# WISCONSIN LINKING STUDY

A Study of the Alignment of the NWEA RIT Scale with Wisconsin's Knowledge and Concepts Exam (WKCE)

August 2012



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# A STUDY OF THE ALIGNMENT OF THE NWEA RIT SCALE WITH THE WISCONSIN KNOWLEDGE AND CONCEPTS EXAM (WKCE)

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Recently, NWEA completed a project to connect the scale of Wisconsin's Knowledge and Concepts Exam (WKCE) used for Wisconsin's math and reading assessments with NWEA's RIT scale. Information from the state assessments was used in a study to establish performance-level scores on the RIT scale that would indicate a good chance of success on these tests.

To perform the analysis, we linked together state test and NWEA test results for a sample of 21,608 Wisconsin students from at least 58 schools who completed both exams in the fall of 2008. The Wisconsin state test is administered in the fall. For the fall season (labeled "current season"), an Equipercentile method was used to estimate the RIT score equivalent to each state performance level. For spring (labeled "prior season"), we determined the percentage of the population within the selected study group that performed at each level on the state test and found the equivalent percentile ranges within the NWEA dataset to estimate the cut scores. For example, if 40% of the study group population in grade 3 mathematics performed below the proficient level on the state test, we would find the RIT score that would be equivalent to the $40^{th}$ percentile for the study population (this would not be the same as the $40^{th}$ percentile in the NWEA norms). This RIT score would be the estimated point on the NWEA RIT scale that would be equivalent to the minimum score for proficiency on the state test. Documentation about this method can be found on our website.

Table Sets 1 and 2 show the best estimate of the minimum RIT equivalent to each state performance level for current-season (fall) and prior-season (spring) RIT scores. These tables can be used to identify students who may need additional help to perform well on these tests.

Table Sets 3 and 4 show the estimated probability of a student receiving a proficient score on the state assessment, based on that student's RIT score. These tables can be used to assist in identifying students who are not likely to pass these assessments, thereby increasing the probability that intervention strategies will be planned and implemented. These tables can also be useful for identifying target RIT-score objectives likely to correspond to successful or "proficient" performance on the state test.

Table 5 shows the correlation coefficients between MAP and the state test in each grade. These statistics show the degree to which MAP and the state test are linearly related, with values at or near 1.0 suggesting a perfect linear relationship, and values near 0.0 indicating no linear relationship. Table 6 shows the percentages of students at each grade and within each subject whose status on the state test (i.e., whether or not the student "met standards") was accurately predicted by their MAP performance and using the estimated cut scores within the current study. This table can be used to understand the predictive validity of MAP with respect to the WKCE.

## TABLE SET 1 – MINIMUM ESTIMATED CURRENT-SEASON (FALL) RIT CUT SCORES CORRESPONDING TO STATE PERFORMANCE LEVELS

| MATH - Current Season | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cut Scores and Percentiles for each State Performance Level | | | | | | | |
| Grade | Minimal Performance | Basic | | Proficient | | Advanced | |
| | Cut Score | Cut Score | Percentile | Cut Score | Percentile | Cut Score | Percentile |
| 2 | <165 | 165 | 15 | 180 | 56 | 195 | 90 |
| 3 | <179 | 179 | 15 | 194 | 56 | 208 | 90 |
| 4 | <189 | 189 | 13 | 204 | 51 | 220 | 89 |
| 5 | <198 | 198 | 15 | 212 | 47 | 229 | 87 |
| 6 | <206 | 206 | 19 | 222 | 56 | 238 | 88 |
| 7 | <212 | 212 | 21 | 227 | 53 | 243 | 85 |
| 8 | <217 | 217 | 22 | 235 | 61 | 252 | 90 |
| READING - Current Season | | | | | | | |
| Cut Scores and Percentiles for each State Performance Level | | | | | | | |
| Grade | Minimal Performance | Basic | | Proficient | | Advanced | |
| | Cut Score | Cut Score | Percentile | Cut Score | Percentile | Cut Score | Percentile |
| 2 | <168 | 168 | 32 | 183 | 68 | 196 | 90 |
| 3 | <183 | 183 | 32 | 197 | 68 | 209 | 90 |
| 4 | <194 | 194 | 34 | 206 | 67 | 217 | 89 |
| 5 | <200 | 200 | 31 | 212 | 63 | 225 | 90 |
| 6 | <206 | 206 | 33 | 218 | 65 | 232 | 91 |
| 7 | <208 | 208 | 28 | 222 | 66 | 236 | 92 |
| 8 | <210 | 210 | 27 | 227 | 70 | 242 | 94 |

