



## **Using PLAN to Identify Student Readiness for Rigorous Courses in High School**

### **Introduction**

As part of recent calls for high school reform, the nation's secondary schools are being strongly encouraged to offer and promote more rigorous coursework that will better prepare students for success in college and work after graduation. One outcome of this effort is increased interest on the part of high schools in having more of their students participate in dual enrollment, Post Secondary Enrollment Options (PSEO), International Baccalaureate (IB), Advanced Placement (AP), and other similarly rigorous programs from which students may earn college placement or credit for college-level work done in high school.

Helping students know whether they are likely to benefit from such programs is an important challenge for educators. As part of its College Readiness System, ACT offers the PLAN<sup>®</sup> program as a way for tenth-grade students to review their progress toward college readiness while there is still time to make necessary interventions. PLAN contains four tests—English, Mathematics, Reading, and Science. These tests are designed to measure students' curriculum-related knowledge and the complex cognitive skills important for future education and careers. Scores range from 1 to 32.

ACT examined the relationships between students' scores on PLAN and their scores on selected AP Exams. Currently, there are 37 AP courses and exams available. An AP Exam assesses students' mastery of the material covered in the corresponding AP course. AP Exams are graded on a 5-point scale: 1 (no recommendation), 2 (possibly qualified), 3 (qualified), 4 (well qualified), and 5 (extremely well qualified). Generally, students who earn AP Exam scores of 3 or higher are considered qualified to receive college credit and/or to be placed into advanced courses. But, this decision is determined by each college or university; in many instances, colleges require AP Exam scores of 4 or higher in order for students to receive college credit for the course.

In this study, ACT developed new score linkages for AP courses that align in curricular content with the four PLAN tests and updated the linkages found in earlier studies. Results from this study show that PLAN test scores are good predictors of success in AP courses, as defined by receiving a score of 3 or higher (or 4 or higher) on the appropriate AP Exam. Because students often take college-level courses during the latter half of their high school careers, PLAN administrations are well timed to provide students with the opportunity to judge their readiness for such coursework.

## Data

For this study, AP student records (45,227 students) were matched with PLAN histories from 1999–00 to 2007–08 (more than 8 million students); matched PLAN/AP records from earlier studies were added to these data. The analyses were limited to students who took PLAN in tenth grade and 5 to 33 months before taking an AP Exam. The total number of matched PLAN/AP student records was 34,336; these students came from 19 states and 277 school districts. Students from all racial/ethnic groups were represented (78 percent White students, 16 percent racial/ethnic minority students [i.e., African American, American Indian, and Hispanic students combined], 3 percent Asian American students, and 3 percent students from other racial/ethnic groups). The sample sizes of matched PLAN/AP student records for the 18 AP Exams ranged from 146 to 13,449; the median sample size was 2,144. The study sample was weighted to represent the 2008 national AP-tested population.

## Results

*Correlations.* All AP scores were correlated with PLAN Composite scores and the corresponding PLAN subject area scores: with two exceptions, AP English and social studies scores were correlated with PLAN English and Reading Test scores,\* and AP mathematics and science scores were correlated with PLAN Mathematics and Science Test scores. Additionally, average PLAN English & Reading and Mathematics & Science scores were created for each student and correlated with relevant AP Exam scores.

Moderate to strong correlations were found between PLAN and AP scores. The maximum correlation generally occurred either with the average of the two subject-related scores (English & Reading or Mathematics & Science) or the PLAN Composite. To maximize accuracy and ensure consistency across PLAN scores used for similar AP subject area exams, we used the averages of two subject-related scores for predicting AP success. For 15 of the 18 AP Exams, the correlations associated with these averages were larger than 0.5 (range: 0.42 to 0.72). Correlations were generally comparable to those reported by Ewing, Camara, and Milsap (2006) and Ewing, Camara, Milsap, and Milewski (2007).

*Predictions of AP Success.* Success on an AP Exam was defined as earning a score of 3 or higher (or 4 or higher). Using logistic regression, PLAN scores were used to predict students' chances (probability) of success. From these predictions, we identified PLAN scores corresponding to a 50 percent and a 75 percent chance of earning a 3 or higher AP score, as well as those associated with a 50 percent chance of earning a 4 or higher score (Table 1). The PLAN scores corresponding to a 50 percent chance of earning a 4 or higher AP score were generally the same or higher than the PLAN scores corresponding to a 75 percent chance of earning a 3 or higher AP score.

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\* The exceptions were AP Macroeconomics and AP Microeconomics, which were correlated with PLAN Mathematics and Science Test scores.

