measure the departure from equity for concordances (Hanson et al., 2001). This index can also be used as an indicator for the predictive validity of the MAP tests, i.e., how accurately the MAP scores can predict a student's proficiency status in the EOG test. For each pair of concordant scores, a classification is considered consistent if the examinee is classified into the same performance category regardless of the test used for making a decision. Consistency rate provided in this report can be calculated as, for the "proficient" performance category concordant scores, the percentage of examinees who score at or above both concordant scores plus the percentage of examinees whose score below both concordant scores on each test. Higher consistency rate indicates stronger congruence between EOG and MAP scores. The results in Table 5 demonstrate that on average, MAP reading scores can consistently classify students' proficiency (Level 3 or higher) status on EOG ELA test approximately 82% of the time and MAP math scores can consistently classify students on EOG math test approximately 85% of the time. Those numbers are high suggesting that both MAP reading and math tests are great predictors of the students' proficiency status on the EOG tests.

TABLE 5. CONSISTENCY RATE OF CLASSIFICATION FOR MAP AND EOG LEVEL 3 EQUIPERCENTILE CONCORDANCES

Grade	ELA/Reading			Math		
	Consistency Rate	False		Consistency Rate	False	
		Positives	Negatives		Positives	Negatives
3	0.83	0.08	0.09	0.83	0.07	0.10
4	0.82	0.09	0.09	0.86	0.07	0.07
5	0.81	0.09	0.10	0.85	0.07	0.08
6	0.82	0.09	0.09	0.85	0.06	0.09
7	0.81	0.09	0.10	0.86	0.07	0.07
8	0.82	0.09	0.09	0.86	0.06	0.08

Proficiency Projection

Proficiency projection tells how likely a student is classified as "proficient" on EOG tests based on his/her observed MAP scores. The conditional growth norms provided in the 2015 MAP Norms were used to calculate this information (Thum & Hauser, 2015). The results of proficiency projection and corresponding probability of achieving "proficient" on the EOG tests are presented in Tables 6 to 8. These tables estimate the probability of scoring at Level 3 or above on EOG in the spring and the prior fall or winter testing season. For example, if a 3rd grade student obtained a MAP math score of 192 in the fall, the probability of obtaining a Level 3 or higher EOG score in the spring of 3rd grade is 78%. Table 6 presents the estimated probability of meeting Level 3 benchmark when MAP is taken in the spring, whereas Tables 7 and 8 present the estimated probability of meeting Level 3 benchmark when MAP is taken in the fall or winter prior to taking the EOG tests.

TABLE 6. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING EOG LEVEL 3 (PROFICIENT) WHEN MAP IS TAKEN IN THE SPRING

Grade	ELA/Reading					Math				
	Start %ile	RIT Spring	Projected Proficiency			Start %ile	RIT Spring	Projected Proficiency		
			Cut Score	Level 3	Prob.			Cut Score	Level 3	Prob.
3	5	174	198	No	<0.01	5	181	200	No	<0.01
	10	179	198	No	<0.01	10	186	200	No	<0.01
	15	183	198	No	<0.01	15	189	200	No	<0.01
	20	186	198	No	<0.01	20	192	200	No	<0.01
	25	188	198	No	<0.01	25	194	200	No	0.02
	30	191	198	No	0.01	30	196	200	No	0.08
	35	193	198	No	0.06	35	198	200	No	0.25
	40	195	198	No	0.17	40	200	200	Yes	0.50
	45	197	198	No	0.38	45	202	200	Yes	0.75
	50	199	198	Yes	0.62	50	203	200	Yes	0.85
	55	201	198	Yes	0.83	55	205	200	Yes	0.96
	60	202	198	Yes	0.89	60	207	200	Yes	0.99
	65	204	198	Yes	0.97	65	209	200	Yes	>0.99
	70	207	198	Yes	>0.99	70	211	200	Yes	>0.99
	75	209	198	Yes	>0.99	75	213	200	Yes	>0.99
	80	211	198	Yes	>0.99	80	215	200	Yes	>0.99
	85	214	198	Yes	>0.99	85	218	200	Yes	>0.99
	90	218	198	Yes	>0.99	90	221	200	Yes	>0.99
	95	223	198	Yes	>0.99	95	226	200	Yes	>0.99
4	5	181	206	No	<0.01	5	189	213	No	<0.01
	10	187	206	No	<0.01	10	194	213	No	<0.01
	15	190	206	No	<0.01	15	198	213	No	<0.01
	20	193	206	No	<0.01	20	201	213	No	<0.01
	25	196	206	No	<0.01	25	203	213	No	<0.01
	30	198	206	No	0.01	30	206	213	No	0.01
	35	200	206	No	0.03	35	208	213	No	0.04
	40	202	206	No	0.11	40	210	213	No	0.15
	45	204	206	No	0.27	45	212	213	No	0.37
	50	206	206	Yes	0.50	50	213	213	Yes	0.50
	55	208	206	Yes	0.73	55	215	213	Yes	0.75
	60	210	206	Yes	0.89	60	217	213	Yes	0.92
	65	212	206	Yes	0.97	65	219	213	Yes	0.98
	70	214	206	Yes	0.99	70	221	213	Yes	>0.99
	75	216	206	Yes	>0.99	75	224	213	Yes	>0.99
	80	218	206	Yes	>0.99	80	226	213	Yes	>0.99
	85	221	206	Yes	>0.99	85	229	213	Yes	>0.99
	90	225	206	Yes	>0.99	90	233	213	Yes	>0.99
	95	230	206	Yes	>0.99	95	238	213	Yes	>0.99

