An Analysis of Econ 100 Grades Relative to Other Knowledge and Inquiry 100-level Course Grades with Heavy Reliance on Quantitative Skills

I. Sensitivity Analysis: Econ 100

The table below is built for a typical 10-question quiz with 10 points possible per question, and it assumes that a score of 75 is in the middle of the C range. The rows are how many questions a student gets wrong out of 10.  The columns are scores based on how many points a student gets for a wrong answer.

For example, in the first column, if we give no credit for a wrong answer (0 points), then 0 wrong (10 correct out of 10) yields a score of 100, 1 wrong (9 correct out of 10) gives a 90, and so on.

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| Ten-question Quiz (10 points per question) |
|  | Grade (by points per wrong answer) |
| Number wrong | 0 | 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |  |  |
| 0 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1 | 90 | 91 | 92 | 93 | 94 | 95 |
| 2 | 80 | 82 | 84 | 86 | 88 | 90 |
| 3 | 70 | 73 | 76 | 79 | 82 | 85 |
| 4 | 60 | 64 | 68 | 72 | 76 | 80 |
| 5 | 50 | 55 | 60 | 65 | 70 | 75 |
| 6 | 40 | 46 | 52 | 58 | 64 | 70 |
| 7 | 30 | 37 | 44 | 51 | 58 | 65 |
| 8 | 20 | 28 | 36 | 44 | 52 | 60 |
| 9 | 10 | 19 | 28 | 37 | 46 | 55 |
| 10 | 0 | 10 | 20 | 30 | 40 | 50 |
| Fraction of material to master to get a score of C = 75 | 0.750 | 0.722 | 0.688 | 0.643 | 0.583 | 0.500 |

Our current standard is in the last column. If we give half credit (5 points) for a wrong answer, then 0 wrong (10 correct out of 10) is 100, 1 wrong (9 correct out of 10) is 95, and so on.

Other options are in the columns in between. For example, giving 10% credit (1 point) for a wrong answer yields 100 for a perfect score, 91 for 1 wrong, 82 for 2 wrong, and so on.

At the bottom of the spreadsheet is a row that shows approximately how much of the material a student has to master in order to get a score of 75 = C.  The figures in this row are derived with linear interpolation.  For instance, if we give 0 points for wrong answers, then a student has to get 2.5 questions wrong, or 7.5 questions correct out of 10.  This is 75% of the material to get a 75.  That’s the 0.750 number at the bottom of the column corresponding to 0 points per wrong answer.  Our current standard is in the last column, and it shows that a student can get a score of 75 if she masters 5 questions out of 10.  That’s the 0.500 number at the bottom of that column.

We picked our current standard because it nicely truncated the usual 0-100 grading scale to a 50-100 scale, where the F range was the same width as the ranges for other letter grades.  But that was based on our willingness to say that a student who walked out of class knowing 50% of the material had produced an average result.  With the current standard (plus the 0 or 100 scoring for in-class activities, and half credit for wrong answers on the final exam) final grades in Econ 100 have been around 80, on average, for my classes for the past few semesters.

A tougher standard should bring that average result down, but not point for point.  Quizzes plus the final exam have been about 60% of the final grade lately.  To get a rough estimate of the effect of changing the standard, let student effort remain the same and let that effort produce average scores of 80 on quizzes and final exams, in line with the average overall grade lately.  (Quiz and final exam scores really haven’t been this high, on average, but ignore that for the moment).  An 80 under our current standard corresponds to 4 wrong out of 10.  Now switch to a tighter standard, like 30% credit for a wrong answer.   If we give 3 points for a wrong answer, instead of 5 points, then 4 wrong out of 10 slips from 80 to 72.  If the same thing happened on the final exam, then that 8-point drop might be reflected in about a (0.60)(8) = 4.8 point drop in average final grades.

We could probably get a refined estimate just using the data from Moodle’s Gradebook for Econ 100 sections over the past few years.  Average quiz scores are there, as well as average final exam scores.  Average in-class activity scores would be held constant.  You can see in the spreadsheet that the lower the average quiz score, the bigger the effect of moving to a new standard.  For example, suppose that average quiz scores under the current standard were 70 instead of 80.  That’s 6 wrong out of 10.  After moving from 5 points to 3 points for wrong answers, 6 wrong out of 10 becomes a 58, or a 12-point drop.  Then, assuming the same effect on the final exam, overall grades drop by (.60)(12) = 7.2 points.

II. An Analysis of ECON 100 grades relative to Math 108, Math 109, Psych 101, and Socy 100 grades (Fall 2006-Spring 2014)

* Average grade for Econ 100: 2.86 with 886 observations
* Average grade for Math 108: 1.79 with 572 observations
* Average grade for Math 109: 2.14 with 1188 observations
* Average grade for Psyc 101: 1.98 with 1775 observations
* Average grade for Socy 100: 2.02 with 1549 observations

If we do decide to do something about the grades, we could pursue one of several possibilities:

* change the weight of wrong answers on quizzes
* change the weight of wrong answers on the final
* change the weight of wrong answers on both

III. Adjustments to the Course

* keep the quizzes at half credit for wrong answers, for the reasons you mentioned. We drop the low quiz score before taking an average.
* weight the average 40% for the final grade.
* create a midterm, which is mainly micro. This will have to be online, so as not to take up a valuable class period. We give no credit for wrong answers. We weight this at 10% for the final grade. We make the midterm 25 multiple-choice questions.
* create a final, which is mainly macro. This could be on paper (although I think we should try it online).  We give no credit for wrong answers.  We weight this at 10% for the final grade.  We make the final also 25 multiple-choice questions.
* continue to score in-class activities at 0 or 100.  We drop the low in-class score before taking an average.  We weight the average 40% for the final grade.