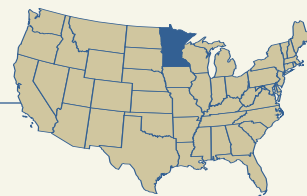


Minnesota



Introduction

This study linked data from the 2003 and 2006 administrations of Minnesota’s reading and math tests to the Northwest Evaluation Association’s Measures of Academic Progress (MAP) assessment, a computerized adaptive test used in schools nationwide. We found that Minnesota’s definitions of proficiency in reading and mathematics are somewhat more difficult than the standards set by many of the other 25 states in this study. In other words, Minnesota’s tests are above average in terms of difficulty.

The level of difficulty changed some from 2003 to 2006—the No Child Left Behind era—although the direction of that change has varied by grade level. Minnesota’s current test appears to be easier in third grade and harder in eighth grade than the test it replaced. As a result, Minnesota’s cut scores are now dramatically lower for third-grade students than for eighth-grade pupils (taking into account the differences in subject content and children’s development). Minnesota policymakers might consider adjusting the cut scores to ensure equivalent difficulty at all grades so that elementary school students are on track to be proficient in the later grades.

What We Studied: Minnesota’s Assessment Program

The Minnesota Comprehensive Assessment II (MCA-II) is currently used for students in grades 3 through 8. The MCA-II is referred to as a standards-referenced test, which means that its primary purpose is to assess how students perform relative to expectations for the grades in which they are enrolled. MCA-II replaced the Minnesota Comprehensive Assessment I, which was administered in grades 3 and 5 until 2005. Prior to 2005, the Minnesota Basic Skills Test (BST) was administered to students in grade 8.

The MCA-II is designed to align with Minnesota’s standards and benchmarks for each grade level.

To determine the difficulty of Minnesota’s proficiency cut scores, we linked reading and math data from state tests to the NWEA assessment. (A “proficiency cut score” is the score a student must achieve in order to be considered proficient.) This was done by analyzing a group of elementary and middle schools in which almost all students took both the state assessment and the NWEA test. (The methodology section of this report explains how performance was compared.)

Part 1: How Difficult are Minnesota's Definitions of Proficiency in Reading and Math?

One way to evaluate the difficulty of a standard is to determine how many people attempting to attain it are likely to succeed. How do we know that a two-foot high jump bar is easy to jump over? We know because, if we asked 100 people at random to attempt such a jump, perhaps 80 percent would make it. How do we know that a six-foot high jump bar is challenging? Because only one (or perhaps none) of those same 100 individuals would successfully meet that challenge. The same principle can be applied to academic standards. Common sense tells us that it is more difficult for students to solve algebraic equations with two unknown variables than it is for them to solve an equation with only one unknown variable. But we can figure out exactly how much more difficult by seeing how many eighth graders nationwide answer both types of questions correctly.

