California Department of Education

Measures for a College and Career Indicator: Research Brief on Advanced Placement and International Baccalaureate

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Educational Policy Improvement Center (EPIC)

Introduction

In September of 2012, Governor Jerry Brown signed into law Senate Bill 1458, which calls for California's school accountability system to shift from a near exclusive reliance on state test scores to a broader range of measures demonstrating student achievement. At the high school level, starting in the 2015–2016 school year, the Academic Performance Index (API) will include an indicator composed of measures reflecting students' college and career preparedness.

To determine exactly what measures will be included in this new indicator, the State Superintendent of Public Instruction and the State Board of Education will consider input from regional public meetings, a statewide survey, and recommendations from the Public Schools Accountability Act (PSAA) Advisory Committee. To further support this decision-making process, the California Department of Education has contracted with the Educational Policy Improvement Center (EPIC) to conduct analyses of six different types or clusters of potential measures of college and career preparedness, summarized in a series of six white papers and a final summary report.

This white paper synthesizes the literature and data relevant to incorporating the Advanced Placement or International Baccalaureate Programme course-taking (participation) and/or exam scores as a measure of college and career preparedness. The paper begins by presenting a brief overview of the two programs, their respective histories, and their current applications to other state accountability systems. Next, the programs are evaluated against the analytical framework being used for all six clusters of potential college and career preparedness measures.

Advanced Placement and the International Baccalaureate: A Brief Overview

The AP program allows high schools to offer college-level curriculum to students in yearlong courses. Students have the option to take an AP exam after completing a course. The AP exams are scored on a 1 to 5 scale with many colleges awarding college credit for scores of 3 or higher. Most AP exams are in two parts—a multiple-choice or forced choice component that is machine scored and a constructed response that is scored by hand by trained reviewers at a large convening organized and managed by the College Board's contractor, ETS.

Most four-year colleges use AP exam scores for a variety of purposes including being considered in admissions decisions, determining advanced standing, and for awarding college credit. According to the Integrated Postsecondary Education Data System, 75% of four-year institutions, 51% of two-year institutions, and 3% of institutions offering certificates report accepting AP credits (National Center for Education Statistics, 2014). The College Board currently allows high schools to offer up to 34 AP courses and exams for college credit. The syllabus of every AP course taught in the world undergoes an audit conducted by the College Board to ensure the course meets the curricular requirements of that AP subject area. Only courses that have successfully completed the audit process are authorized to use the AP designation.

The IB Diploma Programme takes place during the final two years of high school and is designed to prepare students ages 16–19 for "success at university and life beyond" (International Baccalaureate

Organization, 2014b). In order to earn the full diploma, students are required to complete exams in six groups of subjects: language and literature, language acquisition, individuals and societies, sciences, mathematics, and the arts. One course must be taken in all groups except the arts; students may take a course in the arts or a course within a second subject in one of the other five groups.[1] In addition to six exams, students must complete three core requirements: an extended essay, a course in theory of knowledge, and a project in Creativity, Action, Service (CAS). To earn the full IB diploma, students must earn 24 points out of a total of 45 points (up to 7 points for each exam and 3 points for the extended essay). The CAS project is not formally assessed but is an essential requirement for the diploma.[2] Students may also complete IB courses and take individual exams without pursuing the comprehensive diploma program. Students can earn certificates by passing exams in particular subject areas. As with AP exam scores, some colleges accept IB exam scores for course credit and others do not. Those that do tend to require a score of 4 or higher for granting college credit or otherwise acknowledging the student has reached a college level of performance on the exam.

History

Advanced Placement exams were first administered in 1956 after a group of elite private high schools and colleges, including Harvard, Yale, and Princeton, asked the College Board to oversee a program that would test students on the content and concepts in courses designed to reflect entry-level college courses. The original AP program intent was to provide high-achieving students with access to course material that went beyond the content sequence offered in the local high school or offered college-level content in subject areas not offered at the high school. Until the 1980s, the prestigious AP program tended to be available largely to high-achieving high school students in upper middle class and elite high schools. Over time, the AP program has evolved to be much more inclusive. Participation is far more widespread, and nearly 14,000 U.S. high schools offer at least some AP courses (College Board, 2014e). The number of students taking AP exams has increased dramatically in recent years. In 2013, 33% of high school graduates took an AP exam as compared to 19% a decade earlier (College Board, 2014e). The number of test takers who were low-income students increased four-fold from 2003 to 2013. As the numbers of test takers have increased, so has the percentage of students scoring a 3 or higher on an AP exam. Eight percent more test takers scored a 3 or higher than did so in 2003.

The IB Diploma Programme was created in 1968 in Geneva, Switzerland, for internationally mobile students preparing for postsecondary education. Interestingly, it was not designed to be offered in the U.S., but the first U.S. school was authorized in 1971. The content of IB has remained similar over the years with courses being taught in English and French. Spanish was adopted as a third official language in 1983. The intent of the International Baccalaureate Organization (IBO) has always focused heavily on an intercultural, global approach to education. The IB Diploma Programme was originally taught almost exclusively in private international schools and consisted of a preuniversity curriculum. Today more than half of all IB programs are located in public schools, and 40% of IB World Schools are located in the U.S.

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1 At least three and not more than four courses must be taken at the 240 teaching-hour level. The rest of the courses are taken at the 150 teaching-hour level.

2 Students can earn a bilingual diploma by completing two courses in languages, a social or experimental science course in a different language, or an extended essay in social or experimental sciences.

State Accountability and the AP and IB

As a result of the increased national focus on college and career preparedness, both AP and IB participation and performance are no longer used strictly for granting credit to high school students or giving preference in admission decisions. State policymakers and administrators are increasingly using AP and IB participation and performance to measure the college and career preparedness of groups of students or to compare high schools. The most commonly used indicator is the percentage of students who meet a college-ready benchmark on an AP (score $\geq$ 3) or IB (score $\geq$ 4) exam. Research from the College Board found that students with AP exam scores of 3 or higher who placed out of introductory college courses outperform or perform just as well as non-AP students in second year courses (Dodd et al., 2002; Patterson, Kobrin, & Packman, 2011; Patterson & Ewing, 2013). IB students who score at least 24 points out of the possible 45 points on the six exams plus the extended essay are eligible for the diploma. A study of students in the University of California system who had earned the IB diploma or taken IB exams found that these students outperformed students who had not been in IB programs, even after adjusting for family income (International Baccalaureate Organization, 2010).

