Interpreting the Minnesota Comprehensive Assessment Levels: A Link to National Percentile Ranks

Minnesota schools and students have received their results on the Minnesota Comprehensive Assessments (MCA) for reading and mathematics in third and fifth grade. The interpretive materials that accompany the test contain descriptions of four performance levels (see sidebar). Each student will receive a report showing their level of performance, along with a state percentile rank showing how the student compared to other students who took the test. Neither the description of performance levels nor the state percentile rank provides information about how Minnesota students compare to students around the nation.

Last year (1997-98), many students took both the MCA and a nationally standardized norm referenced test. Staff in some districts used the data to approximate the national percentile ranks corresponding to each MCA level. While only approximate, the districts found this national information helped them understand the MCA levels. Using data provided by members of the Minnesota Association of Educational Assessment and Evaluation (MAEAE), we have pulled together data from several districts using various standardized tests. The data approximate the national percentile ranks covered by the MCA levels. We hope that this information can supplement the interpretive tools provided with the test itself. Estimates are based on the 1998 MCA test results.

The information presented requires several cautions. First, the estimated national percentile ranks associated with the MCA levels vary across school districts and norm referenced tests. For this reason, the final estimates can only be considered approximate. Second, not all standardized tests and districts in the state are represented by this effort; the test used by your district may not be included. Third, the estimates were obtained using the “equipercentile” method described in the box on page 4. Other methods would produce somewhat different results. Fourth, the Northwest Evaluation Association Achievement Levels Test (NWEA) has been included. The norm group for the NWEA is not necessarily representative of the nation’s student population. It is a “user norm group” composed of students taking the NWEA, and may not be representative of students nationally. The remaining tests—the California Achievement Test (CAT/5), the Iowa Test of Basic Skills (ITBS), and the Metropolitan Achievement Test (MAT/7)—all use nationally representative norm groups.

The state percentile ranks provided on the MCA reports indicate how a student’s performance compares to that of other

**Achievement Levels**

**Level IV**: Students demonstrate superior performance, well beyond what is expected at the grade level.

**Level III**: Students are working above grade level. Many are proficient with challenging subject matter.

**Level II**: Most students in Minnesota fall within this level. This includes a wide range of students, from those with partial knowledge and skills to students who are increasingly proficient with grade level material.

**Level I**: Students have gaps in the knowledge and skills necessary for satisfactory work.
students in Minnesota. The MCA levels provide a more qualitative description of the student’s performance. The descriptions of the levels provided with test materials constitute the major information with which to understand the levels. The national percentile rank estimates provided in this report constitute additional information to supplement our understanding of those levels.

DATA AND CONCLUSIONS

The table above shows our basic findings. The first three columns show the lowest MCA score in Levels 2, 3, and 4 for reading and mathematics in grades 3 and 5. The next eight columns show the eight estimates of the corresponding national percentile rank. Each estimate represents a different school district or collection of districts. The last column (“Median NPR Estimate”) is the median of the eight school district estimates.

The median NPR estimates are approximate estimates of the national percentile rank where each level begins. For instance, in third grade reading, the median NPR estimates suggest that Level 2 begins at about the 31st national percentile, Level 3 at the 75th national percentile, and Level 4 at the 97th national percentile.

Because the NWEA norm group is not representative of the nation as a whole, one could argue that the NWEA data should not have been used in obtaining the median NPR estimates. However, including the NWEA provided additional data, and seldom changed the final NPR estimate by as much as 3 points. In those cases where it changed the result by more than 3 points, the estimate obtained by including the NWEA is given in bold; the estimate excluding the NWEA is given in plain type.

Using the median NPR estimates in the table, the figure approximates the range of national percentile ranks associated with each MCA level. To see the relationships between the table and the figure, consider third grade reading. The median national percentile rank estimates for the lowest scores in Levels 2, 3, and 4 are 31, 75, and 97 respectively. Therefore, in the figure, Level 2 begins at the 31st percentile,

Table 1. National Percentile Rank Estimates Corresponding to the Lowest Score in MCA Levels 2, 3, and 4 Based on Eight Data Sets from One or Several Districts

