Linking the Minnesota MCA-III Assessments to NWEA MAP Tests

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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 Minnesota Comprehensive Assessments-Series III (MCA-III) reading 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 MCA-III reading 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 MCA-III 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

MCA-III includes a series of achievement tests aligned to the Minnesota K-12 Academic Standards in English Language Arts (ELA) and math for grades 3-8 and 10-11, and science for grades 5 and 8. MCA-III tests are delivered online. For each grade and subject, there are three cut scores that distinguish between performance levels: Level 1: *Does not meet the standards*, Level 2: *Partially meets the standards*, Level 3: *Meets the standards*, and Level 4: *Exceeds the standards*. 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 Minnesota State Standards.

Unlike MCA-III, 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 MCA-III Readiness Levels

Tables 1 to 4 report the MCA-III scaled scores associated with each of the four performance levels, as well as the estimated cut scores on the MAP tests associated with the MCA-III 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 MCA-III performance level, based on their observed MAP scores. For example, a 5th grade student who obtained a MAP math score of 240 in the spring testing season is likely to be at the very high end of Level 3 (Meets) on the MCA-III taken during that same testing season (see Table 2). Similarly, a 3rd grade student who obtained a MAP reading score of 215 in the fall testing season is likely to be at Level 4 (Exceeds) on the MCA-III taken in the spring of 3rd grade (see Table 3).

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

Grade	MCA-III			
	Level 1 *Does not meet*	Level 2 *Partially Meets*	Level 3 *Meets*	Level 4 *Exceeds*
3	301-339	340-349	**350**-373	374-399
4	411-439	440-449	**450**-465	466-490
5	517-539	540-549	**550**-566	567-591
6	606-639	640-649	**650**-666	667-699
7	703-739	740-749	**750**-766	767-798
8	802-839	840-849	**850**-866	867-898

Grade	MAP							
	Level 1 *Does not meet*		Level 2 *Partially Meets*		Level 3 *Meets*		Level 4 *Exceeds*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-194	1-39	195-200	40-54	**201**-216	55-88	217-350	89-99
4	100-200	1-35	201-209	36-59	**210**-222	60-86	223-350	87-99
5	100-201	1-24	202-212	25-51	**213**-228	52-87	229-350	88-99
6	100-209	1-33	210-216	34-52	**217**-228	53-80	229-350	81-99
7	100-215	1-43	216-223	44-63	**224**-236	64-88	237-350	89-99
8	100-219	1-48	220-226	49-65	**227**-238	66-87	239-350	88-99

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 MCA-III AND MAP MATH (WHEN MAP IS TAKEN IN SPRING)

Grade	MCA-III			
	Level 1 *Does not meet*	Level 2 *Partially Meets*	Level 3 *Meets*	Level 4 *Exceeds*
3	315-339	340-349	**350**-365	366-399
4	409-439	440-449	**450**-465	466-499
5	515-539	540-549	**550**-562	563-586
6	611-639	640-649	**650**-661	662-688
7	718-739	740-749	**750**-759	760-782
8	813-839	840-849	**850**-860	861-888

Grade	MAP							
	Level 1 *Does not meet*		Level 2 *Partially Meets*		Level 3 *Meets*		Level 4 *Exceeds*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-193	1-23	194-201	24-44	**202**-215	45-80	216-350	81-99
4	100-204	1-27	205-212	28-47	**213**-226	48-80	227-350	81-99
5	100-214	1-33	215-227	34-64	**228**-243	65-91	244-350	92-99
6	100-221	1-40	222-231	41-64	**232**-244	65-87	245-350	88-99
7	100-222	1-36	223-236	37-67	**237**-250	68-89	251-350	90-99
8	100-224	1-36	225-237	37-63	**238**-251	64-85	252-350	86-99

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 MCA-III AND MAP READING (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING MCA-III TESTS)

Grade	MCA-III			
	Level 1 *Does not meet*	Level 2 *Partially Meets*	Level 3 *Meets*	Level 4 *Exceeds*
3	301-339	340-349	**350**-373	374-399
4	411-439	440-449	**450**-465	466-490
5	517-539	540-549	**550**-566	567-591
6	606-639	640-649	**650**-666	667-699
7	703-739	740-749	**750**-766	767-798
8	802-839	840-849	**850**-866	867-898

