Measures for a College and Career Indicator: Advanced Coursework

Prepared for the California Department of Education
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Introduction

In September 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 2015–16 school year, the Academic Performance Index will include an indicator composed of measures reflecting students' college and career preparedness. This white paper, however, concerns itself exclusively with high school performance. As a result, this report uses school and high school interchangeably.

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 Advisory Committee. To further support this decision-making process, the California Department of Education has contracted with the Educational Policy Improvement Center (EPIC) to evaluate five different categories of potential measures of college and career preparedness. The first five white papers in this series each summarize one of those categories to examine which measure or measures should be included in a college and career indicator. The sixth white paper discusses opportunities and challenges of a multiple measure system. A final report summarizes findings from all six white papers. In this series of white papers, the term *measure* is a discrete metric used to determine an aspect of college and career preparedness. The term *indicator* refers to a system that comprises one or more college and career preparedness measures.

This white paper considers advanced coursework—specifically Advanced Placement® (AP) or International Baccalaureate® (IB) Diploma Programme course-taking (participation) and/or exam scores—as measures of college and career preparedness. This white paper begins by presenting a brief overview of the two programs, their respective histories, and their current applications in other state's accountability systems. Next, the programs are evaluated against the framework being used for all five categories of potential college and career preparedness measures.

AP and IB: A Brief Overview

AP allows high schools to offer college-level curriculum to students, typically in yearlong courses. Students may take an AP exam after completing a course, decline to take the exam after completing the AP course, or take the AP course without sitting for the exam. AP exams are scored on a 1 to 5 scale with many colleges awarding postsecondary 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 trained reviewers convened by the College Board's contractor, the Educational Testing Service.

Most four-year colleges use AP exam scores for a variety of purposes including as considerations in admissions decisions, determining advanced standing, and for

awarding postsecondary credits. The College Board currently allows high schools to offer up to 34 AP courses. 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 complete the audit process successfully receive authorization to use the AP designation.

IB offers four programmes on a continuum that spans the a) Primary Years Programme (typically pre-K or K through Grade 5), b) Middle Years Programme (typically Grades 6-10), c) Diploma Programme, and d) IB Career-Related Certificate (both during the final two years of high school). The Diploma Programme is designed to prepare students for "success at university and life beyond" (International Baccalaureate Organisation, 2014b). Schools that are authorized to administer the Diploma Programme may also apply for authorization to offer the IB Career-Related Certificate, which was introduced in 2013. The IB Career-Related Certificate hybridizes the university preparation of the Diploma Programme with a career pathway accredited at a national, state, or local level. This white paper will consider the Diploma Programme exclusively as a potential college and career preparedness measure. The Middle Years Programme will not be considered because its implementation often depends upon partnerships between middle and high schools. The IB Career-Related Certificate will not be considered because as of Nov. 1, 2014, only 53 public schools in the US offer it. As such, the IB Career-Related Certificate has yet to receive treatment from researchers. To facilitate legibility, this white paper will use "IB" and "Diploma Programme" interchangeably, but will distinguish programmes by name (e.g., IB Middle Years Programme or IB Diploma Progamme) to ensure clarity.

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. At least three and not more than four courses must be taken at the 240 teaching-hour Higher Level. The rest of the courses are taken at the 150 teaching-hour Standard Level. In addition to six exams, students must complete three core requirements: an Extended Essay; a course in Theory of Knowledge; and Creativity, Action, Service (CAS), a series of student-initiated projects and experiences.

To earn the full IB diploma, students must earn 24 points out of a possible 45 points (calculated from a maximum of 7 points for each of six exams and a maximum of 3 points for the combined assessment of Extended Essay and Theory of Knowledge) subject to minimum performance levels across the whole programme. One of those minimum performance levels is CAS, which is not formally assessed, but a student cannot receive the diploma without its completion as reported by the school. 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.

IB schools have autonomy to allow students to pursue some IB courses and take individual exams without pursuing all elements of the comprehensive Diploma Programme. Students can earn certificates by passing exams in particular subject areas. As with AP exam scores, some colleges accept IB exam scores for institutional credits and others do not. Those that do tend to require a score of 4 or higher for granting institutional credits or otherwise acknowledging the student has reached a college level of performance on the exam. Many colleges and universities only recognize the Higher Level courses for credit-granting purposes.[1]

History

AP 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 content and concepts that reflect entry-level college courses. Originally, the AP program intended to provide high-achieving students with access to course material that went beyond the content sequences offered in local high schools or offer college-level content in subject areas not available at high schools. Until the 1980s, the prestigious program tended to be available largely to high-achieving high school students in upper-middle class and elite schools. Over time, AP has become much more inclusive. Participation is far more widespread; 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. In 2013, 8% more test takers scored a 3 or higher than did so in 2003.