<table>
<thead>
<tr>
<th>Grade/Content Area</th>
<th>MCA Level</th>
<th>Lowest Score</th>
<th>CATS NPR Est.</th>
<th>ITBS NPR Est.</th>
<th>MAT7 NPR Est.</th>
<th>NWEA NPR Est.</th>
<th>Median NPR Est</th>
<th>Lowest Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3 Reading National Percentile Rank Estimates</td>
<td>2</td>
<td>1280</td>
<td>32</td>
<td>20</td>
<td>24</td>
<td>33</td>
<td>31/26</td>
<td>31/26</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1500</td>
<td>80</td>
<td>61</td>
<td>67</td>
<td>83</td>
<td>80</td>
<td>75/80</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1690</td>
<td>98</td>
<td>87</td>
<td>95</td>
<td>99</td>
<td>98</td>
<td>97</td>
</tr>
<tr>
<td>Grade 3 Mathematics National Percentile Rank Estimates</td>
<td>2</td>
<td>1210</td>
<td>27</td>
<td>18</td>
<td>23</td>
<td>33</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1500</td>
<td>80</td>
<td>65</td>
<td>73</td>
<td>83</td>
<td>80</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1740</td>
<td>97</td>
<td>93</td>
<td>98</td>
<td>97</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Grade 5 Reading National Percentile Rank Estimates</td>
<td>2</td>
<td>1260</td>
<td>29</td>
<td>21</td>
<td>29</td>
<td>45</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1500</td>
<td>66</td>
<td>66</td>
<td>68</td>
<td>77</td>
<td>74</td>
<td>74/79</td>
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<td></td>
<td>4</td>
<td>1710</td>
<td>96</td>
<td>91</td>
<td>92</td>
<td>96</td>
<td>97</td>
<td>96</td>
</tr>
<tr>
<td>Grade 5 Mathematics National Percentile Rank Estimates</td>
<td>2</td>
<td>1240</td>
<td>32</td>
<td>21</td>
<td>29</td>
<td>45</td>
<td>30</td>
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<td>93</td>
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<td>99</td>
<td>98</td>
<td>98</td>
</tr>
</tbody>
</table>
Level 3 at the 75th percentile, and Level 4 at the 97th. Similarly, for third grade math, the median national percentile rank estimates for the lowest scores in Levels 2, 3, and 4 are 29, 79, and 97 respectively. Therefore, in the figure, Level 2 begins at the 29th percentile, Level 3 at the 79th, and Level 4 at the 97th.

Given the differences among standardized tests, the ranges in our figure could not apply equally well to all standardized tests. Figures 2 – 5 contain separate figures for each of the tests included in this report: the CAT/5, the ITBS, the MAT/7, and the NWEA. For a variety of reasons, including content and format differences between the MCAs and standardized tests, there will always be students who earn national percentile ranks on nationally standardized tests which fall outside the range that would be expected based on their MCA score.

About the data

California Achievement Test (CAT5) data:
1. Provided by the Wayzata School District (the Reading Comprehension and Mathematics Concepts and applications subscales). The number of students ranged from 652 to 697 depending on the grade and subject. The correlations between the MCA and CAT5 scales ranged between .75 and .80.

ITBS data (based on the 1992 norms):
2. Data provided by the Anoka-Hennepin district. The number of students ranged from 2879 to 2945 depending on the grade and subject area. Correlations between MCA and ITBS scales ranged from .66 to .75.

3. Data provided by a consortium of districts through the Statewide Testing Program at the University of Minnesota. Districts include: Ada-Borup, Adrian, Atwater-Grove City-Cosmos, Badger, Bagley, Barnum, Bellingham, Blue Earth, Centennial (Circle Pines), Dover-Eyota, Edgerton, Ely, Fulda, Grand Meadow, Heron Lake-Okabena, Hinkley, Holdingford, Lanesboro, LaPorte, LeSuer, Marshall County (Newfolden), Melrose, Minnesota, Minnewaska, Moose Lake, Mountain Iron, Mountain Lake, North Branch, North St. Paul-Maplewood, Osakis, Pequot Lakes, Pierz, Red Rock Central (Storden-Jeffers), Redwood Falls, Remer, Roseau, Ruthton, St. Francis, Sartell, Sleepy Eye, South Koochiching, Southland (Rose Creek), Truman, and Waconia. The NPRs are taken from State MCA/ITBS Tests: Birds of a Feather by Charles B. Johansson. The numbers of students ranged from 3,176 to 3,200 depending on the grade. The correlation between the MCA scales and the ITBS scales ranged from .76 to .82.