*Note: the cut scores shown in this table are the **minimum** estimated scores. Meeting the minimum MAP cut score corresponds to a 50% probability of achieving that performance level. Use the probabilities in Table Set 3 to determine the appropriate 'target' scores for a desired level of certainty. Italics represent extrapolated data.

## TABLE SET 2 – MINIMUM ESTIMATED PRIOR-SEASON (SPRING) RIT CUT SCORES CORRESPONDING TO STATE PERFORMANCE LEVELS

| MATH – Prior Season | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cut Scores and Percentiles for each State Performance Level | | | | | | | |
| Grade | Minimal Performance | Basic | | Proficient | | Advanced | |
| | Cut Score | Cut Score | Percentile | Cut Score | Percentile | Cut Score | Percentile |
| 2 in Spring (3 in Fall) | <178 | 178 | 14 | 193 | 55 | 207 | 89 |
| 3 in Spring (4 in Fall) | <188 | 188 | 12 | 203 | 50 | 219 | 89 |
| 4 in Spring (5 in Fall) | <198 | 198 | 15 | 211 | 46 | 228 | 86 |
| 5 in Spring (6 in Fall) | <208 | 208 | 19 | 223 | 55 | 238 | 87 |
| 6 in Spring (7 in Fall) | <212 | 212 | 20 | 227 | 53 | 242 | 85 |
| 7 in Spring (8 in Fall) | <217 | 217 | 22 | 235 | 60 | 253 | 90 |
| READING – Prior Season | | | | | | | |
| Cut Scores and Percentiles for each State Performance Level | | | | | | | |
| Grade | Minimal Performance | Basic | | Proficient | | Advanced | |
| | Cut Score | Cut Score | Percentile | Cut Score | Percentile | Cut Score | Percentile |
| 2 in Spring (3 in Fall) | <182 | 182 | 30 | 196 | 67 | 209 | 90 |
| 3 in Spring (4 in Fall) | <193 | 193 | 33 | 205 | 66 | 217 | 89 |
| 4 in Spring (5 in Fall) | <199 | 199 | 29 | 211 | 62 | 225 | 90 |
| 5 in Spring (6 in Fall) | <206 | 206 | 33 | 217 | 63 | 231 | 91 |
| 6 in Spring (7 in Fall) | <208 | 208 | 28 | 222 | 65 | 237 | 92 |
| 7 in Spring (8 in Fall) | <211 | 211 | 27 | 227 | 69 | 242 | 94 |

*Note: the cut scores shown in this table are the **minimum** estimated scores. Meeting the minimum MAP cut score corresponds to a 50% probability of achieving that performance level. Use the probabilities in Table Set 4 to determine the appropriate 'target' scores for a desired level of certainty. Italics represent extrapolated data. Use the lookup row for grade the student will be in when he/she takes the state test. For example, the minimum **reading** MAP score associated with 3rd grade **reading** proficiency during the prior season (when the student was in second grade) is 196.

