Understanding High School Course Grades 27 December 2014,

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Abstract: This presents a system which quantitatively predicts the freshman class rank of any American student at any American college, and graphically summarizes the performance of the school. It also provides comparisons between any school or group of schools and any other school or group.

It seems obvious that intelligent, hard-working students will get higher grades than less intelligent, less hard-working students. But quantitative comparisons and specific predictions on college performance are difficult: Most high school teachers now give higher grades than given in past years, a trend called "grade inflation". Music and art teachers usually give higher grades than math and science teachers. Teachers in Texas and Florida usually give higher grades than teachers in Massachusetts and Connecticut.

In short, high school grades require context to be meaningful.

For a specific student's grade in a specific course (say Susan's B+ from Mr. Smith in Geology at Somewhere H.S. in 2013), that context is all the students in that same year/school/course/teacher group of students, together with their grades in Geology and their most recent class ranks. (Be brave – this is all happening in a computer!) A quick check of the best-fit GPA-vs-rank curve, and Susan's B+ in Geology has become an equivalent local class rank value (say 65^{th} percentile from the bottom).

A microsecond later, the computer has looked at the most recent graduating class from that high school, and converted Susan's Geology B+ further to an equivalent SAT value (say 521 in Math + 532 in Critical Reading = 1053) . All her other grades are converted an instant later, followed immediately by a weighted average using course credits (say 1075; Geology was a tough course).

In a heartbeat, Susan's page-long transcript of qualitative local grades has produced a single number (1075 SAT points) which is understandable anywhere. ACT scores behave similarly.

Without this method, college performance has just been guessed ("gut-ology" is sometimes used as an ironic description of the process) by millions of students, families, counselors, admissions officers, and scholarship committees each year. Guesses for unfamiliar colleges or high schools are especially uncertain.

By contrast, Susan and her counselor can confidently scan thousands of colleges which publish the average SAT scores for their 25^{th} and 75^{th} percentile students. The computer will give Susan her estimated class rank at each college (for example, 67^{th} percentile at Central Connecticut State University, but only the 14^{th} percentile at UConn-Storrs). If Susan has an experienced counselor, he may comment that her ability to shoot and sink a basketball from mid-court may particularly interest UConn. And if her high school has surveyed its graduates for their freshman college class ranks, she may further learn that Somewhere H.S. graduates typically perform 6.2 SAT points higher than calculated earlier, which the computer then includes in its estimates. Both students and colleges could really think nation-wide.

These estimates would be a revolutionary improvement in college counseling and admissions. They would promote better choices on tens of billions of federal, state, local, and family dollars each year.

And further improvements are then easy. By plotting all the graduates of a high school for a given year on a single chart and adding best-fit lines, the method provides simple, graphical summaries of results like colleges applied to, accepted by, entered, performance at, etc. That would be highly interesting to Americans town-by-town nation-wide.

Those plots can also be done to compare any school or group of schools to any other school or group of schools. Does West H.S. do a better job of preparing students for college than East H.S.? See the plots. How do all Ohio high schools compare to all New York high schools? To all Indiana schools? If done and made public, see the NY Times, the Washington Post, or the TV news of your choice.