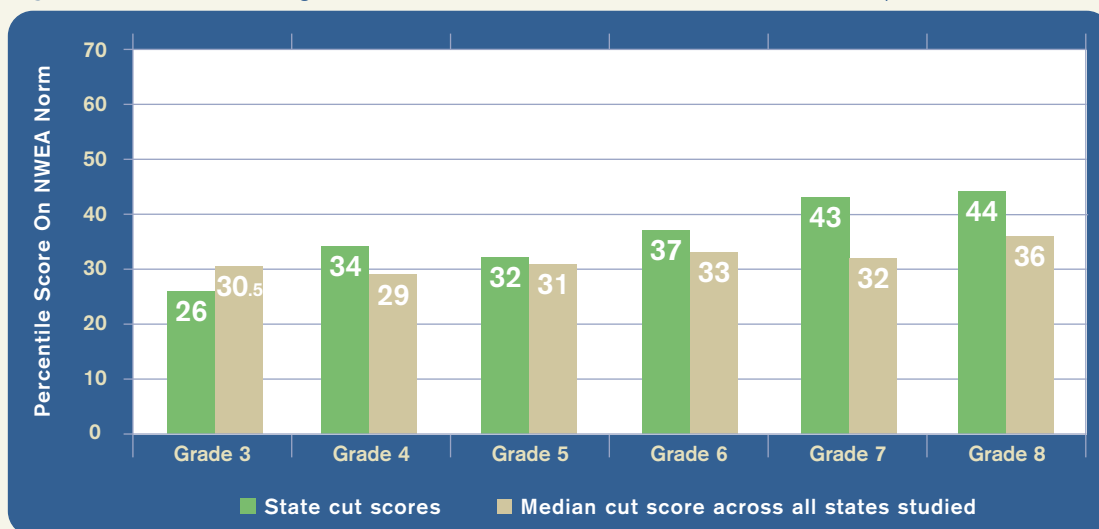
Applying that approach to this task, we evaluated the difficulty of Minnesota's proficiency cut scores by estimating the proportion of students in NWEA's norm group who would perform above the Minnesota cut score on a test of equivalent difficulty. The following two figures show the difficulty of Minnesota's proficiency cut scores for reading (Figure 1) and mathematics (Figure 2) in 2006 in relation to the median cut score for all the states in the study. The proficiency cut scores

for **reading** in Minnesota ranged between the 26th and 44th percentiles for the norm group, with the eighth-grade cut score being most challenging. In **mathematics**, the proficiency cut scores ranged between the 30th and 54th percentiles with fifth grade being most challenging.

Except in grade 3, Minnesota's cut scores in both reading and math are above the median difficulty among the states studied. Note, though, that Minnesota's cut scores for reading are lower than those for mathematics. (This was the case for the majority of states studied.) Thus, reported differences in achievement on the MCA-II between reading and mathematics might be more a product of differences in cut scores than in actual student achievement. In other words, Minnesota students may be performing worse in reading or better in mathematics than is apparent by just looking at the percentage of students passing state tests in those subjects.

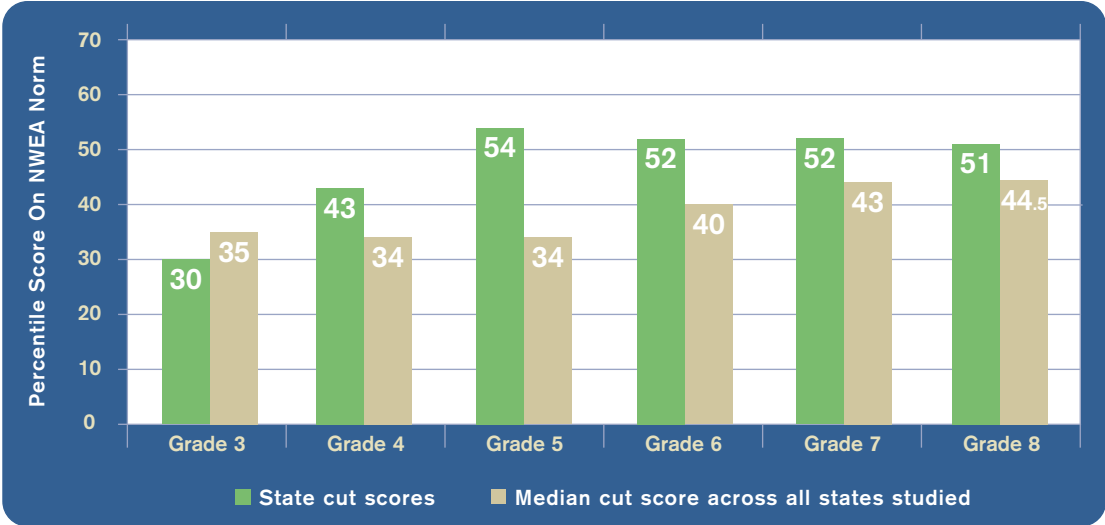
Another way of assessing difficulty is to evaluate how Minnesota's proficiency cut scores rank relative to other states. Table 1 shows that the Minnesota cut scores generally rank in the upper half in difficulty among the 26 states studied for this report. Its reading cut scores in grade 7 and mathematics cut scores in grade 5 rank among the top four to five states in difficulty.