As of March of 2014, 15 states currently incorporate AP/IB participation and performance data into their public high school accountability systems or plan to do so. The role of participation rates and exam scores, however, varies across state systems. Some states use both AP/IB participation and performance when determining accountability scores. For instance, Florida calculates school grades using four types of components: assessment, acceleration, graduation rates, and college readiness. The acceleration component is 18.75% of the high school grade and measures student participation and performance in AP and IB (as well as other courses where students can earn college credit).[3] AP and IB participation is defined as the percentage of grade 11 and 12 students participating in the above courses and accounts for exactly half of the acceleration component. The other half of the component, performance, is defined by the percentage of AP/IB participants who earn college credit (AP score $\geq$ 3 or IB score $\geq$ 4).

Other states use AP/IB participation and performance to award bonus points for school grades or to identify exemplar schools. For instance, Texas uses four components to create a performance index for schools: student achievement, student progress, closing performance gaps, and postsecondary readiness. The performance index score indicates whether schools "Met Standard" or "Improvement is Required." Schools that "Met Standard" are eligible for Academic Achievement Distinction Designations (AADD) in student growth, reading achievement, and mathematics achievement. One of the AADD indicators, AP/IB participation, is defined as the percentage of grade 11 and 12 students who took at least one AP/IB exam. The AP/IB performance AADD indicator is defined by the percentage of AP/IB participants who earn college credit (AP score $\geq$ 3 or IB score $\geq$ 4).

The other main approach states use is to measure only AP/IB performance. For example, Nevada uses five categories in its school performance index: status/growth, gap, graduation rates, CCR, and other indicators. AP performance is part of the CCR category and accounts for 4% of the total performance index. AP performance is defined as the percentage of students who scored 3 or higher on an AP exam.

[3] Advanced International Certificate of Education (AICE), Industry Certification, and dual enrollment courses.

Incorporating AP and IB into state accountability systems, coupled with other incentives, has led to increases in AP participation and performance in some states. For instance, Florida partners with the College Board and Advancement Via Individual Determination (AVID) to identify schools needing support in developing a college-going culture and since 2007 has provided financial incentives to teachers and schools for improving AP/IB participation and performance. Teachers receive a bonus of $50 dollars for each student who earns a qualifying score on an AP or IB exam, and $500 if the school has a grade of "D" or "F." Schools also receive an additional 0.16 full-time equivalent (FTE) student count in the following fiscal year for each student who earns a qualifying score on an AP or IB exam. Thus, for approximately every seven students who pass an AP or IB exam, the school can add one full-time equivalent student to its student membership, thus raising the school's level of funding based on enrollment (Florida Statutes, 2013). From 2008 to 2013, Florida has seen the second largest increase in the percentage of students who scored a 3 or higher on an AP exam, from 19% in 2008 to 27% in 2013, and now ranks fifth among all states. Florida has also seen large increases in the percentage of African American and Hispanic students who scored above a 3 on an AP exam (College Board, 2013).

Each of these accountability approaches carries significant implications for the quality, relevance, and utility of advanced coursework as a measure of high school quality. The following section explores these issues more thoroughly, evaluating the AP and IB against a set of criteria by which state decision makers can consider its potential application to the California school accountability system.

Evaluation Against an Analytical Framework

Working in collaboration with the PSAA Advisory Committee, EPIC developed an analytical framework to provide a consistent, rigorous set of criteria by which each measure can be evaluated for its inclusion in the API. This framework was adapted from the Advisory Committee's API Guiding Principles and was supplemented with additional criteria specific to the charge of designing a College and Career Indicator. Organized under the dimensions of technical quality, stakeholder relevance, and system utility, the following 10 criteria explore the extent to which each measure under consideration

- has a research base demonstrating a relationship with postsecondary success;
- allows for fair comparisons;
- is stable;
- has currency outside the accountability system;
- is understandable to the public;
- measures content, skills, and competencies that can be taught and learned in school;
- emphasizes student performance, not educational processes;
- minimizes burden;
- includes as many students as possible; and
- recognizes a variety of postsecondary pathways.

The design of the framework acknowledges that satisfaction of the above criteria is not a simple binary decision of yes or no. Analyses will be nuanced, supported by research, and summarized on a consistent scale or choice set applied across all six clusters of measures considered in this white paper series. Additionally, analyses may sometimes place criteria in conflict with one another (e.g., a

measure may have a strong evidence base but place an extraordinary implementation burden on schools). The purpose of this work is not to make recommendations, but rather to provide decision makers with the necessary information to identify the strengths, weaknesses, and trade-offs associated with each measure considered for inclusion in the College and Career Indicator (CCI).

The following subsections evaluate AP and IB against the analytical framework, taken as both distinct and unique sets of measures and as a general cluster or class of college preparatory programs.

A. Technical Quality

For the purposes of this research review, technical quality is defined as having predictive validity for forecasting how students will perform in postsecondary pathways, allowing fair comparisons among different subpopulations of students, and having sufficient stability to allow for examination of trends.

A1. Relationship to Postsecondary Success

The first of the 10 evaluative criteria looks at the empirical research base to explore the relationship between the measure and postsecondary success. For the purposes of this project, research on postsecondary success may include a wide array of outcome variables including college matriculation, persistence, course grades, grade point average, and degree completion. Career success outcome variables may be defined extrinsically (e.g., salary or promotion) or intrinsically (e.g., self-reported job satisfaction). The evidence base for each measure or cluster of measures is evaluated on a four-point scale: *no evidence,* or *weak, moderate,* or *strong* relationships.

The research base on the effects of AP course-taking and test scores is extensive, complex, and not entirely conclusive. Many studies support the relationship between performance on AP exams and postsecondary success (Ackerman, Kanfer, & Calderwood, 2013; Dodd et al., 2002; Dougherty, Mellor, & Jian, 2006; Geiser & Santelices, 2004; Hargrove, Godin, & Dodd, 2008; Klopfenstein & Thomas, 2005; Morgan & Klaric, 2007; Patterson, Kobrin, & Packman, 2011; Sadler & Tai, 2007; Shaw, Marini, & Mattern, 2013). Postsecondary success has been defined in a number of ways across studies; common indicators of postsecondary success include first-year college grade point average (FYGPA), second-year college GPA, fourth-year college GPA, college GPA in subject area in which the AP exam was taken, and college graduation.