## TABLE SET 3 –ESTIMATED PROBABILITY OF SCORING AS PROFICIENT OR HIGHER ON THE STATE TEST IN SAME SEASON (FALL), BY STUDENT GRADE AND RIT SCORE RANGE ON MAP ASSESSMENT

| MATH - Current Season | | | | | | | |
|---|---|---|---|---|---|---|---|
| Estimated Probability of Passing State Test Based on Observed MAP Score | | | | | | | |
| RIT Range | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 120 | *0%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 125 | *0%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 130 | *1%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 135 | *1%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 140 | *2%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 145 | *3%* | 1% | 0% | 0% | 0% | 0% | 0% |
| 150 | *5%* | 1% | 0% | 0% | 0% | 0% | 0% |
| 155 | *8%* | 2% | 1% | 0% | 0% | 0% | 0% |
| 160 | *12%* | 3% | 1% | 1% | 0% | 0% | 0% |
| 165 | *18%* | 5% | 2% | 1% | 0% | 0% | 0% |
| 170 | *27%* | 8% | 3% | 1% | 1% | 0% | 0% |
| 175 | *38%* | 13% | 5% | 2% | 1% | 1% | 0% |
| 180 | *50%* | 20% | 8% | 4% | 1% | 1% | 0% |
| 185 | *62%* | 29% | 13% | 6% | 2% | 1% | 1% |
| 190 | *73%* | 40% | 20% | 10% | 4% | 2% | 1% |
| 195 | *82%* | 52% | 29% | 15% | 6% | 4% | 2% |
| 200 | *88%* | 65% | 40% | 23% | 10% | 6% | 3% |
| 205 | *92%* | 75% | 52% | 33% | 15% | 10% | 5% |
| 210 | *95%* | 83% | 65% | 45% | 23% | 15% | 8% |
| 215 | *97%* | 89% | 75% | 57% | 33% | 23% | 12% |
| 220 | *98%* | 93% | 83% | 69% | 45% | 33% | 18% |
| 225 | *99%* | 96% | 89% | 79% | 57% | 45% | 27% |
| 230 | *99%* | 97% | 93% | 86% | 69% | 57% | 38% |
| 235 | *100%* | 98% | 96% | 91% | 79% | 69% | 50% |
| 240 | *100%* | 99% | 97% | 94% | 86% | 79% | 62% |
| 245 | *100%* | 99% | 98% | 96% | 91% | 86% | 73% |
| 250 | *100%* | 100% | 99% | 98% | 94% | 91% | 82% |
| 255 | *100%* | 100% | 99% | 99% | 96% | 94% | 88% |
| 260 | *100%* | 100% | 100% | 99% | 98% | 96% | 92% |
| 265 | *100%* | 100% | 100% | 100% | 99% | 98% | 95% |
| 270 | *100%* | 100% | 100% | 100% | 99% | 99% | 97% |
| 275 | *100%* | 100% | 100% | 100% | 100% | 99% | 98% |
| 280 | *100%* | 100% | 100% | 100% | 100% | 100% | 99% |
| 285 | *100%* | 100% | 100% | 100% | 100% | 100% | 99% |
| 290 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |
| 295 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |
| 300 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |

*Note: This table provides the estimated probability of passing the state test based on a MAP test score taken during that current (fall) season. Example: if a fifth grade student scored 200 on a MAP test taken during the fall season, her/his estimated probability of passing the state test is 25%.

Italics represent extrapolated data.

