E&R Report No. 10.13

A BRIEF LOOK AT:

TEST SCORES AND THE STANDARD ERROR OF MEASUREMENT

David Holdzkom, Brian Sumner, Brad McMillen

Any test score is only an estimate of actual achievement or learning. A variety of factors other than the student's actual knowledge of the tested material may influence the precision of a score for any given student. A sleepless night, inadequate nutrition, distractions in the testing environment, and even good old-fashioned luck just are a few of the factors that can play a role in how well a student scores on any test. For large-scale tests, like the End-of-Grade (EOG) or End-of-Course (EOC) tests taken by public school students in North Carolina each year, the portion of each student's score that can be attributed to those other factors can never be known exactly, but it can be estimated. This measurement is called the standard error of measurement (SEM).

For EOG and EOC tests, the SEM is usually estimated at 3-4 scale points, although this amount will vary depending upon the grade level and subject area (see below). It can also change when a new edition of a test is put in place, but historically it has been around 3-4 points. In practical terms, this means that a student's observed score (i.e., the score that is officially reported) may in fact be somewhat below or above the student's "true" level of knowledge.

Standard Errors of Measurement (SEM) for Current EOG and EOC Tests
2009-10 School Year

End-of-Grade Test	SEM	End-of-Course Test	SEM
Grade 3 Reading	3	Algebra I	3
Grade 4 Reading	3	Algebra II	4
Grade 5 Reading	3	Biology	4
Grade 6 Reading	3	Civics & Economics	3
Grade 7 Reading	3	English I	3
Grade 8 Reading	3	Geometry	4
Grade 3 Mathematics	4	Physical Science	4
Grade 4 Mathematics	3	US History	3
Grade 5 Mathematics	4		
Grade 6 Mathematics	4		
Grade 7 Mathematics	4		
Grade 8 Mathematics	4		
Grade 5 Science	3		
Grade 8 Science	3		

WAKE COUNTY
PUBLIC SCHOOL SYSTEM

When an EOG or EOC test score will be used as the basis for a "high-stakes" decision—such as whether a student should continue on to the next grade or next course—a score within one SEM of the Achievement Level III cut score (between proficiency and non-proficiency) is often considered to be acceptable evidence that the student is ready to move forward. WCPSS local policies regarding promotion and retention reflect this SEM allowance, as do the State Board of Education's policies regarding promotion and high school exit standards (see http://www.ncpublicschools.org/accountability/policies/highschoolexit). The purpose of this allowance is to avoid "false negatives" (i.e., concluding that a student is not proficient on the material covered by a particular test when in fact s/he has learned it), thereby giving students the benefit of the doubt when making decisions about whether to promote them to the next grade or move them on to higher-level courses.

Effectively, this means that a student with a Level II score on an EOG or EOC exit standard test *that is within one SEM of Level III* will be considered to have met the standard for purposes of individual promotion/retention decisions. Similarly, students whose EOC score is within one SEM of the Level II/III cut will be deemed to have met the graduation standard for those EOCs that are part of the state's high school exit standards.

However, with regard to school accountability metrics such as the ABCs and AYP, these students will *not* be counted within the percent of students scoring proficient (i.e., at or above Level III) in those contexts. All students who score below Level III on an EOG or EOC test regardless of the SEM are given a second opportunity to take the test, and will be counted as proficient if and only if they score Level III or higher on that second try. In other words, the SEM does not affect the school's publicly-reported testing results; it can only affect the result as it pertains to the individual student.

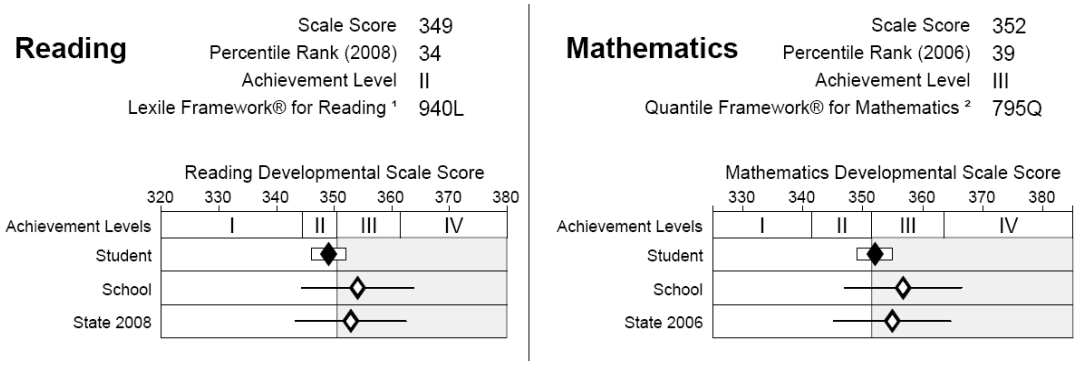
The printed classroom rosters distributed to testing coordinators after the scoring of EOG and EOC tests clearly show if a student met the state promotion standard with the SEM added, as per the example below for a hypothetical 3rd Grade EOG Reading roster report:

Name	Dev. Scale Score	Ach Level	Met State Standard of 338
1 CAULFIELD, HOLDEN	337	2	Yes 1 SE

The student in this example obtained a scale score one point below what was required to reach Achievement Level III, but nonetheless was close enough to make the standard via the application of the SEM, as indicated by the "Yes 1 SE" label in the right-hand column. For some students who do NOT achieve the standard with 1 SE added, these classroom roster reports may show "No 2 SE", indicating that the student's score was more than one SEM below the cut score, or it will just say "No".

Parents of students taking EOG tests will also receive an Individual Student Report that may contain reference to the SEM. That report indicates the scale score, the percentile rank, the Lexile® and Quantile® equivalents for those scores and, of course, the Achievement Level for each EOG test a student takes. If a student scores below Level III but within 1 SEM of the Level

III cut point, the Individual Student Report will show this via a graphic that has a rectangular bar extending outward from the point where the student scored that "crosses" the Level III cut score line. The example below shows how this will look for a student who meets the promotion standard with a Level II score that is within the SEM for Reading:



So in summary, the SEM:

- Is an estimate of the amount of error or inaccuracy in a single test score;
- Generally encompasses 3-4 scale score points on an EOG or EOC test;
- Can be added to a student's Level II score in some cases to help them meet the promotion/exit standard associated with an EOG or EOC test;
- Has no effect on a school's officially reported accountability measures (i.e., ABCs and AYP)

For more detailed information on the SEM, see http://www.wcpss.net/evaluation-research/reports/2000/mment_error.pdf, or contact the WCPSS Evaluation and Research Department at eandr@wcpss.net or (919) 850-1863.