Some researchers also have concluded that AP course-taking alone does not predict postsecondary success as well as does AP test performance (Dodd et al., 2002; Dougherty, Mellor, & Jian, 2006; Geiser & Santelices, 2004; Hargrove, Godin, & Dodd, 2008; Sadler & Tai, 2007; Klopfenstein & Thomas, 2009; Klopfenstein & Thomas, 2010; Shaw, Marini, & Mattern, 2013). Some researchers did find that students who enrolled in AP courses were more likely to attend college than those who did not (Chajewski, Mattern, & Shaw, 2011; Speroni, 2011).

The score level that approximates performance in a college course is also subject to some differences of opinion. Research sponsored by the College Board suggests that an AP exam score of 3 is a valid predictor of postsecondary success (Dodd et al., 2002; Hargrove, Godin, & Dodd, 2008; Morgan & Klaric, 2007). In the area of college retention or overall GPA, predictive validity of AP exams seems to differ by subject, with the three most popular categories of AP classes, math, English, and history, having no significant relationship to college retention or GPA; only

participation in AP science or AP economics courses increases the likelihood that students will persist to a second year of college (Klopfenstein & Thomas, 2005). It is worth noting that retention and overall GPA are more distal measures than performance in a course that sequentially follows the course that led to an AP exam.

The relationship between college success and participation and performance in the IB Diploma Programme is an expanding area of research (International Baccalaureate Organization, 2008). The IBO has sponsored much of the research that has explored this relationship. Multiple studies have found that performance on IB exams is a significant predictor of postsecondary success (Caspary & Bland, 2011; Caspary, 2011; Coca et al., 2012; Halic, 2013; Shah, Dean, & Chen, 2010). Postsecondary success was defined as higher FYGPA, graduation rates, and entering 4-year colleges at higher rates than those with no IB experience. A recent research study showed that among students in a university honors college, those who participated in IB coursework while in high school were more likely to persist to graduation than students who did not (Conley, McGaughy, Davis-Molin, Farkas, & Fukuda, 2014).

The research evidence that IB and AP are predictive of postsecondary success is extensive. Although participation in the courses without taking the exams associated with the courses seems to have a lesser predictive value, passing scores on the exams are associated with higher college GPA and persistence. One important caveat about any correlational research, into which category most of the studies of the relationship between AP and IB participation and postsecondary success fall, is that correlation is not necessarily the same as causation, and that many variables factor into the relationship. In general the research suggests that rigorous coursework, which is provided through both the AP and IB programs, helps prepare students for college-level work or, at the minimum, does not harm them.

A2. Fair Comparisons

This evaluative criterion is based on the assumption that the API must give all students a fair chance to show what they know and have learned. For the purposes of this study, the extent to which a measure provides fair comparisons across students and schools is determined by a careful attention to bias and summarized on a three-point scale: the measure *allows*, *partially allows*, or *does not allow* for fair comparisons.

Historically, white students in economically advantaged schools have been overrepresented in the AP program. California as well as national data confirms that African Americans, Native Americans, and Hispanic students have been underrepresented (The Broad Foundation, 2013; Furry & Hecsh, 2001). The College Board has responded by attempting to expand AP access to low-income schools with historically underserved populations (Schneider, 2009) and encouraging schools to offer AP through open enrollment instead of a student's past performance or teacher recommendation (Broad Foundations, 2013). One example comes from California passing Senate Bill 532 in 2011, which created the California Advanced Placement Expansion (CAPE) in partnership with the College Board (CAPE, 2011; College Board, 2014). CAPE was driven by concerns about AP course access for low-income and minority students and encourages high schools to offer at least five AP courses. Although AP is expanding widely, minority students and students from economically disadvantaged backgrounds are less likely than their nonminority or economically advantaged peers to score a 3 or higher on an AP exam, even after statistically controlling for prior achievement and educational expectations (The Broad Foundations, 2013).

Gender differences in AP participation and passing rates may also influence AP's relevance as an indicator in an accountability system. For example, although girls are equally likely as boys to take honors-level physics, they are less likely than boys to take AP Physics and AP Computer Science (White & Tesfaye, 2011). On the other hand, more girls (55%) than boys (45%) are taking AP exams across all subjects, and girls are slightly more likely than boys to achieve scores of 3 or higher (White & Tesfaye, 2011). Examining a school's gender balance in AP participation and passing rates could add insight into the quality of the school to provide rigorous curricula to all students.

Incentive programs have had mixed effects on AP participation. Jeong (2009) shows that the AP exam fee exemption leads to an increase in the likelihood that disadvantaged students who are already enrolled in AP courses will take the exam, particularly for economically disadvantaged populations. However, Jeong found that incentives awarded based on AP exam scores did not significantly increase AP course enrollment or exam participation. Klopfenstein (2004b) found that programs in Texas that subsidized test fees did not provide incentives to low-income or rural schools to increase AP course offerings. These results conflict with a study that found a Texas incentive program that offered teachers and students financial incentives for AP exam scores of 3 or higher increased both participation and performance in the AP program (Jackson, 2010). However, the program Jackson studied included teacher training, student tutoring, and curriculum changes in addition to the financial incentive; these differences may explain the conflicting findings. Incentive programs may actually widen the gap in AP participation and performance between high schools serving disadvantaged and advantaged students. Klugman (2013) found that California's attempt to expand AP offerings in the early 2000s resulted in high schools serving disadvantaged students increasing AP course offerings, but high schools serving advantaged students increased their AP course offerings at a faster rate. High schools serving advantaged students had more proactive staff willing to initiate new AP course offerings.