Grade	MAP FALL							
	Level 1 *Does not meet*		Level 2 *Partially Meets*		Level 3 *Meets*		Level 4 *Exceeds*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-183	1-38	184-190	39-55	**191**-209	56-90	210-350	91-99
4	100-191	1-33	192-202	34-60	**203**-217	61-89	218-350	90-99
5	100-193	1-21	194-206	22-52	**207**-225	53-90	226-350	91-99
6	100-203	1-30	204-211	31-51	**212**-225	52-83	226-350	84-99
7	100-211	1-42	212-220	43-65	**221**-234	66-90	235-350	91-99
8	100-216	1-48	217-224	49-67	**225**-236	68-88	237-350	89-99

Grade	MAP WINTER							
	Level 1 *Does not meet*		Level 2 *Partially Meets*		Level 3 *Meets*		Level 4 *Exceeds*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-191	1-39	192-197	40-54	**198**-214	55-89	215-350	90-99
4	100-197	1-34	198-207	35-60	**208**-221	61-88	222-350	89-99
5	100-198	1-21	199-210	22-51	**211**-227	52-88	228-350	89-99
6	100-207	1-32	208-215	33-53	**216**-227	54-81	228-350	82-99
7	100-214	1-43	215-222	44-64	**223**-235	65-89	236-350	90-99
8	100-218	1-48	219-225	49-66	**226**-237	67-88	238-350	89-99

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 MCA-III AND MAP MATH (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING MCA-III TESTS)

Grade	MCA-III			
	Level 1 *Does not meet*	Level 2 *Partially Meets*	Level 3 *Meets*	Level 4 *Exceeds*
3	315-339	340-349	**350**-365	366-399
4	409-439	440-449	**450**-465	466-499
5	515-539	540-549	**550**-562	563-586
6	611-639	640-649	**650**-661	662-688
7	718-739	740-749	**750**-759	760-782
8	813-839	840-849	**850**-860	861-888

Grade	MAP FALL							
	Level 1 *Does not meet*		Level 2 *Partially Meets*		Level 3 *Meets*		Level 4 *Exceeds*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-179	1-20	180-188	21-44	**189**-203	45-84	204-350	85-99
4	100-192	1-24	193-200	25-45	**201**-215	46-83	216-350	84-99
5	100-204	1-31	205-217	32-66	**218**-233	67-93	234-350	94-99
6	100-213	1-39	214-223	40-64	**224**-237	65-89	238-350	90-99
7	100-216	1-35	217-230	36-68	**231**-244	69-90	245-350	91-99
8	100-219	1-35	220-233	36-65	**234**-247	66-88	248-350	89-99

Grade	MAP WINTER							
	Level 1 *Does not meet*		Level 2 *Partially Meets*		Level 3 *Meets*		Level 4 *Exceeds*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-188	1-23	189-196	24-44	**197**-210	45-82	211-350	83-99
4	100-199	1-25	200-207	26-46	**208**-221	47-81	222-350	82-99
5	100-210	1-33	211-223	34-65	**224**-239	66-92	240-350	93-99
6	100-218	1-41	219-228	42-65	**229**-241	66-88	242-350	89-99
7	100-220	1-37	221-234	38-68	**235**-248	69-90	249-350	91-99
8	100-222	1-35	223-235	36-63	**236**-249	64-86	250-350	87-99

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 MCA-III 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 who score below both concordant scores on each test. Higher consistency rate indicates stronger congruence between MCA-III and MAP cut scores. The results in Table 5 demonstrate that MAP reading scores can consistently classify students' proficiency (Level 3 or higher) status on MCA-III reading test 84-86% of the time and MAP math scores can consistently classify students on MCA-III math test 86-90% 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 MCA-III tests.

