

Updated Model Predicting High School Students' Attainment of Core Credits in Grade 9

Helen Y. Wang, Ph.D.
Applied Research and Evaluation

Background and Purpose

The Grade 9 course prediction model was developed in 2011–2012 school year and updated in 2016–2017 school year to provide school administrators and teachers with a course prediction tool to guide instructional practice. This prediction model provides information necessary for identifying students at risk of course failure in their first year of high school. Researchers from Shared Accountability recently updated the prediction model again to align with changes over time in courses, instructional practices, and assessments in the district. With a high prediction accuracy rate at 90.4 percent, the current model can effectively predict Grade 9 course performance that can support schools with identifying students in need of additional support. The predicted course information can also be used in conjunction with the student academic milestones indicated in the Pathway for College, Career, and Community Readiness.

Methods

The Grade 9 course prediction model was updated based on data from more than 10,000 students who were enrolled as first-time ninth graders in the school year of 2022–2023 and had related data available: 1) earned core credits in areas of English, mathematics, science, social studies, and world language by the end of Grade 9, and 2) complete predictor data associated with students' prior (Grade 8) academic performance and engagement status. The Grade 9 course credits and the predictor data were obtained through official secondary school report cards and the course history files from the MCPS student data system. The model integrated the Grade 9 course credit information and the predictor data to build a statistic model that predicts the likelihood of earning at least four core credits in Grade 9. More specifically, the likelihood would be estimated based on three research-based constructs that can be represented by the predictors shown below:

- 1) Prior academic performance on standardized assessments
 - Spring MAP-Reading (MAP-R) Rasch Unit (RIT) score in Grade 8
 - Spring MAP-Mathematics (MAP-M) RIT score in Grade 8
- 2) Rigor of prior courses
 - Enrollment in a high school mathematics course passed with a C or higher grade in the second semester of Grade 8
 - Enrollment in an on- or above-grade-level English language course passed with a C or higher grade for the end-of-year mark of Grade 8
- 3) Prior academic engagement
 - Mean Marking Period Average (MPA) in Grade 8
 - Grade 8 attendance rate

A series of advanced statistical procedures were used to explore, adjust, and finalize the course prediction model that includes the statistically significant regression coefficients for the Grade 8 prediction variables to estimate the number of core credits attained at the end of Grade 9. A research-based threshold number of core credits has been determined to distinguish students earning four or more core credits from those earning less than four core credits in Grade 9.

Prediction Accuracy

With a high prediction accuracy rate of 90.4 percent, the current Grade 9 course prediction model validates the effectiveness of the previous models in predicting attainment of four or more core credits for first-time Grade 9 students. Prediction accuracy varies by student group, with a higher rate for students identified as Asian (97.2%), White (96.8%), and Two or More Races (93.5%) than for students identified as Black or American (87.5) and Hispanic Latino (83.2%). For service groups, prediction accuracy is 83.2 percent among students receiving Free and Reduced-price Meals System (FARMS) services, 82.5 percent among students receiving special education services, and 77.4 percent among students identified as Emergent Multilingual Learners or Recently Exited Emergent Multilingual Learners (EML/ReEML).

It is worthy to note that, like previous Grade 9 course prediction models, the current model also inevitably results in a prediction error rate at about 10 percent of first-time Grade 9 students. Among students with error course prediction, they are more likely to be underestimated than overestimated in general, indicating the current prediction model is reasonably rigorous.

Implementation of Grade 9 Course Prediction Model

The current course prediction model has been implemented to obtain core course credit predictions for the first-time Grade 9 students in the current school year, incorporating their prior (Grade 8) predictor data used for the model building. Out of 12,671 first-time Grade 9 students in the current school year, 10,014 (79%) of them are predicted to earn four or more core credits at the end of the school year, 730 (5.8%) are predicted not to, and 877 (6.9%) have no course prediction information due to incomplete predictor data associated with prior academic performance and engagement. The rest of 1,050 (8.3%) students are new MCPS enrollees who have no predictor data (cells left blank).