Students will not have the opportunity to demonstrate what they have learned via an AP exam if they do not have access to AP courses. Researchers have shown that the largest barrier to schools offering AP courses is not having a critical mass of prepared students entering high school (Iatarola, Conger, & Long, 2011; Jeong, 2009; Klopfenstein, 2004a). When offerings are constrained to onsite courses, without students having access to virtual high schools that offer AP courses, students at large high schools are more likely than their peers at smaller schools to have access to a larger number of AP courses. This is true regardless of the racial composition of the school. However, large proportions of economically disadvantaged students do slightly lower the probability that AP courses, and advanced courses more generally, will be offered (Iatarola et al., 2011).

The published literature on IB students and whether there are differences in enrollment or performance due to demographic factors is too scant to be of use in assessing the program as an indicator in an accountability system. The costs associated with introducing an IB program into a school are higher than for AP, which can be introduced one course at a time, which may discourage schools with limited resources and insufficient numbers of highly prepared students from investing in the IB program.

The available evidence base indicates that AP *partially* allows for fair comparisons among student subpopulations. Although AP has expanded greatly in recent years to include more, and more diverse, schools, the participation and exam pass rates do not suggest that all students who take AP courses have an equal chance of passing the exam. Demographic and economic factors at both the individual and school levels appear to influence the likelihood of achieving passing scores. There is

not enough published research regarding the IB program's allowance for fair comparisons. However, the costs associated with implementing an IB program at a school suggest that economically disadvantaged schools with limited resources are less likely than schools in more affluent areas to provide the program.

A3. Stability

This evaluative criterion is chiefly concerned with how the measure contributes to the comparability and flexibility of the API as a whole over time. In order to measure school performance and improvement consistently and comparably over time, all components of a measurement system should be based on definitions that remain relatively constant from year to year. Likewise, the core measures within the College and Career Indicator system need to be reasonably stable. If they are, then the API has some capacity to incorporate future component measures of preparedness, which is important due to the dynamic nature of college and career preparedness. The stability of each measure or cluster of measures is evaluated here on a three-point scale: *not stable*, *partially stable*, and *stable*.

The AP exam score is a *stable* indicator. Although most of the course curricula within AP courses have been slightly revised, the overall aim of the program has remained unchanged. Complexity is introduced because of the sheer number of AP courses, differences in both offerings by school and student enrollment in various courses, and exam pass rates. In addition, the College Board revises some courses and their exams each year to enhance alignment with college-level learning. There is no evidence that these changes have a significant effect on the use of exam scores as indicators of school quality.

The IB is a *stable* indicator. The design of the IP Diploma Programme has not changed in many years and IB shows no signs of revising the IB curriculum. Statistical bulletins are posted twice annually that include trend data from 1990 to the present (International Baccalaureate Organization, 2014a).

These types of advanced coursework appear to be *stable* enough to allow for comparability across schools and years.

B. Stakeholder Relevance

Accountability measures that are relevant to a variety of education stakeholder groups for more purposes than solely rating a school or district provide greater value to the levels of the education system than measures that meet only school and district accountability requirements. To the extent that measures can serve multiple purposes, they may help increase stakeholder acceptance of an accountability system.

B1. Student Currency

This evaluative criterion is chiefly concerned with the extent to which component measures of the College and Career Indicator (CCI) indicator are likely to be actionable and accepted by students. Rather than an assessment or data point that is only valuable in making system-level determinations of school quality, the CCI that has student currency reflects and creates incentives for behaviors and performances that directly affect or improve an individual student's prospects for success after high school.

AP and IB have the potential to provide students with two forms of educational currency: college credit and college application resume builder. Although exact data on the number of public high school students submitting AP scores to colleges is unknown, the College Board does release these data for all California students attending both public and private institutions. Approximately 40% of the 337,624 California high school students that took at least one AP exam submitted their scores to colleges. Although each postsecondary institution sets its own admissions policies, colleges and universities award students institutional credit for AP exam scores of at least a 3. The College Board's website offers detailed information on each institution's AP credit policy but does not provide aggregated data. Data from the Integrated Postsecondary Education Data System (IPEDS) show that in 2012 approximately 75% of the 3,206 four-year postsecondary institutions in the United States accepted AP credits. This percentage falls to approximately 51% for two-year and to 3% for less than two-year postsecondary institutions.

Student participation and performance in the IB Diploma Programme are accepted and used in different ways by U.S. postsecondary institutions. Tarver (2010) found that the 20 top colleges (as defined by US News rankings) awarded credit to students who earned an IB diploma. Furthermore, approximately 60 universities provide scholarships to IB diploma holders (International Baccalaureate Organization, 2011). Some postsecondary institutions award credit based on performance in the IB Diploma Programme. Aggregated data were not available on postsecondary institution credit-granting policies in relation to IB.

Institutions increasingly are using participation in AP courses or the IB Diploma Programme as an admissions criterion in addition to awarding institutional credit in some cases. The more AP or IB courses students have on their high school transcript the higher their chances of being accepted. Data on this type of educational currency have been gathered partially due to the varying institutional policies and also because, within institutions, the use of AP/IB as admissions criteria is not straightforward. Nevertheless, it is clear that having more AP/IB experience benefits students by expanding the number of institutions to which they will apply (Speroni, 2011).

Both the AP and IB programs have a great deal of currency for students beyond the use of scores within a school accountability measure. They include challenging curricula that prepare students for the rigors of college-level work, are considered by college admissions officers who include evidence of rigorous coursework in admissions decisions, offer the opportunity for many students to gain college course credit, and, in some cases, result in scholarships for students.

B2. Public Understanding

The API is intended to give educational stakeholders—educators, parents, students, and the public at large—a clear picture of a school's status and growth. The College and Career Indicator should therefore clearly communicate how it supports college and career preparedness in a way that is easily understood by noneducators as well as educators.

The College Board and IBO provide webpages that aid students, teachers, educators, and policymakers in understanding AP and IB. According to the College Board, scores on AP exams represent student achievement and are reported. The College Board also provides webpages with scoring guidelines, definitions of questions, scoring statistics on questions, and overall score

distributions that show the percent of exam takers at each of the five levels of performance, as well as the mean score for each subject area across multiple years.[4]

The College Board has available a variety of reports intended to aid in students, school, district, and colleges in further understanding individual and aggregated AP exam scores.[5] Finally, the College Board maintains a searchable database on the credit-granting policies of postsecondary institutions that allows users to find out which institutions accept credit for scores on AP exams.[6] This is particularly important for students and their families as postsecondary institutions are changing their policies on what scores they accept and what types of credit is awarded.