TABLE 6. (CONTINUED)

Grade	ELA/Reading					Math				
	Start %ile	RIT Spring	Projected Proficiency			Start %ile	RIT Spring	Projected Proficiency		
			Cut Score	Level 3	Prob.			Cut Score	Level 3	Prob.
5	5	188	213	No	<0.01	5	195	222	No	<0.01
	10	193	213	No	<0.01	10	201	222	No	<0.01
	15	197	213	No	<0.01	15	205	222	No	<0.01
	20	199	213	No	<0.01	20	208	222	No	<0.01
	25	202	213	No	<0.01	25	210	222	No	<0.01
	30	204	213	No	<0.01	30	213	222	No	<0.01
	35	206	213	No	0.01	35	215	222	No	0.01
	40	208	213	No	0.06	40	217	222	No	0.04
	45	210	213	No	0.17	45	219	222	No	0.15
	50	212	213	No	0.38	50	221	222	No	0.37
	55	214	213	Yes	0.62	55	223	222	Yes	0.63
	60	216	213	Yes	0.83	60	225	222	Yes	0.85
	65	217	213	Yes	0.89	65	228	222	Yes	0.98
	70	220	213	Yes	0.99	70	230	222	Yes	>0.99
	75	222	213	Yes	>0.99	75	232	222	Yes	>0.99
	80	224	213	Yes	>0.99	80	235	222	Yes	>0.99
	85	227	213	Yes	>0.99	85	238	222	Yes	>0.99
	90	231	213	Yes	>0.99	90	242	222	Yes	>0.99
	95	236	213	Yes	>0.99	95	248	222	Yes	>0.99
6	5	192	214	No	<0.01	5	198	228	No	<0.01
	10	197	214	No	<0.01	10	204	228	No	<0.01
	15	201	214	No	<0.01	15	208	228	No	<0.01
	20	203	214	No	<0.01	20	211	228	No	<0.01
	25	206	214	No	0.01	25	214	228	No	<0.01
	30	208	214	No	0.03	30	217	228	No	<0.01
	35	210	214	No	0.11	35	219	228	No	<0.01
	40	212	214	No	0.27	40	221	228	No	0.01
	45	214	214	Yes	0.50	45	223	228	No	0.04
	50	216	214	Yes	0.73	50	225	228	No	0.15
	55	218	214	Yes	0.89	55	227	228	No	0.37
	60	219	214	Yes	0.94	60	230	228	Yes	0.75
	65	221	214	Yes	0.99	65	232	228	Yes	0.92
	70	223	214	Yes	>0.99	70	234	228	Yes	0.98
	75	226	214	Yes	>0.99	75	237	228	Yes	>0.99
	80	228	214	Yes	>0.99	80	239	228	Yes	>0.99
	85	231	214	Yes	>0.99	85	243	228	Yes	>0.99
	90	235	214	Yes	>0.99	90	247	228	Yes	>0.99
	95	240	214	Yes	>0.99	95	253	228	Yes	>0.99

TABLE 6. (CONTINUED)