TABLE 5. CONSISTENCY RATE OF CLASSIFICATION FOR MAP AND MCA-III LEVEL 3 EQUIPERCENTILE CONCORDANCES

Grade	Reading			Math		
	Consistency Rate	False Positives	False Negatives	Consistency Rate	False Positives	False Negatives
3	0.86	0.08	0.06	0.90	0.06	0.04
4	0.85	0.07	0.08	0.90	0.06	0.04
5	0.86	0.06	0.08	0.88	0.06	0.06
6	0.86	0.08	0.06	0.89	0.05	0.06
7	0.84	0.08	0.08	0.88	0.06	0.06
8	0.85	0.07	0.08	0.86	0.07	0.07

Proficiency Projection

Proficiency projection tells how likely a student is classified as "proficient" on MCA-III 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 MCA-III

tests are presented in Tables 6 to 8. These tables estimate the probability of scoring at Level 3 or above on MCA-III in the spring and the prior fall or winter testing season. For example, if a 3rd grade student obtained a MAP reading score of 202 in the fall, the probability of obtaining a Level 3 or higher MCA-III score in the spring of 3rd grade is 90%. 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 MCA-III tests.

TABLE 6. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING MCA-III LEVEL 3 (MEETS) WHEN MAP IS TAKEN IN THE SPRING

Grade	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	201	No	<0.01	5	181	202	No	<0.01
	10	179	201	No	<0.01	10	186	202	No	<0.01
	15	183	201	No	<0.01	15	189	202	No	<0.01
	20	186	201	No	<0.01	20	192	202	No	<0.01
	25	188	201	No	<0.01	25	194	202	No	<0.01
	30	191	201	No	<0.01	30	196	202	No	0.02
	35	193	201	No	0.01	35	198	202	No	0.08
	40	195	201	No	0.03	40	200	202	No	0.25
	45	197	201	No	0.11	45	202	202	Yes	0.50
	50	199	201	No	0.27	50	203	202	Yes	0.63
	55	201	201	Yes	0.50	55	205	202	Yes	0.85
	60	202	201	Yes	0.62	60	207	202	Yes	0.96
	65	204	201	Yes	0.83	65	209	202	Yes	0.99
	70	207	201	Yes	0.97	70	211	202	Yes	>0.99
	75	209	201	Yes	0.99	75	213	202	Yes	>0.99
	80	211	201	Yes	>0.99	80	215	202	Yes	>0.99
	85	214	201	Yes	>0.99	85	218	202	Yes	>0.99
	90	218	201	Yes	>0.99	90	221	202	Yes	>0.99
	95	223	201	Yes	>0.99	95	226	202	Yes	>0.99
4	5	181	210	No	<0.01	5	189	213	No	<0.01
	10	187	210	No	<0.01	10	194	213	No	<0.01
	15	190	210	No	<0.01	15	198	213	No	<0.01
	20	193	210	No	<0.01	20	201	213	No	<0.01
	25	196	210	No	<0.01	25	203	213	No	<0.01
	30	198	210	No	<0.01	30	206	213	No	0.01
	35	200	210	No	<0.01	35	208	213	No	0.04
	40	202	210	No	0.01	40	210	213	No	0.15
	45	204	210	No	0.03	45	212	213	No	0.37
	50	206	210	No	0.11	50	213	213	Yes	0.50
	55	208	210	No	0.27	55	215	213	Yes	0.75
	60	210	210	Yes	0.50	60	217	213	Yes	0.92
	65	212	210	Yes	0.73	65	219	213	Yes	0.98
	70	214	210	Yes	0.89	70	221	213	Yes	>0.99
	75	216	210	Yes	0.97	75	224	213	Yes	>0.99
	80	218	210	Yes	0.99	80	226	213	Yes	>0.99
	85	221	210	Yes	>0.99	85	229	213	Yes	>0.99
	90	225	210	Yes	>0.99	90	233	213	Yes	>0.99
	95	230	210	Yes	>0.99	95	238	213	Yes	>0.99

TABLE 6. (CONTINUED)