Figure 1 – Minnesota Reading Cut Scores in Relation to All 26 States Studied, 2006 (Expressed in MAP Percentiles)



Note: This figure compares reading test cut scores ("proficiency passing scores") as percentiles of the NWEA norm. These percentiles are compared with the median cut scores of all 26 states reviewed in this study. Except for grade 3, Minnesota's reading cut scores are all above the median.

Figure 2 – Minnesota Mathematics Cut Scores in Relation to All 26 States Studied, 2006
(Expressed in MAP Percentiles)



Note: Minnesota's math test cut scores are shown as percentiles of the NWEA norm and compared with the median cut scores of all 26 states reviewed in this study. Except in grade 3, Minnesota's cut scores are consistently 6.5 to 20 percentile points above the median.

Table 1 – Minnesota Rank for Proficiency Cut Scores Among 26 States in Reading and Mathematics, 2006

Ranking (Out of 26 States)						
	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Reading	16	6	11	10	5	6
Mathematics	14	8	4	6	7	10

Note: This table ranks Minnesota's cut scores relative to the cut scores of the other 25 states in the study, with 1 being highest and 26 lowest.

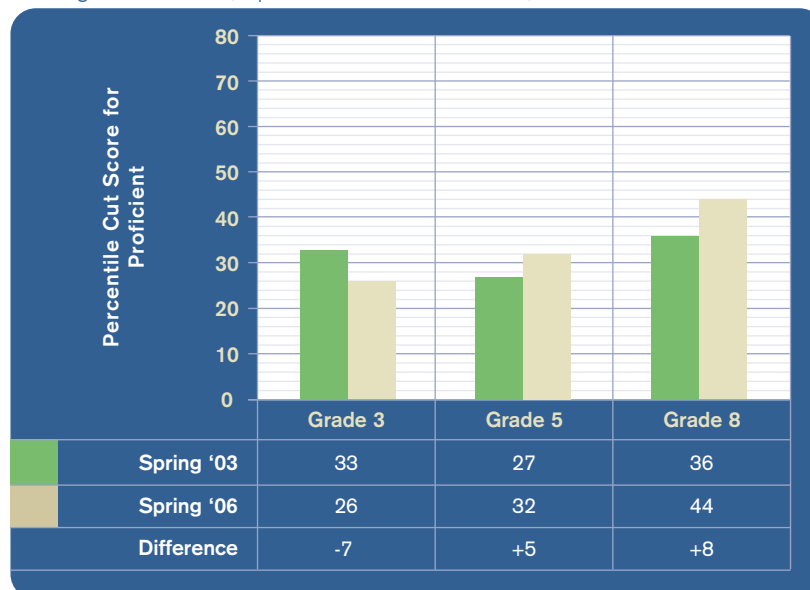
Part 2: Changes in Cut Scores over Time

In order to measure their consistency, Minnesota's proficiency cut scores were mapped to their equivalent scores on NWEA's MAP assessment for the 2003 and 2006 school years. Because in 2003 the Minnesota Comprehensive Assessment (called the MCA-I) was administered only in grades 3 and 5 and the BST was given only in grade 8, the estimates of change over time are limited to these grades.

After changing over from the MCA-I and BST to MCA-II, the Minnesota Department of Education established new cut scores for all grades. Because the tests were different in various ways, changes in the definition of proficiency were to be expected. For that reason, the Minnesota Department of Education cautions that results from the MCA-I and BST should not be considered equivalent to the results from the MCA-II series of exams.