Grade	ELA/Reading					Math				
	Start %ile	RIT Spring	Projected Proficiency			Start %ile	RIT Spring	Projected Proficiency		
			Cut Score	Level 3	Prob.			Cut Score	Level 3	Prob.
7	5	193	217	No	<0.01	5	199	233	No	<0.01
	10	199	217	No	<0.01	10	206	233	No	<0.01
	15	202	217	No	<0.01	15	210	233	No	<0.01
	20	205	217	No	<0.01	20	214	233	No	<0.01
	25	208	217	No	<0.01	25	217	233	No	<0.01
	30	210	217	No	0.01	30	219	233	No	<0.01
	35	212	217	No	0.06	35	222	233	No	<0.01
	40	214	217	No	0.17	40	224	233	No	<0.01
	45	216	217	No	0.38	45	226	233	No	0.01
	50	218	217	Yes	0.62	50	229	233	No	0.08
	55	220	217	Yes	0.83	55	231	233	No	0.25
	60	222	217	Yes	0.94	60	233	233	Yes	0.50
	65	224	217	Yes	0.99	65	235	233	Yes	0.75
	70	226	217	Yes	>0.99	70	238	233	Yes	0.96
	75	228	217	Yes	>0.99	75	241	233	Yes	>0.99
	80	231	217	Yes	>0.99	80	244	233	Yes	>0.99
	85	234	217	Yes	>0.99	85	247	233	Yes	>0.99
	90	238	217	Yes	>0.99	90	251	233	Yes	>0.99
	95	243	217	Yes	>0.99	95	258	233	Yes	>0.99
8	5	194	221	No	<0.01	5	199	239	No	<0.01
	10	200	221	No	<0.01	10	206	239	No	<0.01
	15	204	221	No	<0.01	15	211	239	No	<0.01
	20	207	221	No	<0.01	20	215	239	No	<0.01
	25	209	221	No	<0.01	25	218	239	No	<0.01
	30	212	221	No	<0.01	30	221	239	No	<0.01
	35	214	221	No	0.01	35	224	239	No	<0.01
	40	216	221	No	0.06	40	226	239	No	<0.01
	45	218	221	No	0.17	45	229	239	No	<0.01
	50	220	221	No	0.38	50	231	239	No	<0.01
	55	222	221	Yes	0.62	55	233	239	No	0.02
	60	224	221	Yes	0.83	60	236	239	No	0.15
	65	226	221	Yes	0.94	65	238	239	No	0.37
	70	228	221	Yes	0.99	70	241	239	Yes	0.75
	75	231	221	Yes	>0.99	75	244	239	Yes	0.96
	80	233	221	Yes	>0.99	80	247	239	Yes	>0.99
	85	236	221	Yes	>0.99	85	251	239	Yes	>0.99
	90	240	221	Yes	>0.99	90	255	239	Yes	>0.99
	95	246	221	Yes	>0.99	95	262	239	Yes	>0.99

Note. %ile=percentile

TABLE 7. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING EOG ELA LEVEL 3 (PROFICIENT) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING EOG TESTS

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut Score	Level 3	Prob.			Cut Score	Level 3	Prob.
3	5	162	198	No	<0.01	5	171	198	No	<0.01
	10	168	198	No	0.01	10	176	198	No	<0.01
	15	172	198	No	0.03	15	180	198	No	<0.01
	20	175	198	No	0.06	20	183	198	No	0.02
	25	178	198	No	0.13	25	185	198	No	0.04
	30	180	198	No	0.20	30	188	198	No	0.13
	35	182	198	No	0.24	35	190	198	No	0.17
	40	184	198	No	0.34	40	192	198	No	0.28
	45	186	198	No	0.44	45	194	198	No	0.42
	50	188	198	Yes	0.50	50	196	198	Yes	0.58
	55	190	198	Yes	0.61	55	198	198	Yes	0.72
	60	192	198	Yes	0.71	60	199	198	Yes	0.78
	65	194	198	Yes	0.76	65	201	198	Yes	0.87
	70	197	198	Yes	0.87	70	204	198	Yes	0.96
	75	199	198	Yes	0.92	75	206	198	Yes	0.97
	80	202	198	Yes	0.95	80	208	198	Yes	0.99
	85	205	198	Yes	0.98	85	211	198	Yes	>0.99
	90	209	198	Yes	0.99	90	215	198	Yes	>0.99
	95	214	198	Yes	>0.99	95	221	198	Yes	>0.99
4	5	173	206	No	<0.01	5	179	206	No	<0.01
	10	178	206	No	0.01	10	184	206	No	<0.01
	15	182	206	No	0.02	15	188	206	No	<0.01
	20	185	206	No	0.05	20	191	206	No	0.01
	25	188	206	No	0.09	25	194	206	No	0.04
	30	190	206	No	0.15	30	196	206	No	0.08
	35	192	206	No	0.23	35	198	206	No	0.16
	40	194	206	No	0.27	40	200	206	No	0.28
	45	196	206	No	0.38	45	202	206	No	0.35
	50	198	206	Yes	0.50	50	204	206	Yes	0.50
	55	200	206	Yes	0.56	55	205	206	Yes	0.58
	60	202	206	Yes	0.67	60	207	206	Yes	0.72
	65	204	206	Yes	0.77	65	209	206	Yes	0.84
	70	206	206	Yes	0.85	70	211	206	Yes	0.92
	75	209	206	Yes	0.91	75	214	206	Yes	0.98
	80	211	206	Yes	0.95	80	216	206	Yes	0.99
	85	214	206	Yes	0.97	85	219	206	Yes	>0.99
	90	218	206	Yes	0.99	90	223	206	Yes	>0.99
	95	224	206	Yes	>0.99	95	228	206	Yes	>0.99