The ways in which AP participation and passing rates can be aggregated and presented at the school and district levels has differed across states that have reported AP indicators. States have measured performance two different ways: dividing the number of students achieving pass scores by (1) the number of AP/IB exams attempted, or (2) the number of graduating seniors in the school. These two methods can produce drastically different percentages and provide different types of information about a school.

For example, data from a hypothetical school are below. The percentage of students achieving qualifying scores can be calculated by dividing the "# AP exams passed" by either the "# AP exams" or the "# in graduating class." Dividing by the number of AP exams attempted produces a 67% pass rate; dividing by the number of graduates produces a pass rate of 4%. The first percentage shows that those who attempted AP exams succeeded 67% of the time. This provides information about the quality of AP courses in terms of preparing students to pass AP exams. The second percentage indicates that only 4% of the graduating class was eligible to receive college credit based on qualifying AP exam scores. This provides more information about the school as a whole, how much it is promoting AP participation, as well as how well it is preparing students to pass the exam.

# AP students	# AP exams	# AP exams passed	# in graduating class
25	15	10	250

Similar to the College Board, the IBO provides webpages that detail the methods used to grade IB exams and also provides a searchable database that allows users to see how different postsecondary institutions recognize the IB Diploma Programme.[7] With the IB Diploma Programme offered in only 810 high schools nationally and with less research and publicity about the program, it is far less likely that the public would be aware of the program or the benefits that might accrue to students who participate as compared to the AP program.

B3. Content, Skills, and Competencies

In order for the API to provide a valid description of school quality, its component parts must measure content, skills, and competencies that are taught and learned in schools. This criterion,

[4] https://professionals.collegeboard.com/testing/ap/scores/distributions
[5] https://professionals.collegeboard.com/testing/ap/scores/reporting
[6] https://apstudent.collegeboard.org/creditandplacement/search-credit-policies
[7] https://www.ibo.org/recognition/university/index.cfm (**Not a Working URL**)

evaluated on a three-point scale (*does*, *partially does*, *does not*), addresses not just the validity of accountability but also the actionability of a College and Career Indicator.

Both AP and IB students complete semester or yearlong courses. Student performance in these courses and on summative exams measures the content skills and competencies taught and learned in the school. To date, no study has analyzed the alignment of current California state standards to the AP program or the IB Diploma Programme.

The Knowledge and Skills for University Success (KSUS), now known as the Standards for Success, were developed by 400 faculty and staff members at 20 research universities and reflect the knowledge and skills necessary for success in entry-level college courses. The Standards for Success are benchmarked against the AP program and were instrumental in the development of the CCSS. Furthermore, the College Board has indicated that the AP exams will be revised to further align with the Common Core State Standards (The School Superintendents Association, 2013).

Two studies from the Educational Policy Improvement Center (EPIC) examined the alignment of the IB with college and career preparedness standards. The first study examined IB's alignment with the Standards for Success. The findings suggest that the IB curriculum, with a few exceptions, reflects the knowledge, skills, and abilities required of students entering college (Conley & Ward, 2009). A second study examined IB's alignment with the CCSS. The results show that the IB standards are reasonably aligned with the CCSS and that the depth of knowledge required of students is consistent across the two sets of standards (Conley et al., 2011). A review of 20 studies about AP programs, however, concluded that course quality varies and the critical thinking skills that are necessary for college success may not be well taught in AP courses because of the breadth of content that needs to be covered (Challenge Success, 2013).

Some research has shown that schools and districts can improve AP participation and exam passing rates, especially for minority students, by ensuring student access to a variety of AP courses and academic and social supports (Jackson, 2010; The Broad Foundations, 2013). School systems that encourage or mandate extensive professional development for teachers see gains in AP participation and pass rates. The ability of schools and school systems to take specific actions that can affect AP participation and pass rates is a factor in AP's favor for inclusion as an indicator of college and career preparedness.

AP and IB are rigorous curricula that have relevance to an accountability system by being standardized across schools and measuring content knowledge and skills that can be taught in schools and are related to the knowledge and skills students will need to succeed in postsecondary settings.

B4. Emphasis on Student Performance

The legislative charge to California's school accountability system is to focus on educational outcomes rather than inputs. As important as it is to account for different features of quality schooling (e.g., teachers, instructional resources, curriculum, and school organization), this evaluative criterion looks at the extent to which potential component measures of the College and Career Indicator emphasize student performance.

Scores on AP or IB exams directly measure student performance. States that measure AP or IB performance generally hold schools accountable to the percentage of students achieving qualifying scores on AP (3 or higher) or IB exams (4 or higher).

Measuring participation in AP or IB is a reflection of the school resources and teacher supply within a school rather than student performance, although it may be an indicator of a student's prior preparation to take rigorous coursework. A high percentage of participation in AP/IB indicates that schools have sufficient resources for high levels of participation, have prepared their students to be able to take rigorous coursework, and have expectations that a broad range of students will enroll in AP or IB. High participation may also indicate a subset of these factors, or other factors related to the school or its community. Low participation rates could also have a number of explanations, thus make it difficult to determine the relationship to school quality. Participation data could be combined across AP/IB and other honors-level course offerings within schools to give a more accurate picture of student participation in challenging, college preparatory coursework.

Scores on AP or IB exams directly measure student performance. States that measure AP or IB performance generally hold schools accountable to the percentage of students achieving qualifying scores on AP (3 or higher) or IB exams (4 or higher). However, states measure performance two different ways: dividing the number of students achieving pass scores by (1) the number of AP/IB exams attempted, or (2) the number of graduating seniors in the school. These two methods can produce drastically different percentages. The first method provides information about the quality of AP courses in terms of preparing students to take AP exams. The second method provides more information about a school's ability to provide quality AP courses to students.

