Standard Error of Measurement

The simplest, most non-technical way to think of the standard error of measurement is the following:

> *If a single student were to take the same test repeatedly (with no new learning taking place between testings and no memory of question effects), the standard deviation of his/her repeated test scores is denoted as the standard error of measurement.*

What is the difference between the "standard deviation of scores on a test" and the "standard error of measurement on a test"?

> *When one refers to the standard deviation of scores on a test, usually he/she is referring to the standard deviation of the test scores obtained by a group of students on a single test. It is a measure of the "spread" of scores between students.*
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> *When one refers to the standard error of measurement on a test, he/she is referring to the standard deviation of test scores that would have been obtained from a single student had that student been tested multiple times. It is a measure of the "spread" of scores within a student had the student been tested repeatedly.*

Since it is highly unlikely that each student would be tested repeatedly on a test in order to estimate the standard error of measurement, how is the standard error of measurement estimated?

> *Fortunately, the standard error of measurement can be estimated from a single testing of a population of students (e.g. a single TAAS or TAKS administration). From the test scores of a population of students on a single exam, one can easily compute estimates of the test score mean, test score standard deviation, and the test score reliability (notated as $\bar{x}$, s_x, and r_{xx}, respectively). From these estimates, an estimate of the standard error of measurement, $s_{E,}$ is computed using the following formula:*

$$s_E = s_x \sqrt{1 - r_{xx}}$$