| READING - Current Season | | | | | | | |
|---|---|---|---|---|---|---|---|
| Estimated Probability of Passing State Test Based on Observed MAP Score | | | | | | | |
| RIT Range | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 120 | *0%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 125 | *0%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 130 | *0%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 135 | *1%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 140 | *1%* | 0% | 0% | 0% | 0% | 0% | 0% |
| 145 | *2%* | 1% | 0% | 0% | 0% | 0% | 0% |
| 150 | *4%* | 1% | 0% | 0% | 0% | 0% | 0% |
| 155 | *6%* | 1% | 1% | 0% | 0% | 0% | 0% |
| 160 | *9%* | 2% | 1% | 1% | 0% | 0% | 0% |
| 165 | *14%* | 4% | 2% | 1% | 0% | 0% | 0% |
| 170 | *21%* | 6% | 3% | 1% | 1% | 1% | 0% |
| 175 | *31%* | 10% | 4% | 2% | 1% | 1% | 1% |
| 180 | *43%* | 15% | 7% | 4% | 2% | 1% | 1% |
| 185 | *55%* | 23% | 11% | 6% | 4% | 2% | 1% |
| 190 | *67%* | 33% | 17% | 10% | 6% | 4% | 2% |
| 195 | *77%* | 45% | 25% | 15% | 9% | 6% | 4% |
| 200 | *85%* | 57% | 35% | 23% | 14% | 10% | 6% |
| 205 | *90%* | 69% | 48% | 33% | 21% | 15% | 10% |
| 210 | *94%* | 79% | 60% | 45% | 31% | 23% | 15% |
| 215 | *96%* | 86% | 71% | 57% | 43% | 33% | 23% |
| 220 | *98%* | 91% | 80% | 69% | 55% | 45% | 33% |
| 225 | *99%* | 94% | 87% | 79% | 67% | 57% | 45% |
| 230 | *99%* | 96% | 92% | 86% | 77% | 69% | 57% |
| 235 | *99%* | 98% | 95% | 91% | 85% | 79% | 69% |
| 240 | *100%* | 99% | 97% | 94% | 90% | 86% | 79% |
| 245 | *100%* | 99% | 98% | 96% | 94% | 91% | 86% |
| 250 | *100%* | 100% | 99% | 98% | 96% | 94% | 91% |
| 255 | *100%* | 100% | 99% | 99% | 98% | 96% | 94% |
| 260 | *100%* | 100% | 100% | 99% | 99% | 98% | 96% |
| 265 | *100%* | 100% | 100% | 100% | 99% | 99% | 98% |
| 270 | *100%* | 100% | 100% | 100% | 99% | 99% | 99% |
| 275 | *100%* | 100% | 100% | 100% | 100% | 100% | 99% |
| 280 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |
| 285 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |
| 290 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |
| 295 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |
| 300 | *100%* | 100% | 100% | 100% | 100% | 100% | 100% |

*Note: This table provides the estimated probability of passing the state test based on a MAP test score taken during that current (fall) season. Example: if a fifth grade student scored 200 on a MAP test taken during the fall season, her/his estimated probability of passing the state test is 23%.

Italics represent extrapolated data.

## TABLE SET 4 –ESTIMATED PROBABILITY OF SCORING AS PROFICIENT OR HIGHER ON THE STATE TEST IN PRIOR SEASON (SPRING), BY STUDENT GRADE AND RIT SCORE RANGE ON MAP