Measuring participation in AP or IB is a reflection of a school's resources, its teacher supply, and student preparation rather than student performance. A high percentage of participation in AP/IB indicates that a school has sufficient resources, adequate supports for teachers, high expectations for student enrollment in rigorous courses, and/or a large percentage of prepared students. A low percentage indicates that a school does not have enough resources to offer AP/IB courses, students choose not to enroll, or students are not prepared to or expected to enroll in advanced courses. Thus, AP and IB participation and exam pass rates are measures of student content knowledge and skills but also imply that other conditions exist within the school that support rigorous course-taking.

C. System Utility

Measures to be included in an accountability system have greater utility if they add minimal burden to the education system yet include as many students as possible. The measures also are most useful when they are applicable to students who will pursue a variety of postsecondary pathways.

C1. Minimal Burden

Minimizing the burden of component measures of the College and Career Indicator means constraining the time and cost of implementation and data collection processes to the maximum extent possible. This criterion considers direct and indirect effects, for example, time to take a test and instructional time devoted to test prep, and the effects on students, teachers, administrators, and the system as a whole.

Direct burdens to students include AP/IB exam fees, testing time, and course time. AP exams are voluntary and cost students $89 per exam.[8] Students who receive free and reduced lunch are eligible for a $26 fee reduction (College Board, 2012).[9] In California, school districts can receive up to $48 per AP exam for students whose family income does not exceed 185 percent of the federal poverty level (California Department of Education, 2012). Students voluntarily enter the IB Diploma Programme but are required to pay a one-time registration fee of $157 per examination session and a separate $108 per subject exam.[10] The IB website did not provide information on fee reductions for low-income students, but California school districts can receive up to $98 per IB exam for students whose family income does not exceed 185 percent of the federal poverty level (California Department of Education, 2014).

The direct AP and IB test time burdens for students is minimal. The duration of each subject test within AP and IB is different, but all tests can be completed in 3 hours or less. The indirect burden of test preparation should not be overlooked. The test prep industry confounds the correlation between socioeconomic status and scores on AP and IB exams. The direct course time burdens are substantial for both AP and IB. Yearlong AP courses culminate with exams in the month of May. Standard and higher-level IB courses require 150 and 240 hours of instruction respectfully.

Schools are responsible for the cost of providing an AP course or the IB Diploma Programme. The College Board does not charge annual fees for offering AP courses, but schools do incur the costs associated with professional development, textbooks, supplemental readings, materials, and equipment. These costs vary by school and can range from approximately $1,900 in English to $10,000 in the sciences.

The College Board does offer free support to AP teachers in the form of AP teacher communities and classroom information (College Board, 2014d). The IB Diploma Programme, on the other hand, requires schools to pay an annual fee of $10,660. In return, the IBO provides curriculum services, communications and recognition services, and other by-request services. In addition to the annual fee, schools must pay an annual Candidate fee of $9,500 to become a school that can award IB diplomas after submitting the one-time Candidate Application fee of $4,000 (International Baccalaureate Organization, 2013). California school districts are allocated state funding using the Local Control Funding Formula (LCFF). The LCFF requires that school districts create a Local Control and Accountability Plan (LCAP) that describes how the district's budget will achieve educational goals. These funds can be used to start up AP or IB courses and improve participation and performance in both programs.

The direct costs to the California Department of Education would include ordering scores from the College Board and IBO, as well as the cost of aggregating, analyzing, and generating the data used to hold public high schools accountable. The exact cost depends on the type of analysis needed. As a conditional rather than universal measure, burden would continue to be minimal for teachers and administrators.

There also may be unintended opportunity costs associated with offering AP or IB programs. Klopfenstein and Thomas (2010) noted that the best teachers may be reserved for AP courses,

[8] Students who take a late AP exam are charged an additional $45.

[9] Alternative criteria can be used to determine fee reduction eligibility.

[10] Students who take a late IB exam are charged an unspecified late registration fee.

leaving non-AP students with less experienced or less effective teachers. Non-AP course offerings in a school may also be reduced in order to ensure sufficient funding and staff for the AP courses. The potential for possibly harmful opportunity costs raises the importance of creating an accountability index that balances multiple means schools have to develop students' preparedness, and does not privilege a measure related to AP or IB that may be beneficial for some students but detrimental to those who do not participate.

Use of AP or IB scores as indicators *partially* minimizes burden on the education system. As a universal measure, AP or IB (or a combination thereof) could be used if students have equal access to the curricula and exams. Both programs, and their exams, have costs associated with them. Some costs are borne by the school or district, but the costs of exams are often borne by the students when fee waivers are not available.

C2. Student Coverage

The API Guiding Principles state that the API should include as many students as possible in each school and district. This inclusion principle was cornerstone to an accountability system based entirely off universal measures (e.g., all students must take state assessments including populations requiring testing accommodations). The proposed College and Career Indicator is by necessity composed of conditional measures because not all students can be compelled to go to college, nor would it be desirable to do so. Students and their parents retain the right to choose which path makes the most sense for them, and college is only one option among many. In addition, students can demonstrate preparedness through an array of measures that are empirically linked to postsecondary success but that address different knowledge, skills, and aspirations. This evaluative criterion gives preference to scaled or scalable measures over local and unique ones.

The availability of AP courses to students has been expanding exponentially during the past two decades, and enrollment in AP courses tripled during the first decade of the 21st century (The Broad Foundations, 2013). Nearly every public high school in California offered at least one AP course in 2013 (College Board, 2013; California Department of Education, 2013). Data from the College Board's Educational Organization Database indicates that in 2013 California high schools offered an average of 11 AP subjects to students. The top five AP subjects were English literature, Calculus AB, U.S. history, English language, and U.S. government and politics. The College Board received 557,844 AP exam scores from 299,026 California public high school students in 2013. These students represent approximately 15% of public high school students in California (California Department of Education, 2013).

There are 89 California public high schools that offer the IB Diploma Programme to students, representing approximately 6% of high schools. In 2009, California had 1,705 IB candidates, with approximately 70% of these students receiving diplomas.[11] California IB candidates represent less than 1% of California public high school students.

Most high school students in California have access to at least AP course and a few offer IB courses. The almost ubiquitous access to AP courses allows for the possibility of having AP as a universal measure in the accountability system.

[11] Ten percent of all U.S. schools offering the IB Diploma Programme are located in California.