Is it possible anyway to compare the proficiency scores between earlier administrations of Minnesota tests and today's? Yes. Assume that we're judging a group of fourth graders on their high-jump prowess and that we measure this by finding how many in that group can successfully clear a three-foot bar. Now assume that we change the measure and set a new height. Perhaps students must now clear a bar set at one meter. This is somewhat akin to adjusting or changing a state test and its proficiency requirements. Despite this, it is still possible to determine whether it is more difficult to clear one meter than three feet, because we know the relationship between the measures. The same principle applies here. Although the MCA-I, MCA-II, and BST's are different measures, they can all be linked to the MAP, which has remained consistent over time. Just as one can compare three feet to one meter and know that a one-meter jump is slightly more difficult than a three-foot jump, one can estimate the cut score needed to pass the Minnesota tests in 2003 and 2006 on the MAP scale and ascertain whether the test may have changed in difficulty.

Figure 3 – Estimated Differences in Minnesota's Proficiency Cut Scores in Reading, 2003-2006 (Expressed in MAP Percentiles)



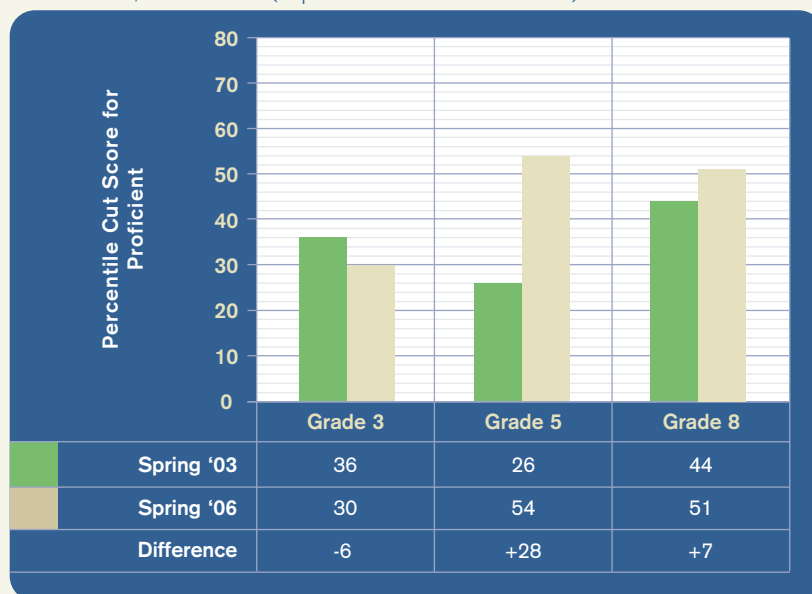
Note: This graphic shows how the difficulty of achieving proficiency in reading has changed. For example, third-grade students in 2003 had to score at the 33rd percentile on the NWEA norm in order to be considered proficient, while in 2006 third graders only had to score at the 26th percentile to achieve proficiency. The change in grade 5 was within the margin of error (in other words, too small to be considered substantive).

In **reading**, Minnesota's estimated cut scores decreased over this three-year period in the third grade (see Figure 3). Consequently, even if student performance stayed the same on an equivalent test like NWEA's MAP assessment, one would expect the third-grade reading proficiency rate in 2006 to be 7 percent higher than in 2003. (Minnesota reported a 5-point gain for third graders over this period.) For grade 8, the reading proficiency cut score rose. Consequently, even if student performance stayed the same on an equivalent test like NWEA's MAP assessment, one would expect the eighth-grade reading proficiency rate to decline by 8 percent. (Minnesota reported a 17-point decline for eighth graders over this period.)

In **mathematics**, Minnesota showed increases in estimates of their fifth- and eighth-grade mathematics cut scores (see Figure 4). These were large enough to cause a 28 percent drop in the expected proficiency rating for fifth grade, and a 7 percent drop in the pass rate for eighth grade. (Minnesota reported an 18-point decline for fifth graders and a 15-point decline for eighth graders over this period.)