The Diploma Programme was created in 1968 in Geneva, Switzerland for internationally mobile students preparing for postsecondary education. The first U.S. school was authorized in 1971, and the first U.S. public IB school was authorized in 1978. The content of Diploma Programme 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 Organisation has always focused heavily on an intercultural, global approach to education. The Diploma Programme was originally taught almost exclusively in private international schools and consisted of a preuniversity curriculum. As of Nov. 1, 2014, there were 828 Diploma Programmes in the US, 88.9% of which were located in public schools.

State Accountability with AP and the IB Diploma Programme

As a result of the increased national focus on college and career preparedness, both AP and IB Diploma Programme participation and performance are no longer used

[1] Granting credit for AP or IB courses is not uniform across or within colleges and universities. For example, a score of 4 on an AP exam or 5 on an IB Higher Level exam might be high enough for the Biology department of one college to grant institutional credits. The Chemistry department at the same college may grant institutional credits only for a 5 on the AP or 6 on the IB Higher Level.

strictly for granting postsecondary credits to high school students or giving preference in admission decisions. State policymakers and administrators are increasingly using AP and Diploma Programme participation and performance as measures of college and career preparedness for groups of students or to compare high schools. The most commonly used metric 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, Fitzpatrick, & De Ayala, 2002; Patterson & Ewing, 2013; Patterson, Kobrin, & Packman, 2011). 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 Diploma Programmes in both grade-point average (GPA) and graduation rates, even after adjusting for family income (International Baccalaureate Organisation, 2010).

As of March 2014, 15 states incorporated AP/Diploma Programme participation and performance data into their high school accountability systems or publicized plans to do so. The role of participation rates and exam scores, however, varies across states. 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 postsecondary credits).[2] AP and Diploma Programme 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 are eligible to earn postsecondary credits (i.e., scoring $\geq$ 3 on an AP exam or $\geq$ 4 on an IB exam).

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 in student growth, reading achievement, and mathematics achievement. There are eight Designation measures for schools. Three Designation measures apply only to mathematics and English language arts (ELA), and the other two measures apply to both mathematics and ELA. One of the eight Designation measures, AP/IB participation, is defined as the percentage of Grade 11 and 12 students who took at least one AP/IB exam. AP/IB performance is defined by the percentage of AP/IB participants who are eligible to earn postsecondary credits based on exam scores.

[2] Advanced International Certificate of Education, Industry Certification, and dual enrollment courses.

Schools are first assigned a comparison group of 40 similar schools. Designations are awarded to schools that are in the top 25% of their comparison group across 5 Designation measures (Texas Education Agency, 2013a).[3] Finally, it appears that AP/IB data will be integrated into the Texas Performance Index Framework by 2015 (Texas Education Agency, 2013b).

The other main approach states use is to measure AP/IB performance only. For example, Nevada uses five categories in its school performance index: status/growth, gap, graduation rates, college and career preparedness, and other indicators. AP performance is part of the college and career preparedness 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.

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 to identify schools needing support in developing a college-going culture. Since 2007, this collaboration 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 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 college-level coursework as a measure of high school quality. The following section explores these issues more thoroughly, evaluating AP and IB against a set of criteria by which state decision makers can consider its potential application to the California school accountability system.

Evaluative Framework

Working in collaboration with the Public School Accountability Act Advisory Committee, EPIC developed an evaluative framework to provide a consistent, rigorous set of criteria by which each measure can be evaluated for its inclusion in the Academic

[3] The Designation indicators include: a) AP/IB participation for both mathematics and ELA, b) AP/IB mathematics performance, c) AP/IB ELA performance, d) SAT/ACT participation in both mathematics and ELA, e) SAT mathematics performance, f) SAT ELA performance, g) ACT mathematics performance, and h) ACT ELA performance.

Performance Index. This framework was adapted from the Advisory Committee's Academic Performance Index 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*;
- has *stability*;
- has *value for students*;
- is *publicly understandable*;
- has *instructional sensitivity*;
- emphasizes *student performance*, not educational processes;
- *minimizes burden*;
- provides as much *student coverage* as possible; and
- recognizes *various postsecondary pathways*.