| MATH - Prior Season | | | | | | |
|---|---|---|---|---|---|---|
| Estimated Probability of Passing State Test Based on Observed MAP Score | | | | | | |
| RIT Range | 2 | 3 | 4 | 5 | 6 | 7 |
| 120 | 0% | 0% | 0% | 0% | 0% | 0% |
| 125 | 0% | 0% | 0% | 0% | 0% | 0% |
| 130 | 0% | 0% | 0% | 0% | 0% | 0% |
| 135 | 0% | 0% | 0% | 0% | 0% | 0% |
| 140 | 0% | 0% | 0% | 0% | 0% | 0% |
| 145 | 1% | 0% | 0% | 0% | 0% | 0% |
| 150 | 1% | 0% | 0% | 0% | 0% | 0% |
| 155 | 2% | 1% | 0% | 0% | 0% | 0% |
| 160 | 4% | 1% | 1% | 0% | 0% | 0% |
| 165 | 6% | 2% | 1% | 0% | 0% | 0% |
| 170 | 9% | 4% | 2% | 0% | 0% | 0% |
| 175 | 14% | 6% | 3% | 1% | 1% | 0% |
| 180 | 21% | 9% | 4% | 1% | 1% | 0% |
| 185 | 31% | 14% | 7% | 2% | 1% | 1% |
| 190 | 43% | 21% | 11% | 4% | 2% | 1% |
| 195 | 55% | 31% | 17% | 6% | 4% | 2% |
| 200 | 67% | 43% | 25% | 9% | 6% | 3% |
| 205 | 77% | 55% | 35% | 14% | 10% | 5% |
| 210 | 85% | 67% | 48% | 21% | 15% | 8% |
| 215 | 90% | 77% | 60% | 31% | 23% | 12% |
| 220 | 94% | 85% | 71% | 43% | 33% | 18% |
| 225 | 96% | 90% | 80% | 55% | 45% | 27% |
| 230 | 98% | 94% | 87% | 67% | 57% | 38% |
| 235 | 99% | 96% | 92% | 77% | 69% | 50% |
| 240 | 99% | 98% | 95% | 85% | 79% | 62% |
| 245 | 99% | 99% | 97% | 90% | 86% | 73% |
| 250 | 100% | 99% | 98% | 94% | 91% | 82% |
| 255 | 100% | 99% | 99% | 96% | 94% | 88% |
| 260 | 100% | 100% | 99% | 98% | 96% | 92% |
| 265 | 100% | 100% | 100% | 99% | 98% | 95% |
| 270 | 100% | 100% | 100% | 99% | 99% | 97% |
| 275 | 100% | 100% | 100% | 99% | 99% | 98% |
| 280 | 100% | 100% | 100% | 100% | 100% | 99% |
| 285 | 100% | 100% | 100% | 100% | 100% | 99% |
| 290 | 100% | 100% | 100% | 100% | 100% | 100% |
| 295 | 100% | 100% | 100% | 100% | 100% | 100% |
| 300 | 100% | 100% | 100% | 100% | 100% | 100% |

*Note: This table provides the estimated probability of passing the state test based on a MAP test score taken during the previous spring season, when the student was in her/his prior grade. Example: if a fourth grade student scored 200 on a MAP test taken during the spring season, her/his estimated probability of passing the 5th grade fall state test is 25%.

| READING - Prior Season | | | | | | |
|---|---|---|---|---|---|---|
| Estimated Probability of Passing State Test Based on Observed MAP Score | | | | | | |
| RIT Range | 2 | 3 | 4 | 5 | 6 | 7 |
| 120 | 0% | 0% | 0% | 0% | 0% | 0% |
| 125 | 0% | 0% | 0% | 0% | 0% | 0% |
| 130 | 0% | 0% | 0% | 0% | 0% | 0% |
| 135 | 0% | 0% | 0% | 0% | 0% | 0% |
| 140 | 0% | 0% | 0% | 0% | 0% | 0% |
| 145 | 1% | 0% | 0% | 0% | 0% | 0% |
| 150 | 1% | 0% | 0% | 0% | 0% | 0% |
| 155 | 2% | 1% | 0% | 0% | 0% | 0% |
| 160 | 3% | 1% | 1% | 0% | 0% | 0% |
| 165 | 4% | 2% | 1% | 1% | 0% | 0% |
| 170 | 7% | 3% | 2% | 1% | 1% | 0% |
| 175 | 11% | 5% | 3% | 1% | 1% | 1% |
| 180 | 17% | 8% | 4% | 2% | 1% | 1% |
| 185 | 25% | 12% | 7% | 4% | 2% | 1% |
| 190 | 35% | 18% | 11% | 6% | 4% | 2% |
| 195 | 48% | 27% | 17% | 10% | 6% | 4% |
| 200 | 60% | 38% | 25% | 15% | 10% | 6% |
| 205 | 71% | 50% | 35% | 23% | 15% | 10% |
| 210 | 80% | 62% | 48% | 33% | 23% | 15% |
| 215 | 87% | 73% | 60% | 45% | 33% | 23% |
| 220 | 92% | 82% | 71% | 57% | 45% | 33% |
| 225 | 95% | 88% | 80% | 69% | 57% | 45% |
| 230 | 97% | 92% | 87% | 79% | 69% | 57% |
| 235 | 98% | 95% | 92% | 86% | 79% | 69% |
| 240 | 99% | 97% | 95% | 91% | 86% | 79% |
| 245 | 99% | 98% | 97% | 94% | 91% | 86% |
| 250 | 100% | 99% | 98% | 96% | 94% | 91% |
| 255 | 100% | 99% | 99% | 98% | 96% | 94% |
| 260 | 100% | 100% | 99% | 99% | 98% | 96% |
| 265 | 100% | 100% | 100% | 99% | 99% | 98% |
| 270 | 100% | 100% | 100% | 100% | 99% | 99% |
| 275 | 100% | 100% | 100% | 100% | 100% | 99% |
| 280 | 100% | 100% | 100% | 100% | 100% | 100% |
| 285 | 100% | 100% | 100% | 100% | 100% | 100% |
| 290 | 100% | 100% | 100% | 100% | 100% | 100% |
| 295 | 100% | 100% | 100% | 100% | 100% | 100% |
| 300 | 100% | 100% | 100% | 100% | 100% | 100% |