Grade	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	228	No	<0.01
	10	193	213	No	<0.01	10	201	228	No	<0.01
	15	197	213	No	<0.01	15	205	228	No	<0.01
	20	199	213	No	<0.01	20	208	228	No	<0.01
	25	202	213	No	<0.01	25	210	228	No	<0.01
	30	204	213	No	<0.01	30	213	228	No	<0.01
	35	206	213	No	0.01	35	215	228	No	<0.01
	40	208	213	No	0.06	40	217	228	No	<0.01
	45	210	213	No	0.17	45	219	228	No	<0.01
	50	212	213	No	0.38	50	221	228	No	0.01
	55	214	213	Yes	0.62	55	223	228	No	0.04
	60	216	213	Yes	0.83	60	225	228	No	0.15
	65	217	213	Yes	0.89	65	228	228	Yes	0.50
	70	220	213	Yes	0.99	70	230	228	Yes	0.75
	75	222	213	Yes	>0.99	75	232	228	Yes	0.92
	80	224	213	Yes	>0.99	80	235	228	Yes	0.99
	85	227	213	Yes	>0.99	85	238	228	Yes	>0.99
	90	231	213	Yes	>0.99	90	242	228	Yes	>0.99
	95	236	213	Yes	>0.99	95	248	228	Yes	>0.99
6	5	192	217	No	<0.01	5	198	232	No	<0.01
	10	197	217	No	<0.01	10	204	232	No	<0.01
	15	201	217	No	<0.01	15	208	232	No	<0.01
	20	203	217	No	<0.01	20	211	232	No	<0.01
	25	206	217	No	<0.01	25	214	232	No	<0.01
	30	208	217	No	<0.01	30	217	232	No	<0.01
	35	210	217	No	0.01	35	219	232	No	<0.01
	40	212	217	No	0.06	40	221	232	No	<0.01
	45	214	217	No	0.17	45	223	232	No	<0.01
	50	216	217	No	0.38	50	225	232	No	0.01
	55	218	217	Yes	0.62	55	227	232	No	0.04
	60	219	217	Yes	0.73	60	230	232	No	0.25
	65	221	217	Yes	0.89	65	232	232	Yes	0.50
	70	223	217	Yes	0.97	70	234	232	Yes	0.75
	75	226	217	Yes	>0.99	75	237	232	Yes	0.96
	80	228	217	Yes	>0.99	80	239	232	Yes	0.99
	85	231	217	Yes	>0.99	85	243	232	Yes	>0.99
	90	235	217	Yes	>0.99	90	247	232	Yes	>0.99
	95	240	217	Yes	>0.99	95	253	232	Yes	>0.99

TABLE 6. (CONTINUED)

Grade	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	224	No	<0.01	5	199	237	No	<0.01
	10	199	224	No	<0.01	10	206	237	No	<0.01
	15	202	224	No	<0.01	15	210	237	No	<0.01
	20	205	224	No	<0.01	20	214	237	No	<0.01
	25	208	224	No	<0.01	25	217	237	No	<0.01
	30	210	224	No	<0.01	30	219	237	No	<0.01
	35	212	224	No	<0.01	35	222	237	No	<0.01
	40	214	224	No	<0.01	40	224	237	No	<0.01
	45	216	224	No	0.01	45	226	237	No	<0.01
	50	218	224	No	0.03	50	229	237	No	<0.01
	55	220	224	No	0.11	55	231	237	No	0.02
	60	222	224	No	0.27	60	233	237	No	0.08
	65	224	224	Yes	0.50	65	235	237	No	0.25
	70	226	224	Yes	0.73	70	238	237	Yes	0.63
	75	228	224	Yes	0.89	75	241	237	Yes	0.92
	80	231	224	Yes	0.99	80	244	237	Yes	0.99
	85	234	224	Yes	>0.99	85	247	237	Yes	>0.99
	90	238	224	Yes	>0.99	90	251	237	Yes	>0.99
	95	243	224	Yes	>0.99	95	258	237	Yes	>0.99
8	5	194	227	No	<0.01	5	199	238	No	<0.01
	10	200	227	No	<0.01	10	206	238	No	<0.01
	15	204	227	No	<0.01	15	211	238	No	<0.01
	20	207	227	No	<0.01	20	215	238	No	<0.01
	25	209	227	No	<0.01	25	218	238	No	<0.01
	30	212	227	No	<0.01	30	221	238	No	<0.01
	35	214	227	No	<0.01	35	224	238	No	<0.01
	40	216	227	No	<0.01	40	226	238	No	<0.01
	45	218	227	No	<0.01	45	229	238	No	<0.01
	50	220	227	No	0.01	50	231	238	No	0.01
	55	222	227	No	0.06	55	233	238	No	0.04
	60	224	227	No	0.17	60	236	238	No	0.25
	65	226	227	No	0.38	65	238	238	Yes	0.50
	70	228	227	Yes	0.62	70	241	238	Yes	0.85
	75	231	227	Yes	0.89	75	244	238	Yes	0.98
	80	233	227	Yes	0.97	80	247	238	Yes	>0.99
	85	236	227	Yes	>0.99	85	251	238	Yes	>0.99
	90	240	227	Yes	>0.99	90	255	238	Yes	>0.99
	95	246	227	Yes	>0.99	95	262	238	Yes	>0.99