The design of the framework acknowledges that satisfaction of the above criteria is not a simple binary decision of yes or no. Evaluations will be nuanced, supported by research, and summarized on a consistent scale. Additionally, evaluations may sometimes place criteria in conflict with one another (e.g., a measure may have a strong research 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 strengths, weaknesses, and trade-offs associated with each measure considered for inclusion in the college and career indicator. Each criterion below will be rated on a three-point scale: strong, moderate, or weak.

The following subsections evaluate AP and IB against the framework, taken as both distinct measures and as a general category of advanced coursework.

A. Technical Quality

For the purpose of this white paper, 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. Research Base

The first of the 10 evaluative criteria considers the empirical research base to ascertain the degree to which it describes 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, GPA, 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 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 et al., 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 GPA, 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 AP test performance (Dodd et al., 2002; Dougherty et al., 2006; Geiser & Santelices, 2004; Hargrove et al., 2008; Sadler & Tai, 2007; Klopfenstein & Thomas, 2009; Klopfenstein & Thomas, 2010; Shaw et al., 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 has also received 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 et al., 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. Depending upon when an AP student takes the corresponding course in high school and then sits for the sequential course at a college, more than four years could have elapsed if the student sat for an exam at the end of the freshman year of high school and took the sequential course in the second semester of the sophomore year of college.

The relationship between college success and participation and performance in the Diploma Programme is an expanding area of research (International Baccalaureate Organisation, 2008). The International Baccalaureate Organisation 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 GPA, graduation rates, and entering four-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 AP and IB are predictive of postsecondary success is extensive (Ackerman et al., 2013; Dodd et al., 2002; Dougherty et al., 2006; Geiser & Santelices, 2004; Hargrove et al., 2008; Klopfenstein & Thomas, 2005; Morgan & Klaric, 2007; Patterson et al., 2011; Sadler & Tai, 2007; Shaw et al., 2013; Caspary & Bland, 2011; Caspary, 2011; Coca et al., 2012; Halic, 2013; Shah et al., 2010). Participation in the courses without taking the courses' exams seems to have less predictive value. However, 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 relationships between AP and IB participation and postsecondary success fall, is that correlation is not necessarily the same as causation, and that many variables, such as parents' highest degree attained and socioeconomic status, may factor into the relationships. In general, research suggests rigorous coursework, which AP and IB provide, helps prepare students for college-level work or, at a minimum, does not harm them. It is worth noting that AP and IB may not share operationalized definition of rigorous coursework.

AP: Strong
IB: Moderate Category: Strong

A2. Fair Comparisons

This evaluative criterion is based on the assumption that the Academic Performance Index must give all students a fair chance to show what they know and have learned. For the purposes of this white paper, the extent to which a measure provides fair comparisons across students and schools is determined by careful attention to bias.

Historically, white students in economically advantaged schools have been overrepresented in AP programs. Data from California confirm national findings 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 (The Broad Foundation, 2013). One example comes from California passing Senate Bill 532 in 2011, which created the California Advanced Placement Expansion in partnership with the College Board (College Board, 2014). Concerns about AP course access for low-income and minority students drove the partnership that 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 AP exams, even after statistically controlling for prior achievement and educational expectations (The Broad Foundation, 2013).

Gender differences in AP participation and passing rates may also influence AP's relevance within 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%) take AP exams across all subjects, a disparity that conforms to data from the 2012 U.S. Census, which revealed women being 10% more likely to enroll in college than men.[4] Additionally, girls are slightly more likely than boys to achieve scores of 3 or higher (White & Tesfaye, 2011). Examinations of schools' gender distributions of AP participation and passing rates provide an opportunity to evaluate school quality (Robinson & Lubienski, 2011).

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.

As a result, some students suffer from an opportunity-to-learn disparity. 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).

[4] See http://www.pewresearch.org/fact-tank/2014/03/06/womens-college-enrollment-gains-leave-men-behind/

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's validity as a measure of college and career preparedness.

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, 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 facilitation of 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.

AP: Moderate
IB: Moderate Category: Moderate

A3. Stability

This evaluative criterion is chiefly concerned with how the measure contributes to the comparability and flexibility of the Academic Performance Index as a whole over time. In order to measure school performance and improvement consistently 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 need to be reasonably stable. If they are, then the Academic Performance Index has some capacity to incorporate future measures of preparedness, which is important due to the dynamic nature of college and career preparedness.