Thus, one could fairly say that Minnesota's third-grade test in reading was easier to pass in 2006 than in 2003, while the eighth-grade reading and the fifth- and eighth-grade math tests became substantively harder to pass. As a result, improvements in the state-reported third grade proficiency rate during this period may not be entirely a product of improved achievement, while real improvements in other areas may be masked somewhat by the increased difficulty of the state's proficiency cut scores at these grades.

Figure 4 – Estimated Differences in Minnesota's Proficiency Cut Scores in Mathematics, 2003-2006 (Expressed in MAP Percentiles)



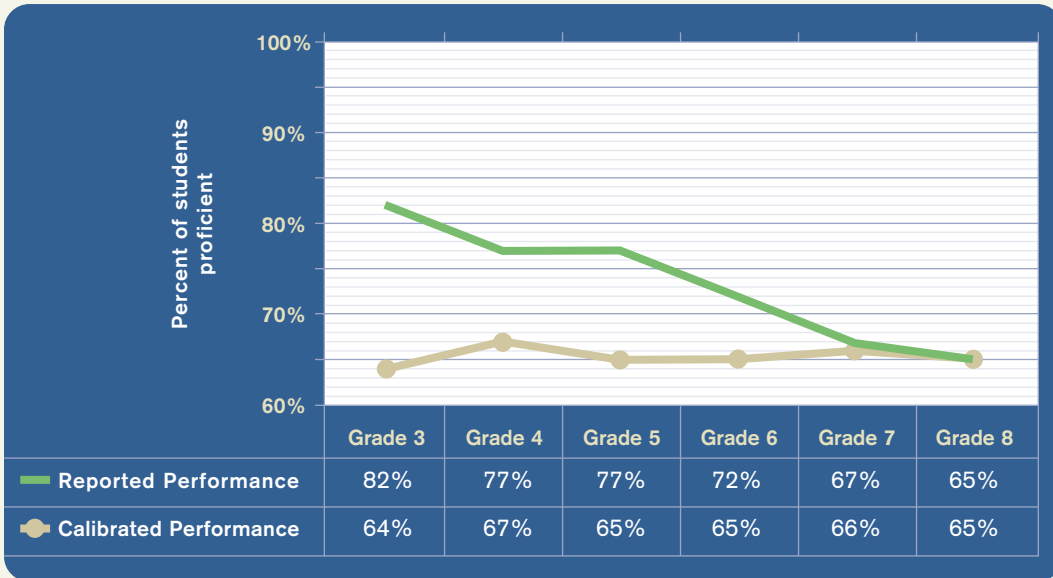
Note: This graphic shows how the difficulty of achieving proficiency in math has changed. For example, fifth-grade students in 2003 had to score at the 26th percentile on the NWEA norm in order to be considered proficient, while by 2006 fifth graders had to score at the 54th percentile to achieve proficiency. The change in grade 3 was within the margin of error (in other words, too small to be considered substantive).

Part 3: Calibration across Grades

Calibrated proficiency cut scores are those that are relatively equal in difficulty across all grades. Thus, an eighth-grade cut score would be no more or less difficult for eighth graders to achieve than a third-grade cut score is for third graders. When cut scores are so calibrated, parents and educators have some assurance that achieving the third-grade proficiency cut score puts a student on track to achieve the standards at eighth grade. It also provides assurance to the public that reported differences in performance across grades are a product of differences in actual educational attainment and not simply differences in the difficulty of the test.