Note. %ile=percentile

TABLE 7. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING MCA-III READING LEVEL 3 (MEETS) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING MCA-III 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	201	No	<0.01	5	171	201	No	<0.01
	10	168	201	No	<0.01	10	176	201	No	<0.01
	15	172	201	No	0.01	15	180	201	No	<0.01
	20	175	201	No	0.03	20	183	201	No	<0.01
	25	178	201	No	0.06	25	185	201	No	0.01
	30	180	201	No	0.10	30	188	201	No	0.04
	35	182	201	No	0.13	35	190	201	No	0.06
	40	184	201	No	0.20	40	192	201	No	0.13
	45	186	201	No	0.29	45	194	201	No	0.22
	50	188	201	No	0.34	50	196	201	No	0.35
	55	190	201	No	0.44	55	198	201	Yes	0.50
	60	192	201	Yes	0.56	60	199	201	Yes	0.58
	65	194	201	Yes	0.61	65	201	201	Yes	0.72
	70	197	201	Yes	0.76	70	204	201	Yes	0.87
	75	199	201	Yes	0.84	75	206	201	Yes	0.91
	80	202	201	Yes	0.90	80	208	201	Yes	0.96
	85	205	201	Yes	0.95	85	211	201	Yes	0.99
	90	209	201	Yes	0.98	90	215	201	Yes	>0.99
	95	214	201	Yes	>0.99	95	221	201	Yes	>0.99
4	5	173	210	No	<0.01	5	179	210	No	<0.01
	10	178	210	No	<0.01	10	184	210	No	<0.01
	15	182	210	No	<0.01	15	188	210	No	<0.01
	20	185	210	No	0.01	20	191	210	No	<0.01
	25	188	210	No	0.03	25	194	210	No	0.01
	30	190	210	No	0.05	30	196	210	No	0.02
	35	192	210	No	0.09	35	198	210	No	0.04
	40	194	210	No	0.12	40	200	210	No	0.08
	45	196	210	No	0.18	45	202	210	No	0.12
	50	198	210	No	0.27	50	204	210	No	0.22
	55	200	210	No	0.33	55	205	210	No	0.28
	60	202	210	No	0.44	60	207	210	No	0.42
	65	204	210	Yes	0.56	65	209	210	Yes	0.58
	70	206	210	Yes	0.67	70	211	210	Yes	0.72
	75	209	210	Yes	0.77	75	214	210	Yes	0.88
	80	211	210	Yes	0.85	80	216	210	Yes	0.94
	85	214	210	Yes	0.91	85	219	210	Yes	0.98
	90	218	210	Yes	0.97	90	223	210	Yes	>0.99
	95	224	210	Yes	>0.99	95	228	210	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.
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	217	No	<0.01	5	190	217	No	<0.01
	10	192	217	No	<0.01	10	196	217	No	<0.01
	15	196	217	No	0.02	15	199	217	No	<0.01
	20	198	217	No	0.03	20	202	217	No	0.01
	25	201	217	No	0.07	25	204	217	No	0.02
	30	203	217	No	0.12	30	207	217	No	0.06
	35	205	217	No	0.19	35	209	217	No	0.12
	40	207	217	No	0.23	40	211	217	No	0.22
	45	209	217	No	0.33	45	212	217	No	0.28
	50	211	217	No	0.44	50	214	217	No	0.42
	55	213	217	Yes	0.56	55	216	217	Yes	0.50
	60	215	217	Yes	0.61	60	218	217	Yes	0.65
	65	217	217	Yes	0.72	65	220	217	Yes	0.78
	70	219	217	Yes	0.81	70	222	217	Yes	0.88
	75	221	217	Yes	0.84	75	224	217	Yes	0.94
	80	224	217	Yes	0.93	80	226	217	Yes	0.97
	85	226	217	Yes	0.96	85	229	217	Yes	0.99
	90	230	217	Yes	0.99	90	233	217	Yes	>0.99
	95	236	217	Yes	>0.99	95	238	217	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	224	No	<0.01	5	192	224	No	<0.01
	10	195	224	No	<0.01	10	198	224	No	<0.01
	15	199	224	No	<0.01	15	201	224	No	<0.01
	20	202	224	No	0.01	20	204	224	No	<0.01
	25	204	224	No	0.01	25	207	224	No	<0.01
	30	206	224	No	0.03	30	209	224	No	0.01
	35	209	224	No	0.05	35	211	224	No	0.02
	40	211	224	No	0.10	40	213	224	No	0.03
	45	213	224	No	0.15	45	215	224	No	0.06
	50	214	224	No	0.19	50	217	224	No	0.12
	55	216	224	No	0.23	55	219	224	No	0.22
	60	218	224	No	0.33	60	221	224	No	0.35
	65	220	224	No	0.44	65	223	224	Yes	0.50
	70	222	224	Yes	0.56	70	225	224	Yes	0.65
	75	225	224	Yes	0.67	75	227	224	Yes	0.78
	80	227	224	Yes	0.77	80	230	224	Yes	0.91
	85	230	224	Yes	0.88	85	232	224	Yes	0.94
	90	234	224	Yes	0.95	90	236	224	Yes	0.99
	95	240	224	Yes	0.99	95	242	224	Yes	>0.99
8	5	191	227	No	<0.01	5	194	227	No	<0.01
	10	197	227	No	<0.01	10	199	227	No	<0.01
	15	201	227	No	<0.01	15	203	227	No	<0.01
	20	204	227	No	0.01	20	206	227	No	<0.01
	25	207	227	No	0.02	25	209	227	No	<0.01
	30	209	227	No	0.04	30	211	227	No	<0.01
	35	211	227	No	0.06	35	213	227	No	0.01
	40	213	227	No	0.08	40	215	227	No	0.02
	45	215	227	No	0.13	45	217	227	No	0.05
	50	217	227	No	0.19	50	219	227	No	0.10
	55	219	227	No	0.26	55	221	227	No	0.18
	60	221	227	No	0.31	60	223	227	No	0.29
	65	223	227	No	0.40	65	225	227	No	0.43
	70	225	227	Yes	0.50	70	227	227	Yes	0.57
	75	228	227	Yes	0.60	75	229	227	Yes	0.71
	80	230	227	Yes	0.69	80	232	227	Yes	0.82
	85	234	227	Yes	0.84	85	235	227	Yes	0.93
	90	237	227	Yes	0.90	90	239	227	Yes	0.99
	95	243	227	Yes	0.98	95	244	227	Yes	>0.99