TABLE 7. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency Cut-Score	Projected Proficiency Level 3	Projected Proficiency Prob.	Start %ile	RIT Winter	Projected Proficiency Cut-Score	Projected Proficiency Level 3	Projected Proficiency Prob.
5	5	181	213	No	<0.01	5	186	213	No	<0.01
	10	186	213	No	<0.01	10	191	213	No	<0.01
	15	190	213	No	0.01	15	195	213	No	<0.01
	20	193	213	No	0.04	20	197	213	No	0.01
	25	195	213	No	0.07	25	200	213	No	0.03
	30	198	213	No	0.12	30	202	213	No	0.04
	35	200	213	No	0.19	35	204	213	No	0.09
	40	202	213	No	0.28	40	206	213	No	0.17
	45	204	213	No	0.33	45	208	213	No	0.28
	50	206	213	No	0.44	50	210	213	No	0.42
	55	208	213	Yes	0.56	55	212	213	Yes	0.58
	60	210	213	Yes	0.67	60	214	213	Yes	0.72
	65	212	213	Yes	0.72	65	215	213	Yes	0.78
	70	214	213	Yes	0.81	70	218	213	Yes	0.91
	75	216	213	Yes	0.88	75	220	213	Yes	0.94
	80	218	213	Yes	0.91	80	222	213	Yes	0.97
	85	221	213	Yes	0.96	85	225	213	Yes	0.99
	90	225	213	Yes	0.99	90	229	213	Yes	>0.99
	95	231	213	Yes	>0.99	95	234	213	Yes	>0.99
6	5	186	214	No	<0.01	5	190	214	No	<0.01
	10	192	214	No	0.01	10	196	214	No	<0.01
	15	196	214	No	0.06	15	199	214	No	0.01
	20	198	214	No	0.07	20	202	214	No	0.03
	25	201	214	No	0.16	25	204	214	No	0.06
	30	203	214	No	0.23	30	207	214	No	0.17
	35	205	214	No	0.33	35	209	214	No	0.28
	40	207	214	No	0.39	40	211	214	No	0.42
	45	209	214	Yes	0.50	45	212	214	Yes	0.50
	50	211	214	Yes	0.61	50	214	214	Yes	0.65
	55	213	214	Yes	0.72	55	216	214	Yes	0.72
	60	215	214	Yes	0.77	60	218	214	Yes	0.83
	65	217	214	Yes	0.84	65	220	214	Yes	0.91
	70	219	214	Yes	0.90	70	222	214	Yes	0.96
	75	221	214	Yes	0.93	75	224	214	Yes	0.98
	80	224	214	Yes	0.97	80	226	214	Yes	0.99
	85	226	214	Yes	0.99	85	229	214	Yes	>0.99
	90	230	214	Yes	>0.99	90	233	214	Yes	>0.99
	95	236	214	Yes	>0.99	95	238	214	Yes	>0.99