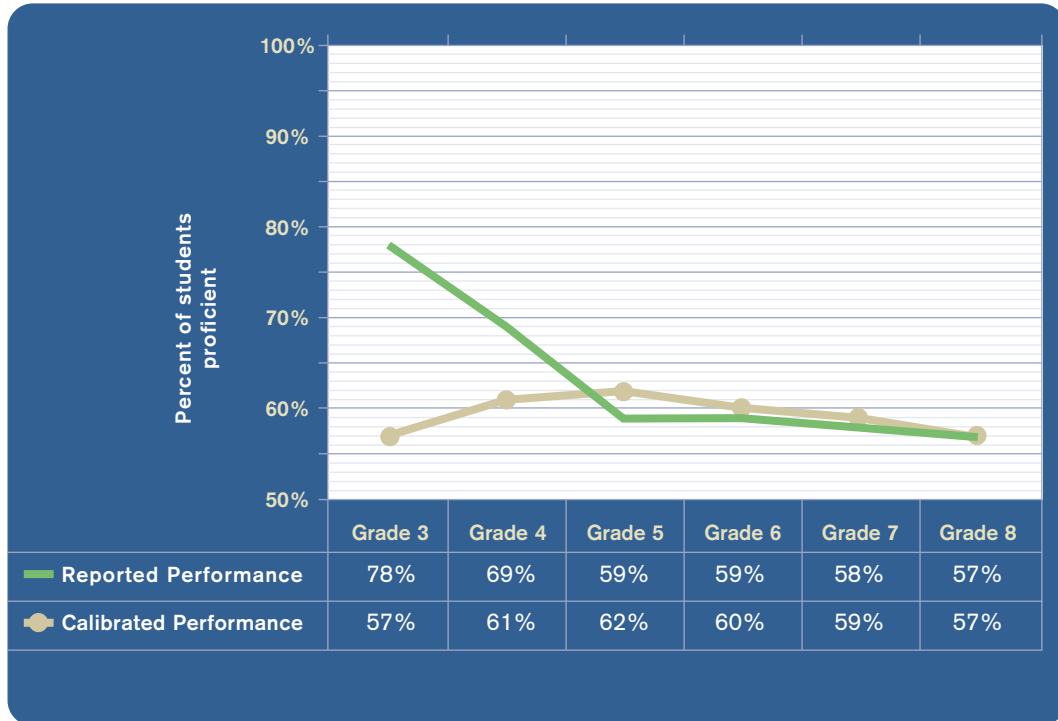
Examining Minnesota’s cut scores, we find that they are not well calibrated across grades. Figures 1 and 2 showed that, as in most other states in this study, Minnesota’s upper-grade cut scores in reading and math in 2006 were considerably more challenging than the cut scores in the lower grades, particularly grade 3. The two figures that follow show Minnesota’s reported performance in reading (Figure 5) and mathematics (Figure 6) on its state test and the rate of proficiency that would be achieved if the cut scores were all calibrated to the grade-8 standard. When differences in grade-to-grade difficulty of the cut scores are taken into account, student performance is more consistent across grades. This would lead to the conclusion that the higher proficiency rates reported by the state for students in earlier grades are somewhat misleading.

Figure 5 – Minnesota Reading Performance as Reported and as Calibrated to the Grade-8 Standard, 2006



Note: This graphic shows, for example, that if Minnesota’s grade-3 reading cut score were set at the same level of difficulty as its grade-8 cut score, only 64 percent of third graders would achieve the proficient level, rather than 82 percent, as reported by the state.

Figure 6 – Minnesota Mathematics Performance as Reported and as Calibrated to the Grade-8 Standard, 2006



Note: This graphic shows that, for example, if Minnesota's grade-3 mathematics cut score were set at the same level of difficulty as its grade-8 cut score, only 57 percent of third graders would achieve the proficient level, rather than 78 percent, as was reported by the state.

Policy Implications

When setting the cut scores for what it takes for a student to be considered proficient in reading and math, Minnesota is relatively high, at least compared with the other 25 states in this study. In recent years, the state has adjusted the difficulty of these cut scores—making them more challenging in the later grades and less so in the early ones. As a result, Minnesota's expectations are not smoothly calibrated across grades; students who are proficient in third grade are not necessarily on track to be proficient by the eighth grade. State

policymakers might consider adjusting their standards across grades so that parents and schools can be assured that elementary school students scoring at the proficient level are truly prepared for success later in their educational careers. Furthermore, state leaders need to be aware of the disparity between math and reading standards when evaluating differences in teacher and student performance across these domains.