Note. %ile=percentile

TABLE 8. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING MCA-III MATH LEVEL 3 (MEETS) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING MCA-III 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	202	No	<0.01	5	176	202	No	<0.01
	10	174	202	No	0.01	10	181	202	No	<0.01
	15	177	202	No	0.04	15	184	202	No	0.01
	20	179	202	No	0.08	20	187	202	No	0.02
	25	182	202	No	0.17	25	189	202	No	0.05
	30	184	202	No	0.22	30	191	202	No	0.10
	35	185	202	No	0.27	35	193	202	No	0.20
	40	187	202	No	0.38	40	195	202	No	0.34
	45	189	202	Yes	0.50	45	197	202	Yes	0.50
	50	190	202	Yes	0.56	50	198	202	Yes	0.58
	55	192	202	Yes	0.68	55	200	202	Yes	0.74
	60	194	202	Yes	0.78	60	202	202	Yes	0.86
	65	195	202	Yes	0.83	65	203	202	Yes	0.90
	70	197	202	Yes	0.89	70	205	202	Yes	0.95
	75	199	202	Yes	0.92	75	207	202	Yes	0.98
	80	201	202	Yes	0.96	80	209	202	Yes	0.99
	85	204	202	Yes	0.99	85	212	202	Yes	>0.99
	90	207	202	Yes	>0.99	90	215	202	Yes	>0.99
	95	212	202	Yes	>0.99	95	220	202	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	228	No	<0.01	5	192	228	No	<0.01
	10	193	228	No	<0.01	10	198	228	No	<0.01
	15	196	228	No	<0.01	15	201	228	No	<0.01
	20	199	228	No	<0.01	20	204	228	No	<0.01
	25	202	228	No	0.01	25	207	228	No	<0.01
	30	204	228	No	0.02	30	209	228	No	<0.01
	35	206	228	No	0.04	35	211	228	No	<0.01
	40	208	228	No	0.07	40	213	228	No	0.01
	45	210	228	No	0.12	45	215	228	No	0.03
	50	211	228	No	0.15	50	217	228	No	0.07
	55	213	228	No	0.23	55	219	228	No	0.15
	60	215	228	No	0.33	60	221	228	No	0.27
	65	217	228	No	0.44	65	223	228	No	0.42
	70	219	228	Yes	0.56	70	225	228	Yes	0.58
	75	221	228	Yes	0.67	75	228	228	Yes	0.80
	80	224	228	Yes	0.81	80	230	228	Yes	0.89
	85	227	228	Yes	0.91	85	233	228	Yes	0.97
	90	230	228	Yes	0.96	90	237	228	Yes	>0.99
	95	236	228	Yes	>0.99	95	242	228	Yes	>0.99
6	5	192	232	No	<0.01	5	196	232	No	<0.01
	10	198	232	No	<0.01	10	202	232	No	<0.01
	15	202	232	No	<0.01	15	205	232	No	<0.01
	20	205	232	No	<0.01	20	209	232	No	<0.01
	25	207	232	No	0.01	25	211	232	No	<0.01
	30	209	232	No	0.01	30	214	232	No	<0.01
	35	212	232	No	0.04	35	216	232	No	<0.01
	40	214	232	No	0.07	40	218	232	No	0.01
	45	216	232	No	0.12	45	220	232	No	0.03
	50	218	232	No	0.19	50	222	232	No	0.07
	55	220	232	No	0.28	55	224	232	No	0.15
	60	222	232	No	0.38	60	226	232	No	0.27
	65	224	232	Yes	0.50	65	228	232	No	0.42
	70	226	232	Yes	0.62	70	230	232	Yes	0.58