TABLE 7. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut-Score	Level 3	Prob.			Cut-Score	Level 3	Prob.
7	5	189	217	No	<0.01	5	192	217	No	<0.01
	10	195	217	No	0.01	10	198	217	No	<0.01
	15	199	217	No	0.04	15	201	217	No	<0.01
	20	202	217	No	0.07	20	204	217	No	0.02
	25	204	217	No	0.12	25	207	217	No	0.06
	30	206	217	No	0.19	30	209	217	No	0.12
	35	209	217	No	0.28	35	211	217	No	0.22
	40	211	217	No	0.39	40	213	217	No	0.28
	45	213	217	Yes	0.50	45	215	217	No	0.42
	50	214	217	Yes	0.56	50	217	217	Yes	0.58
	55	216	217	Yes	0.61	55	219	217	Yes	0.72
	60	218	217	Yes	0.72	60	221	217	Yes	0.83
	65	220	217	Yes	0.81	65	223	217	Yes	0.91
	70	222	217	Yes	0.88	70	225	217	Yes	0.96
	75	225	217	Yes	0.93	75	227	217	Yes	0.98
	80	227	217	Yes	0.96	80	230	217	Yes	>0.99
	85	230	217	Yes	0.99	85	232	217	Yes	>0.99
	90	234	217	Yes	>0.99	90	236	217	Yes	>0.99
	95	240	217	Yes	>0.99	95	242	217	Yes	>0.99
8	5	191	221	No	<0.01	5	194	221	No	<0.01
	10	197	221	No	0.01	10	199	221	No	<0.01
	15	201	221	No	0.03	15	203	221	No	<0.01
	20	204	221	No	0.06	20	206	221	No	0.01
	25	207	221	No	0.10	25	209	221	No	0.02
	30	209	221	No	0.16	30	211	221	No	0.05
	35	211	221	No	0.22	35	213	221	No	0.10
	40	213	221	No	0.26	40	215	221	No	0.18
	45	215	221	No	0.35	45	217	221	No	0.29
	50	217	221	No	0.45	50	219	221	No	0.43
	55	219	221	Yes	0.55	55	221	221	Yes	0.57
	60	221	221	Yes	0.60	60	223	221	Yes	0.71
	65	223	221	Yes	0.69	65	225	221	Yes	0.82
	70	225	221	Yes	0.78	70	227	221	Yes	0.90
	75	228	221	Yes	0.84	75	229	221	Yes	0.95
	80	230	221	Yes	0.90	80	232	221	Yes	0.98
	85	234	221	Yes	0.96	85	235	221	Yes	0.99
	90	237	221	Yes	0.98	90	239	221	Yes	>0.99
	95	243	221	Yes	>0.99	95	244	221	Yes	>0.99

Note. %ile=percentile

TABLE 8. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING EOG MATH LEVEL 3 (PROFICIENT) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING EOG TESTS

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut Score	Level 3	Prob.			Cut Score	Level 3	Prob.
3	5	169	200	No	<0.01	5	176	200	No	<0.01
	10	174	200	No	0.03	10	181	200	No	<0.01
	15	177	200	No	0.08	15	184	200	No	0.02
	20	179	200	No	0.14	20	187	200	No	0.05
	25	182	200	No	0.27	25	189	200	No	0.10
	30	184	200	No	0.32	30	191	200	No	0.20
	35	185	200	No	0.38	35	193	200	No	0.34
	40	187	200	Yes	0.50	40	195	200	Yes	0.50
	45	189	200	Yes	0.62	45	197	200	Yes	0.66
	50	190	200	Yes	0.68	50	198	200	Yes	0.74
	55	192	200	Yes	0.78	55	200	200	Yes	0.86
	60	194	200	Yes	0.86	60	202	200	Yes	0.93
	65	195	200	Yes	0.89	65	203	200	Yes	0.95
	70	197	200	Yes	0.94	70	205	200	Yes	0.98
	75	199	200	Yes	0.96	75	207	200	Yes	0.99
	80	201	200	Yes	0.98	80	209	200	Yes	>0.99
	85	204	200	Yes	0.99	85	212	200	Yes	>0.99
	90	207	200	Yes	>0.99	90	215	200	Yes	>0.99
	95	212	200	Yes	>0.99	95	220	200	Yes	>0.99
4	5	179	213	No	<0.01	5	185	213	No	<0.01
	10	184	213	No	<0.01	10	190	213	No	<0.01
	15	188	213	No	0.02	15	194	213	No	<0.01
	20	190	213	No	0.04	20	197	213	No	0.01
	25	193	213	No	0.11	25	199	213	No	0.03
	30	195	213	No	0.17	30	201	213	No	0.07
	35	197	213	No	0.27	35	203	213	No	0.14
	40	198	213	No	0.32	40	205	213	No	0.26
	45	200	213	No	0.44	45	207	213	No	0.42
	50	202	213	Yes	0.56	50	209	213	Yes	0.58
	55	204	213	Yes	0.68	55	211	213	Yes	0.74
	60	205	213	Yes	0.68	60	212	213	Yes	0.80
	65	207	213	Yes	0.78	65	214	213	Yes	0.90
	70	209	213	Yes	0.86	70	216	213	Yes	0.95
	75	211	213	Yes	0.92	75	218	213	Yes	0.98
	80	214	213	Yes	0.97	80	221	213	Yes	>0.99
	85	216	213	Yes	0.99	85	223	213	Yes	>0.99
	90	220	213	Yes	>0.99	90	227	213	Yes	>0.99
	95	225	213	Yes	>0.99	95	232	213	Yes	>0.99