**Table 1: PLAN Scores Associated with Selected AP Exam Scores**

AP Exam	Sample Size	PLAN Tests	PLAN Scores		
			3 or Higher AP Score		4 or Higher AP Score
			50%	75%	50%
Biology	4,781	Avg. Mathematics & Science	23	26	26.5
Calculus AB	5,858	Avg. Mathematics & Science	22.5	25.5	25.5
Calculus BC	696	Avg. Mathematics & Science	21	24.5	25
Chemistry	828	Avg. Mathematics & Science	24.5	27.5	28
English Language	13,449	Avg. English & Reading	21.5	24	26
English Literature	11,402	Avg. English & Reading	21.5	24	26.5
European History	2,006	Avg. English & Reading	21.5	24.5	27
Government and Politics: Comparative	815	Avg. English & Reading	22	25.5	26.5
Government and Politics: United States	3,397	Avg. English & Reading	22.5	26	27
Macroeconomics	500	Avg. Mathematics & Science	24	27.5	27
Microeconomics	288	Avg. Mathematics & Science	22	26	26.5
Physics B	1,075	Avg. Mathematics & Science	23.5	26.5	27
Physics C: Electricity & Magnetism	146	Avg. Mathematics & Science	23	27.5	26
Physics C: Mechanics	370	Avg. Mathematics & Science	22.5	25.5	25.5
Psychology	2,828	Avg. English & Reading	19	22.5	22.5
Statistics	2,283	Avg. Mathematics & Science	22.5	24.5	25.5
U.S. History	12,280	Avg. English & Reading	22.5	26	26.5
World History	5,937	Avg. English & Reading	22	25	26

### Using the Table

PLAN scores corresponding to a 50 percent chance of earning a 3 or higher AP score (fourth column, shaded in red) might be a reasonable starting point for identifying students who would likely succeed in an AP course. However, compared to higher scores such as the scores in the fifth column (shaded in gray) that correspond to a 75 percent chance of earning a score of 3 or higher, lower scores are also associated with a greater chance of identifying students for an AP course who ultimately would not be successful in the course. The following are suggested guidelines for using the PLAN/AP score linkages in Table 1:

- Students with PLAN scores *at or above* the score corresponding to a 75 percent chance of earning an AP score of 3 or higher (gray-shaded column) are likely to succeed in, and should therefore be encouraged to consider taking, an AP course. Frequently, this PLAN score, or the score 1 point above this score, corresponds to at least a 50 percent chance of earning an AP score of 4 or higher (last column).

- Students with PLAN scores *between* the two scores corresponding to a 50 percent chance (red-shaded column) and a 75 percent chance (gray-shaded column) of earning an AP score of 3 or higher might succeed in an AP course. At a minimum, these students should be made aware of the possible AP courses available to them, as well as be encouraged to take the high school coursework necessary to prepare them for these AP courses.
- Students with PLAN scores *considerably below* the score corresponding to a 50 percent chance of earning an AP score of 3 or higher (red-shaded column) are not likely to succeed in an AP course. These students might benefit most by taking additional high school coursework necessary to prepare them for AP courses.

## Conclusion

The PLAN/AP linkages identified in this study can be used by schools and educators to:

- provide inquiring students and their parents with information regarding their likelihood of success on an AP Exam,
- identify students who should take additional preparatory coursework prior to taking an AP course, and
- determine the number of students who might be eligible for an upcoming AP course.

Clearly, there are other factors related to AP success. Similar to the process for college admissions, multiple measures of academic achievement should be used in identifying students who are likely to be successful in AP courses. Besides PLAN test scores, other measures of college readiness that might be considered include high school grade point average, high school class rank, high school coursework, and letters of recommendation. Nonacademic factors such as achievement motivation and social support likely also contribute to the probable success of students in AP courses.

Nevertheless, administering PLAN to tenth-grade students not only provides them with the opportunity to assess their progress toward their education and career goals, but also allows schools and school districts to determine which of their students might be most eligible to take dual enrollment, PSEO, IB, AP, and other rigorous courses.

## Reference

- Ewing, M., Camara, W. J., Millsap, R. E. (2006). *The relationship between PSAT/NMSQT scores and AP Examination grades: A follow-up study*. (College Board Research Report No. 2006-1). New York: College Board.
- Ewing, M., Camara, W. J., Millsap, R. E., Milewski, G. B. (2007). *Updating AP Potential expectancy tables involving PSAT/NMSQT Writing*. (College Board Research Notes No. RN-35). New York: College Board.