C3. Postsecondary Pathways

The last criterion is less an evaluation of a measure than a categorization to inform more global decisions about the API. A College and Career Indicator must include component measures that collectively or individually recognize a diverse set of postsecondary pathways. Thus, this criterion identifies whether a component measure supports a college-going pathway, career-going pathway, both, or neither.

Both AP and IB are designed to prepare students to succeed in postsecondary education. In many cases students are awarded college credit for AP and IB exam performance. However, this is mainly true for four-year institutions; two-year and one-year postsecondary institutions are far less likely to recognize AP or IB for credit. Students are increasingly using AP and IB participation as a resume builder to demonstrate the skills and dispositions to persist and succeed in challenging coursework, which have relevance to a number of postsecondary pathways, even if those are not formally recognized by institutions in the form of credit.

Summary Analysis

Both AP/IB appear to be technically strong measures of college and career preparedness. Research suggests that there is strong evidence that performance in AP/IB is positively related to postsecondary success; however, participation in AP/IB seems to have little predictive value, and whether or not the relationship between AP/IB and postsecondary success is causal is an unanswered question. Research suggests that AP allows for partially fair comparisons because not all students who take AP courses have an equal chance of passing the exam—minority students have passing rates that are significantly lower than those of white students. Not enough research exists to make the determination if IB allows for fair comparisons. Finally, both AP and IB appear to be stable indicators, however, the sheer number of AP courses, differences in both offerings by school and student enrollment in various courses, and exam passing rates have the potential to influence stability over time.

Incorporating AP/IB as a measure of preparedness serves multiple purposes for a variety of stakeholders. Students gain significant educational currency in the form of college credit and resume building from participating and taking AP/IB exams. The AP/IB data reported on schools would be understandable to a variety of stakeholders, including the general public interested in how schools are preparing students for college. This is because AP/IB exam scores provide evidence about student content skills and competencies rather than about educational processes.

Although IB is not found in many high schools, AP is; between the two, most students have access to one or the other. This nearly ubiquitous access means these college preparation programs have utility for incorporation into an accountability system. Nearly all high schools in California offer at least one AP course, with the average high school offering 11 different AP subjects to students. However, only six percent of high schools offer the IB Diploma Programme. Likewise, students incur a smaller cost when taking AP exams in relation to IB exams. However, the state of California offers fee reductions to students who cannot afford to take AP or IB exams. Finally, both AP and IB represent progress toward only the college-going pathway.

Some states include a combination of AP/IB participation and performance as a component within accountability systems. Some states use only performance, and others only report AP/IB data to the

public but do not use the data to calculate school grades. The approach that policymakers choose has implications for the type of student that schools will encourage to take AP/IB exams. An indicator based solely on performance produces the incentive to encourage only high-achieving students to take AP/IB exams. Including both performance and participation in a CRR measure has the potential to minimize the incentive to encourage test taking among only high-achieving students. Data from Florida show that financial incentives combined with outreach efforts designed to increase AP access and holding schools accountable to AP/IB participation and performance has the potential to dramatically boost AP performance among all types of students.

References

Ackerman, P. L., Kanfer, R., & Calderwood, C. (2013). High school Advanced Placement and student performance in college: STEM majors, non-STEM majors, and gender differences. *Teachers College Record, 115*(10), 1–43.

The Broad Foundations. (2013). *The road to equity: Expanding AP access and success for African-American students.* Los Angeles, CA: Author.

California Department of Education. (2013). *Fingertip facts on education in California: CalEdFacts.* Retrieved from http://www.cde.ca.gov/ds/sd/cb/ceffingertipfacts.asp

California Department of Education. (2014). *Cost of the AP/IB Test.* Retrieved from http://www.cde.ca.gov/ci/gs/ps/faqap13.asp#Cost

Caspary, K. (2011). *Research brief: Postsecondary enrollment patterns of IB certificate and diploma candidates from U.S. high schools.* Menlo Park, CA: SRI International.

Caspary, K., & Bland, J. (2011). *Research brief: First college courses taken by Florida IB students.* Menlo Park, CA: SRI International.

Chajewski, M., Mattern, K., & Shaw, E. J. (2011). Examining the role of Advanced Placement® exam participation in 4-year college enrollment. *Educational Measurement: Issues and Practice 30*(4), 16–27.

Challenge Success. (2013). *The Advanced Placement program: Living up to its promise?* Stanford, CA: Author.

Coca, V., Johnson, D., Kelley-Kemple, T., Roderick, M., Moeller, E., Williams, N., & Moragne, K. (2012). *Working to my potential: The postsecondary experiences of CPS students in the International Baccalaureate Diploma Programme.* Chicago, IL: The University of Chicago Consortium on Chicago School Research.

College Board. (2012). *Score distributions* [Data file]. Retrieved from https://professionals.collegeboard.com/testing/ap/scores/distributions

College Board. (2013). *School report of AP exams 2012-2013 (by state).* Retrieved from http://media.collegeboard.com/digitalServices/pdf/research/2013/School-Report-Exams-2013.pdf

College Board. (2014a). *The 10th annual AP report to the nation.* New York, NY: Author.

College Board. (2014b). *The California AP expansion program.* Retrieved from http://apcentral.collegeboard.com/apc/html/cape-program/cape-program.html

College Board. (2014c). *About AP scores.* Retrieved from https://apscore.collegeboard.org/scores/about-ap-scores

College Board. (2014d). *How to start an AP course.* Retrieved from http://apcentral.collegeboard.com/apc/html/how-to-start-an-ap-course/how-to-start-an-ap-corse.html

College Board. (2014e). *10 years of Advanced Placement exam data show significant gains in access and success; Areas for improvement.* Retrieved from https://www.collegeboard.org/releases/2014 /class-2013-advanced-placement-results-announced

Conley, D. T., Drummond, K. V., de Gonzalez, A., Seburn, M., Stout, O., & Rooseboom, J. (2011). *Lining up: The relationship between the Common Core State Standards and five sets of comparison standards.* Eugene, OR: Educational Policy Improvement Center.

Conley, D. T., McGaughy, C., Davis-Molin, W., Farkas, R., & Fukuda, E. (2014). *International Baccalaureate Diploma Programme: Examining college readiness.* Eugene, OR: Educational Policy Improvement Center.