TABLE 8. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut-Score	Level 3	Prob.			Cut-Score	Level 3	Prob.
5	5	187	222	No	<0.01	5	192	222	No	<0.01
	10	193	222	No	<0.01	10	198	222	No	<0.01
	15	196	222	No	0.01	15	201	222	No	<0.01
	20	199	222	No	0.03	20	204	222	No	<0.01
	25	202	222	No	0.07	25	207	222	No	0.01
	30	204	222	No	0.12	30	209	222	No	0.03
	35	206	222	No	0.19	35	211	222	No	0.07
	40	208	222	No	0.28	40	213	222	No	0.15
	45	210	222	No	0.38	45	215	222	No	0.27
	50	211	222	No	0.44	50	217	222	No	0.42
	55	213	222	Yes	0.56	55	219	222	Yes	0.58
	60	215	222	Yes	0.67	60	221	222	Yes	0.73
	65	217	222	Yes	0.77	65	223	222	Yes	0.85
	70	219	222	Yes	0.85	70	225	222	Yes	0.93
	75	221	222	Yes	0.91	75	228	222	Yes	0.98
	80	224	222	Yes	0.96	80	230	222	Yes	0.99
	85	227	222	Yes	0.99	85	233	222	Yes	>0.99
	90	230	222	Yes	>0.99	90	237	222	Yes	>0.99
	95	236	222	Yes	>0.99	95	242	222	Yes	>0.99
6	5	192	228	No	<0.01	5	196	228	No	<0.01
	10	198	228	No	<0.01	10	202	228	No	<0.01
	15	202	228	No	<0.01	15	205	228	No	<0.01
	20	205	228	No	0.01	20	209	228	No	<0.01
	25	207	228	No	0.03	25	211	228	No	<0.01
	30	209	228	No	0.05	30	214	228	No	0.01
	35	212	228	No	0.12	35	216	228	No	0.03
	40	214	228	No	0.19	40	218	228	No	0.07
	45	216	228	No	0.28	45	220	228	No	0.15
	50	218	228	No	0.38	50	222	228	No	0.27
	55	220	228	Yes	0.50	55	224	228	No	0.42
	60	222	228	Yes	0.62	60	226	228	Yes	0.58
	65	224	228	Yes	0.72	65	228	228	Yes	0.73
	70	226	228	Yes	0.81	70	230	228	Yes	0.85
	75	228	228	Yes	0.88	75	233	228	Yes	0.95
	80	231	228	Yes	0.95	80	236	228	Yes	0.99
	85	234	228	Yes	0.97	85	239	228	Yes	>0.99
	90	238	228	Yes	0.99	90	243	228	Yes	>0.99
	95	243	228	Yes	>0.99	95	248	228	Yes	>0.99