	75	228	232	Yes	0.72	75	233	232	Yes	0.80
	80	231	232	Yes	0.85	80	236	232	Yes	0.93
	85	234	232	Yes	0.91	85	239	232	Yes	0.98
	90	238	232	Yes	0.97	90	243	232	Yes	>0.99
	95	243	232	Yes	>0.99	95	248	232	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	237	No	<0.01	5	198	237	No	<0.01
	10	201	237	No	<0.01	10	204	237	No	<0.01
	15	205	237	No	<0.01	15	208	237	No	<0.01
	20	209	237	No	<0.01	20	212	237	No	<0.01
	25	211	237	No	<0.01	25	215	237	No	<0.01
	30	214	237	No	<0.01	30	217	237	No	<0.01
	35	216	237	No	0.01	35	220	237	No	<0.01
	40	218	237	No	0.02	40	222	237	No	<0.01
	45	221	237	No	0.06	45	224	237	No	0.01
	50	223	237	No	0.11	50	226	237	No	0.03
	55	225	237	No	0.18	55	228	237	No	0.07
	60	227	237	No	0.27	60	230	237	No	0.15
	65	229	237	No	0.38	65	233	237	No	0.34
	70	231	237	Yes	0.50	70	235	237	Yes	0.50
	75	234	237	Yes	0.68	75	238	237	Yes	0.74
	80	237	237	Yes	0.82	80	240	237	Yes	0.85
	85	240	237	Yes	0.92	85	244	237	Yes	0.97
	90	244	237	Yes	0.98	90	248	237	Yes	>0.99
	95	250	237	Yes	>0.99	95	254	237	Yes	>0.99
8	5	197	238	No	<0.01	5	199	238	No	<0.01
	10	203	238	No	<0.01	10	206	238	No	<0.01
	15	208	238	No	<0.01	15	210	238	No	<0.01
	20	211	238	No	<0.01	20	214	238	No	<0.01
	25	214	238	No	0.01	25	217	238	No	<0.01
	30	217	238	No	0.02	30	220	238	No	<0.01
	35	219	238	No	0.03	35	222	238	No	<0.01
	40	222	238	No	0.08	40	225	238	No	0.01
	45	224	238	No	0.12	45	227	238	No	0.04
	50	226	238	No	0.18	50	229	238	No	0.08
	55	229	238	No	0.30	55	231	238	No	0.16
	60	231	238	No	0.40	60	234	238	No	0.35
	65	233	238	Yes	0.50	65	236	238	Yes	0.50
	70	236	238	Yes	0.60	70	239	238	Yes	0.72
	75	238	238	Yes	0.70	75	241	238	Yes	0.84
	80	241	238	Yes	0.82	80	245	238	Yes	0.96
	85	245	238	Yes	0.92	85	248	238	Yes	0.99
	90	249	238	Yes	0.98	90	253	238	Yes	>0.99
	95	256	238	Yes	>0.99	95	259	238	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 MCA-III performance level. By using matched score data from a sample of students from Minnesota, 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 2015 NWEA 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 MCA-III 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 MCA-III 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 30 school districts in Minnesota, 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 MCA-III performance from other schools in Minnesota to enhance the quality and generalizability of the study.