MAT7 results (based on 1992 norms):
4. Results provided by the St. Paul Public Schools. The number of students in the data set ranged from 2887 to 3388 depending on the grade and subject area. Correlations between the MCA and the MAT7 ranged from .82 to .88.

5. Results provided by the Duluth Public Schools. The number of students varied from 825 to 848 depending on the grade and subject area. Correlations between the MCA and MAT7 ranged between .79 and 84.

The NWEA 1996 norms (based on a user sample that may not be representative of students in the nation’s schools). The three districts are Moundsview (6), Robbinsdale (7), and Minneapolis (8).

6. In Moundsview the number of students varied from 779 to 834, depending on the grade and subject area. The correlations between the MCA and NWEA scores ranged between .79 and .86 depending on the grade and subject area.

7. In Robbinsdale, the number of students varied from 1001 to 1026. The correlations between the MCA and NWEA ranged between .80 and .88.

8. In Minneapolis, the number of students varied from 3289 to 3822. The correlations between the MCA and NWEA ranged from .87 to .89.
The Equipercentile Method

The equipercentile method is so named because the percentage of students whose scores fall below a given MCA score is equated with the percentage whose scores fall below the matching norm referenced test score. As applied here, the equipercentile method requires data from a set of students who have taken both the MCA and a norm referenced test in the same content area. Given a particular MCA score, the method involves finding a “matching” score on the norm referenced test, and then identifying the national percentile rank of the matching score. The national percentile rank of the matching score becomes the estimate of the national percentile rank for the MCA score. A score on a norm referenced test is said to match a score on the MCA if the percentage of students with scores equal to or less than the MCA score is the same as the percentage of students with scores equal to or less than the norm referenced test score. The equipercentile method (Crocker and Algina, 1986) involves three steps. For example, to find the equipercentile for an MCA score of 1500:

Step 1: Find the percentage of students in the district with scores equal to or less than the chosen MCA score. For instance, we might find that 75% of district students have scores equal to or less than 1500.

Step 2: For the norm referenced test, focus on the percentage of students identified in Step 1. In this example, since 75% of students in Step 1 had scores equal to or less than 1500, we would search the norm referenced test scores to find the score at which 75% of the district’s students would be included. We might find that 75% of the students have scores equal to or less than 144. In that case, 144 would become our estimate of the norm referenced test score that matches the MCA score of 1500.

Step 3: Using the appropriate charts, find the national percentile rank of the matching norm referenced score. In our example, we would find the national percentile rank for the score of 144 identified in Step 2. This becomes our estimate of the national percentile rank for an MCA score of 1500.

REFERENCES


FIGURES 2-5

Estimated Ranges for National Percentile Ranks for CAT/5, ITBS, MAT/7, and NWEA Assessments

Figure 2. Estimated Ranges of National Percentile Ranks Associated with each MCA Level, based on Estimated CAT/5 National Percentile Ranks from Table 1.

Note: In third grade reading, Level 2 begins at the 32nd percentile; Level 3 at the 80th percentile; and Level 4 at the 98th percentile. In third grade math, Level 2 begins at the 27th percentile; Level 3 at the 80th percentile; and Level 4 at the 97th percentile. In 5th grade reading, Level 2 begins at the 25th percentile; Level 3 at the 68th percentile; and Level 4 at the 96th percentile. In 5th grade math, Level 2 begins at the 32nd percentile; Level 3 at the 86th percentile; and Level 4 at the 99th percentile.
Note: In third grade reading, Level 2 begins at the 33rd percentile; Level 3 at the 81st percentile; and Level 4 at the 97th percentile. In third grade math, Level 2 begins at the 31st percentile; Level 3 at the 81st percentile; and Level 4 at the 97th percentile. In 5th grade reading, Level 2 begins at the 30th percentile; Level 3 at the 75th percentile; and Level 4 at the 97th percentile. In 5th grade math, Level 2 begins at the 37th percentile; Level 3 at the 89th percentile; and Level 4 at the 99th percentile.
About MAEAE . . .
The Minnesota Association of Educational Assessment and Evaluation (MAEAE) is an informal group of individuals from school districts, state government and higher education. MAEAE meets monthly to discuss issues in educational measurement and evaluation.

About the OEA . . . The Office of Educational Accountability is an independent office whose mission is to analyze and publicly report on the needs of students and the condition of education in Minnesota as reflected in a comprehensive set of indicators. OEA reports are designed to inform and facilitate the improvement of education statewide.

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