TABLE 8. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut-Score	Level 3	Prob.			Cut-Score	Level 3	Prob.
7	5	195	233	No	<0.01	5	198	233	No	<0.01
	10	201	233	No	<0.01	10	204	233	No	<0.01
	15	205	233	No	<0.01	15	208	233	No	<0.01
	20	209	233	No	<0.01	20	212	233	No	<0.01
	25	211	233	No	0.01	25	215	233	No	<0.01
	30	214	233	No	0.02	30	217	233	No	<0.01
	35	216	233	No	0.05	35	220	233	No	0.01
	40	218	233	No	0.08	40	222	233	No	0.03
	45	221	233	No	0.18	45	224	233	No	0.07
	50	223	233	No	0.27	50	226	233	No	0.15
	55	225	233	No	0.38	55	228	233	No	0.26
	60	227	233	Yes	0.50	60	230	233	No	0.42
	65	229	233	Yes	0.62	65	233	233	Yes	0.66
	70	231	233	Yes	0.73	70	235	233	Yes	0.80
	75	234	233	Yes	0.86	75	238	233	Yes	0.93
	80	237	233	Yes	0.94	80	240	233	Yes	0.97
	85	240	233	Yes	0.98	85	244	233	Yes	>0.99
	90	244	233	Yes	>0.99	90	248	233	Yes	>0.99
	95	250	233	Yes	>0.99	95	254	233	Yes	>0.99
8	5	197	239	No	<0.01	5	199	239	No	<0.01
	10	203	239	No	<0.01	10	206	239	No	<0.01
	15	208	239	No	<0.01	15	210	239	No	<0.01
	20	211	239	No	<0.01	20	214	239	No	<0.01
	25	214	239	No	<0.01	25	217	239	No	<0.01
	30	217	239	No	0.01	30	220	239	No	<0.01
	35	219	239	No	0.02	35	222	239	No	<0.01
	40	222	239	No	0.06	40	225	239	No	0.01
	45	224	239	No	0.10	45	227	239	No	0.02
	50	226	239	No	0.15	50	229	239	No	0.06
	55	229	239	No	0.26	55	231	239	No	0.12
	60	231	239	No	0.35	60	234	239	No	0.28
	65	233	239	No	0.45	65	236	239	No	0.42
	70	236	239	Yes	0.55	70	239	239	Yes	0.65
	75	238	239	Yes	0.65	75	241	239	Yes	0.79
	80	241	239	Yes	0.78	80	245	239	Yes	0.94
	85	245	239	Yes	0.90	85	248	239	Yes	0.99
	90	249	239	Yes	0.97	90	253	239	Yes	>0.99
	95	256	239	Yes	>0.99	95	259	239	Yes	>0.99

Note. %ile=percentile

Summary and Discussion

This study produced a set of cut scores on MAP reading and math tests for Grades 3 to 8 that correspond to each EOG performance level. By using matched score data from a sample of students from North Carolina , the study demonstrates that MAP scores can accurately predict whether a student could be proficient or above on the basis of his/her MAP scores. This study also used the NWEA 2015 RIT Scale norming study results to project a student's probability to meet proficiency based on that student's prior MAP scores in fall and winter. These results will help educators predict student performance in EOG tests as early as possible and identify those students who are at risk of failing to meet required standards so that they can receive necessary resources and assistance to meet their goals.

While concordance tables can be helpful and informative, they have general limitations. First, the concordance tables provide information about score comparability on different tests, but the scores cannot be assumed to be interchangeable. In the case for EOG and MAP tests, as they are not parallel in content, scores from these two tests should not be directly compared. Second, the sample data used in this study were collected from 3 school districts, which may limit the generalizability of the results to test takers who differ significantly from this sample. Finally, cautions should also be exercised if the concorded scores are used for a subpopulation. NWEA will continue to gather information about EOG performance from other school districts in North Carolina to enhance the quality and generalizability of the study.

References

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Appendix

Data and Analysis

Data

Data used in this study were collected from 3 school districts in North Carolina. The sample contained matched EOG ELA and MAP reading scores from 34,029 students in Grades 3 to 8 and matched EOG and MAP math scores from 33,974 students in Grades 3 to 8 who completed both EOG and MAP in the spring of 2013.

To understand the statistical characteristics of the test scores, descriptive statistics are provided in Table A1. As Table A1 indicates, the correlation coefficients between MAP reading and EOG ELA scores range from 0.77 to 0.82, and the correlation coefficients between MAP and EOG math scores range from 0.82 to 0.86. All these correlations indicate a strong relationship between MAP and EOG test scores.

TABLE A1. DESCRIPTIVE STATISTICS OF THE SAMPLE DATA

Subject	Grade	N	r	EOG				MAP			
				Mean	SD	Min	Max	Mean	SD	Min	Max
ELA/ Reading	3	6,503	0.82	440	9.95	410	462	199	14.40	144	242
	4	7,115	0.79	446	9.43	417	468	207	13.78	143	255
	5	6,898	0.80	450	9.26	423	473	213	13.00	152	250
	6	4,623	0.78	455	9.87	416	478	218	13.43	152	262
	7	4,495	0.77	458	9.84	425	483	222	13.39	142	265
	8	4,395	0.78	461	10.38	422	488	225	14.81	152	271
Math	3	6,527	0.82	450	9.29	425	473	202	11.40	145	265
	4	7,033	0.84	450	9.17	425	475	215	12.43	138	273
	5	6,823	0.85	450	9.31	426	475	223	13.87	157	273
	6	4,588	0.85	452	9.60	427	476	228	14.45	158	298
	7	4,529	0.86	452	9.54	429	476	234	16.00	158	312
	8	4,474	0.85	452	9.82	429	478	238	18.18	151	321