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Appendix

Data and Analysis

Data

Data used in this study were collected from 30 school districts in Minnesota. The sample contained matched MCA-III and MAP reading scores from 36,844 students in Grades 3 to 8 and matched MCA-III and MAP math scores from 35,665 students in Grades 3 to 8 who completed both MCA-III and MAP in the spring of 2015.

To understand the statistical characteristics of the test scores, descriptive statistics are provided in Table A1 below. As Table A1 indicates, the correlation coefficients between MAP and MCA-III reading scores range from 0.85 to 0.86, and the correlation coefficients between MAP and MCA-III math scores range from 0.89 to 0.92. In general, all these correlations indicate a strong relationship between MAP and MCA-III test scores.

TABLE A1. DESCRIPTIVE STATISTICS OF THE SAMPLE DATA

				MCA-III				MAP			
Subject	**Grade**	**N**	***r***	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Reading	3	6706	0.86	352.70	21.17	301	475	202.26	15.58	141	242
	4	6460	0.85	452.40	15.38	411	552	211.00	14.53	141	250
	5	6513	0.85	555.02	14.48	411	633	217.01	14.62	143	258
	6	5964	0.85	655.08	17.85	606	699	220.66	13.71	143	261
	7	5886	0.86	751.75	17.16	703	798	224.79	13.74	150	275
	8	5315	0.85	850.60	18.86	802	898	226.72	14.26	149	272
Math	3	6737	0.90	357.34	15.80	315	457	208.84	14.00	143	269
	4	6458	0.90	458.95	17.54	409	537	221.15	15.50	152	281
	5	6566	0.90	552.46	13.45	420	635	230.88	16.90	148	292
	6	5876	0.92	650.93	14.33	611	688	233.33	16.02	159	288
	7	5535	0.91	750.48	11.49	718	782	237.79	16.61	154	311
	8	4493	0.89	850.35	13.78	813	888	238.70	18.29	150	295

Equipercentile Linking Procedure

The equipercentile procedure (e.g., Kolen & Brennan, 2004) was used to establish the concordance relationship between MCA-III and MAP scores for grades 3 to 8 in 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., MCA-III). 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):

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

where $e_y(x)$ is the equipercentile equivalent of scores on MCA-III 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 MCA-III tests.

To calculate consistency rate of classification, sample students were designated “Below MCA-III cut” or “At or above MCA-III cut” based on their actual MCA-III 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 MCA-III 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 MCA-III 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 MCA-III 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 MCA-III 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 MCA-III 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 MCA-III TO MAP CONCORDANCE

		MCA-III Score	
		Below MCA-III cut	At or Above MCA-III 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 the MCA-III based on that student's MAP scores in prior seasons (e.g. fall and winter). The probability of a student achieving Level 3 (Meets) on MCA-III, 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 MCA-III 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.

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