*Note: This table provides the estimated probability of passing the state test based on a MAP test score taken during the previous spring season, when the student was in her/his prior grade. Example: if a fourth grade student scored 200 on a MAP test taken during the spring season, her/his estimated probability of passing the 5th grade fall state test is 25%.

## TABLE 5 – CORRELATION COEFFICIENTS BETWEEN MAP AND STATE TEST FOR EACH GRADE AND TEST SUBJECT

| Grade | Math Correlation Pearson's r | Reading Correlation Pearson's r |
|---|---|---|
| 3 | 0.792 | 0.784 |
| 4 | 0.790 | 0.818 |
| 5 | 0.831 | 0.808 |
| 6 | 0.860 | 0.815 |
| 7 | 0.863 | 0.798 |
| 8 | 0.871 | 0.808 |

* Note: Correlations range from 0 (indicating no correlation between the state test score and the NWEA test score) to 1 (indicating complete correlation between the state test score and the NWEA test score).

## TABLE 6 – PERCENTAGE OF STUDENTS WHOSE PASS STATUS WAS ACCURATELY PREDICTED BY THEIR MAP PERFORMANCE USING REPORTED CUT SCORES

| Grade | Sample Size | MAP Accurately Predicted State Performance | MAP Underestimated State Performance | MAP Overestimated State Performance |
|---|---|---|---|---|
| Mathematics | | | | |
| 3 | 3904 | 83.3% | 7.9% | 8.8% |
| 4 | 3738 | 82.0% | 7.0% | 11.0% |
| 5 | 3914 | 83.3% | 8.0% | 8.7% |
| 6 | 3793 | 85.4% | 6.4% | 8.3% |
| 7 | 3847 | 85.4% | 6.4% | 8.2% |
| 8 | 3641 | 87.8% | 5.8% | 6.4% |
| Reading | | | | |
| 3 | 3884 | 83.3% | 8.4% | 8.3% |
| 4 | 3748 | 83.2% | 8.0% | 8.8% |
| 5 | 3904 | 82.4% | 7.3% | 10.3% |
| 6 | 3787 | 82.6% | 7.6% | 9.8% |
| 7 | 3831 | 82.7% | 8.0% | 9.3% |
| 8 | 3624 | 82.3% | 8.5% | 9.2% |

*Note: The third column of this table shows the percentage of students whose Pass/NotPass status was predicted accurately when their state test score was linked to their MAP score based on this linking study. The fourth column shows the percentage of students whose MAP score predicted they would not pass the state benchmark but they did pass. The last column shows the percentage of students whose MAP score predicted they would pass the state benchmark but they did not pass. Due to rounding, percentages may not add to 100%.