The ability to predict outcomes in a course is valuable to students, instructors, and the institution. Early predictions can alert for academic difficulty and trigger intervention strategies.

Yet accurate prediction is difficult because multiple factors contribute to success or failure in a course.

Demographic variables and measures of prior academic success (high school GPA, SAT/ACT scores, placement tests) have limited value because they miss crucial information about motivation and preparation for class.

The Gateway to Completion (G2C) project provided opportunity to test if actual performance, measured at several time points during a semester, can predict a productive final grade (C- or better) in a course.

Data were collected at weeks 1 through 6, 8, 10, 12, and final for eighteen course/sections of BIO121, CHM101, CHM103, and MTH111 in the Fall 2015 semester.

Instructors established weekly point totals based on quizzes, exams, graded homework, and other assignments and recorded running totals of earned points to calculate a fractional “grade” for each student.

~~~ Research Questions ~~~

Does graded work skillfully predict a productive final grade? If so, how soon in the semester?

Logistic regression is an effective way to model binary responses. It can generate the probabilities of earning productive final grades for all students in a course/section using only the fractional grades at regular time points. The probabilities are predictors of the eventual outcome.

For example, in a BIO121 section, 81.3% of students ultimately earned productive final grades. At Week4 the probability model is shown by the blue curve. Black dots above the curve represent Week4 grades that ended up as productive final grades (vertical position of dots is arbitrary here). All had at least a 0.6 fractional grade at this point.

How good is the prediction?

The accuracy of the model can be gauged by the relationship between false-positive and true-positive predictions as shown by the Receiver Operator Curve (ROC). As the Area Under the Curve (AUC) index approaches 1 (the case of no false negatives and no false positives), the model is deemed more accurate. A test with no predictive ability beyond uninformed guessing would have an AUC = 0.5.

The aggregated AUC numbers are impressive. Early evaluation, even by the second week, is highly predictive of productive final grades in these courses.

The Office of Institutional Research (OIR) at the University of Rhode Island (URI) website provides additional resources and information on assessment and evaluation.

Recommendations:

- Give graded assignments early to detect potential failure, when intervention will be most beneficial.
- Assess class performance early when modification of content delivery can help a whole class having difficulty with the material.
- Frontload coursework to take pressure off final exams/projects when time is tight for both students and instructors and when outcomes will change little.