Conley, D. T., & Ward, T. (2009). *Summary brief: International Baccalaureate standards development and alignment project.* Eugene, OR: Educational Policy Improvement Center.

Dodd, B. G., Fitzpatrick, S., & De Ayala, R. J. (2002). *An investigation of the validity of AP grades of 3 and a comparison of AP and non-AP graduate groups* (Report No. 2002–9). New York, NY: College Entrance Examination Board.

Dougherty, C., Mellor, L., & Jian, S. (2006). *The relationship between advanced placement and college graduation* (2005 AP Study Series, Report 1). Austin, TX: The National Center for Accountability.

Furry, W. S., & Hecsh, J. (2001). *Characteristics and performance of Advanced Placement classes in California.* Sacramento: Institute for Education Reform, California State University.

Geiser, S., & Santelices, V. (2004). The role of advanced placement and honors courses in college admissions. In P. Gandara, G. Orfield, & C. Horn (Eds.), *Expanding opportunity in higher education: Leveraging promise* (pp. 75–113). Albany: State University of New York.

Halic, O. (2013). *Postsecondary educational attainment of IB Diploma Programme candidates from US high schools.* Geneva, Switzerland: International Baccalaureate Organization.

Hargrove, L., Godin, D., & Dodd, B. (2008). *College outcomes comparisons by AP and non-AP high school experiences.* New York, NY: The College Board.

Iatarola, P., Conger, D., & Long, M. C. (2011). Determinants of high schools' advanced course offerings. *Educational Evaluation and Policy Analysis, 33*(3), 340–359.

International Baccalaureate Organization. (2008). *A review of research related to the IB Diploma Programme.* Cardiff, Wales: Author.

International Baccalaureate Organization. (2010). *Academic Performance of IB Students Entering the University of California System from 2000-2002.* Retrieved from http://www.ibo.org/research/programmevalidation/documents/CADataReportReportSummary_tempweb.pdf (**Not a Working URL**)

International Baccalaureate Organization. (2011). *University scholarships for IB diploma holders.* Retrieved from https://www.ibo.org/diploma/recognition/scholarships/index.cfm (**Not a Working URL**)

International Baccalaureate Organization. (2013). *IB Americas Diploma Programme application timeline and fees.* Retrieved from http://www.ibo.org/iba/become/documents/DPAug-SeptEng.pdf (**Not a Working URL**)

International Baccalaureate Organization. (2014a). *Diploma Programme assessment.* Retrieved from https://www.ibo.org/diploma/assessment/results (**Not a Working URL**)

International Baccalaureate Organization. (2014b). *The IB Diploma Programme.* Retrieved from http://www.ibo.org/diploma

Jackson, C. K. (2010). A little now for a lot later: A look at a Texas Advanced Placement incentive program. *The Journal of Human Resources, 45*(3), 591–639.

Jeong, D. W. (2009). Student participation and performance on Advanced Placement exams: Do state-sponsored incentives make a difference? *Educational Evaluation and Policy Analysis, 31(*4), 346–366.

Klopfenstein, K. (2004a). Advanced Placement: Do minorities have equal opportunity? *Economics of Education Review, 23*(2), 115–131.

Klopfenstein, K. (2004b). The Advanced Placement expansion of the 1990s: How did traditionally underserved students fare? *Education Policy Analysis Archives, 12*(68).

Klopfenstein, K., & Thomas, M. K. (2005, January). The advanced placement performance advantage: Fact or fiction. In M. Ferreyra (Chair), *Women's Acquisition of Human Capital.* Symposium conducted at the annual meeting of the Allied Social Sciences Association, Philadelphia, PA.

Klopfenstein, K., & Thomas, M. K. (2009). The link between advanced placement experience and early college success. *Southern Economic Journal, 75*(3), 873–891.

Klopfenstein, K., & Thomas, M. K. (2010). Evaluating the policies of states and colleges. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A critical examination of the Advanced Placement program* (pp. 167–188). Cambridge, MA: Harvard Education Press.

Klugman, J. (2013). The Advanced Placement arms race and the reproduction of educational inequality. *Teachers College Record, 115*(5), 1–34.

Morgan, R., & Klaric, J. (2007). *AP students in college: An analysis of five-year academic careers* (Report No. 2007-4). New York, NY: The College Board.

National Center for Education Statistics. (2014). *The Integrated Postsecondary Education Data System: 2012 institutional characteristics* [Data center]. Retrieved from http://nces.ed.gov/ ipeds /datacenter/DataFiles.aspx

Patterson, B. F, & Ewing, M. (2013). *Validating the use of AP exam scores for college course placement.* New York, NY: The College Board.

Patterson, B. F., Kobrin, J. L., & Packman, S. (2011). *Advanced Placement exam-taking and performance: Relationships with first-year subject area college grades.* New York, NY: The College Board.

Sadler, P. M., & Tai, R. H. (2007). Advanced Placement exam scores as a predictor of performance in introductory college biology, chemistry and physics courses. *Science Educator 16*(1).

Schneider, J. (2009) Privilege, equity, and the Advanced Placement program: Tug of war. *Journal of Curriculum Studies, 41(*6), 813–831.

The School Superintendents Association. (2013). *College Board: Reconciling AP Exams with Common Core.* Retrieved from http://www.aasa.org/content.aspx?id=27296

Shah, S., Dean, M., & Chen, Y. C. (2010). *Academic performance of IB students entering the University of California System from 2000-2002.* Geneva, Switzerland. International Baccalaureate Organization.

Shaw, E. J., Marini, J. P., & Mattern, K. D. (2013). Exploring the utility of Advanced Placement participation and performance in college admission decisions. *Educational and Psychological Measurement, 73*(2), 229–253.

Speroni, C. (2011). *Determinants of students' success: The role of Advanced Placement and dual enrollment programs.* New York, NY: National Center for Postsecondary Research.

Tarver, E. T. (2010). *University admissions officers' perceptions of student performance within the International Baccalaureate Diploma Program* (Unpublished doctoral dissertation). Baton Rouge: Louisiana State University.

White, S., & Tesfaye, C. L. (2011). *Female students in high school physics: Results from the 2008-09 nationwide survey of high school physics teachers.* College Park, MD: American Institute of Physics.