Equipercentile Linking Procedure

The equipercentile procedure (e.g., Kolen & Brennan, 2004) was used to establish the concordance relationship between EOG and MAP scores for grades 3 to 8 in ELA/reading and math. This procedure matches scores on the two scales that have the same percentile rank (i.e., the proportion of scores at or below each score).

Suppose we need to establish the concorded scores between two tests. x is a score on Test X (e.g., EOG). Its equipercentile equivalent score on Test Y (e.g., MAP), $e_y(x)$, can be obtained through a cumulative-distribution-based linking function defined in Equation (A1):

$$e_y(x) = G^{-1}[P(x)] \qquad \text{(A1)}$$

where $e_y(x)$ is the equipercentile equivalent of scores on EOG on the scale of MAP, $P(x)$ is the percentile rank of a given score on Test X. G^{-1} is the inverse of the percentile rank function for scores on Test Y which indicates the scores on Test Y corresponding to a given percentile. Polynomial loglinear pre-smoothing was applied to reduce irregularities of the frequency distributions as well as equipercentile linking curve.

Consistency rate of Classification

Consistency rate of classification accuracy, expressed in the form of a rate between 0 and 1, measures the extent to which MAP scores (and the estimated MAP cut scores) accurately predicted whether students in the sample would be proficient (i.e., Level 3 or higher) on EOG tests.

To calculate consistency rate of classification, sample students were designated "Below EOG cut" or "At or above EOG cut" based on their actual EOG scores. Similarly, they were also designated as "Below MAP cut" or "At or above MAP cut" based on their actual MAP scores. A 2-way contingency table was then tabulated (see Table A2), classifying students as "Proficient" on the basis of EOG cut score and concordant MAP cut score. Students classified in the *true positive* (TP) category were those predicted to be Proficient based on the MAP cut scores and were also classified as Proficient based on the EOG cut scores. Students classified in the *true negative* (TN) category were those predicted to be Not Proficient based on the MAP cut scores and were also classified as Not Proficient based on the EOG cut scores. Students classified in the *false positive* (FP) category were those predicted to be Proficient based on the MAP cut scores but were classified as Not Proficient based on the EOG cut scores. Students classified in the *false negative* (FN) category were those predicated to be Not Proficient based on the MAP cut scores but were classified as Proficient based on the EOG cut scores. The overall consistency rate of classification was computed as the proportion of correct classifications among the entire sample by (TP+TN) / (TP+TN+FP+FN).

TABLE A2. DEFINITION OF CONSISTENCY RATE FOR EOG TO MAP CONCORDANCE

		EOG Score	
		Below EOG cut	At or Above EOG cut
MAP Score	Below MAP cut	True Negative	False Positive
	At or Above MAP cut	False Negative	True Positive

Note. Shaded cells are summed to compute the consistency rate.

Proficiency Projection

MAP conditional growth norms provide student's expected gain scores across testing seasons (Thum & Hauser, 2015). This information is utilized to predict a student's performance on EOG based on that student's MAP scores in prior seasons (e.g. fall and winter). The probability of a student achieving Level 3 (Proficient) on EOG, based on his/her fall or winter MAP score is given in Equation (A2):

$$Pr(Achieveing\ Level\ 3\ in\ spring | a\ RIT\ score\ of\ x) = 1 - \Phi\left(\frac{x + g - c}{SD}\right) \qquad (A2)$$

where, Φ is a standardized normal cumulative distribution, x is the student's RIT score in fall or winter, g is the expected growth from fall or winter to spring corresponding to x, c is the MAP cut-score for spring, and SD is the conditional standard deviation of growth from fall or winter to spring.

For the probability of a student achieving Level 3 on the EOG tests, based on his/her spring score s, it can be calculated by Equation (A3):

$$Pr(Achieveing\ Level\ 3\ in\ spring | a\ RIT\ score\ of\ s\ in\ spring) = 1 - \Phi\left(\frac{s - c}{SE}\right) \qquad (A3)$$

where *SE* is the standard error of measurement for MAP reading or math test.