The AP exam score is a stable measure. 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 measures of school quality.

The IB is a stable measure. The overall design of the IP Diploma Programme has not changed in many years, though each IB course undergoes curriculum review roughly every seven years. Statistical bulletins are posted twice annually, once after May exam sessions (typically undertaken by Northern hemisphere students) and once after November exam sessions (typically undertaken by Southern hemisphere students) that include trend data from 1990 to the present (International Baccalaureate Organisation, 2014a).

AP: Strong
IB: Strong Category: Strong

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. The extent to which measures can serve multiple purposes may help increase stakeholder acceptance of an accountability system.

B1. Value for Students

This evaluative criterion is chiefly concerned with the extent to which the component measures of the college and career 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, a college and career indicator with student currency reflects and creates incentives for behaviors and performances that directly affect or improve an individual student's prospects for postsecondary success.

AP and IB have the potential to provide students with two forms of educational currency: for postsecondary credits and as résume builders. Although the exact number of public high school students submitting AP scores to colleges is unknown, the College Board does release the number of 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. 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 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 (National Center for Education Statistics, 2014).

Student participation and performance in the Diploma Programme are used in different ways by U.S. postsecondary institutions. Tarver (2010) found that the 20 top colleges (as defined by U.S. News & World Reports rankings) awarded postsecondary credits to students who earned an IB diploma. Furthermore, approximately 60 universities provide scholarships to IB diploma holders (International Baccalaureate Organisation, 2011). Some postsecondary institutions award credits based on performance in the 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 Diploma Programme as admissions criteria, and in some cases, awarding institutional credits. Often, more AP or IB courses on a student's high school transcript increases one's chances of admission. Though institutional policies on the use of AP and IB as admissions criteria vary, it is clear that having more AP or IB experience benefits students by expanding the number of institutions they apply to (Speroni, 2011).

Both AP and IB provide challenging curricula that prepare students for college-level work. Both programs are considered by college admissions officers to include evidence of rigorous coursework in admissions decisions, offer opportunities for students to gain college-course credit, and might result in scholarships for some students.

AP: Strong
IB: Strong Category: Strong

B2. Publicly Understandable

The Academic Performance Index is intended to give educational stakeholders—students, parents, educators, and the public at large—a clear picture of a school's status and growth. Therefore measures should communicate how they support college and career preparedness in a way that is easily understood by noneducators and educators alike.

The College Board and the International Baccalaureate Organisation provide webpages that aid students, their families, educators, and policymakers in understanding AP and IB. The College Board reports scores on AP exams as measures of student achievement. The College Board's site also provides scoring guidelines, examples 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.[5]

The College Board makes a variety of reports available to aid students, school, district, and colleges in understanding individual and aggregated AP exam scores.[6] 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.[7] This is particularly important for students and their families to keep abreast of postsecondary institutional policies on what scores they accept and what types of credit are awarded.

States' methods of aggregating and reporting AP participation and passing rates at the school and district levels have varied. States have measured performance in two ways: dividing the number of students achieving pass scores by a) the numberb) 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. The latter is the same calculation Washington Post education reporter Jay Matthews uses for his Challenge Index, which has been questioned methodologically (Tierney, 2013).

For example, data from a hypothetical school (see Table 1) show the percentages of students achieving qualifying scores by dividing the "# AP exams passed" by either the "# AP exams" or the "# in graduating class." Dividing by the

[5] See https://professionals.collegeboard.com/testing/ap/scores/distributions
[6] See https://professionals.collegeboard.com/testing/ap/scores/reporting
[7] See https://apstudent.collegeboard.org/creditandplacement/search-credit-policies

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 postsecondary credits 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.

Table 1. Hypothetical School Example: Performance vs. Participation

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

Similar to the College Board, the International Baccalaureate Organisation provides webpages that detail the methods used to grade IB exams and a searchable database allowing users to see how different postsecondary institutions recognize the Diploma Programme.[8] As of Nov. 1, 2014, 828 high schools in the U.S. offered the Diploma Programme. Combined with less research and publicity, it is far less likely that the public would be aware of the programme or the benefits that might accrue to students who participate when compared to AP.

AP: Moderate
IB: Weak Category: Moderate

B3. Instructional Sensitivity

In order for the Academic Performance Index 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 addresses not just the validity of the accountability measure but also the actionability of a college and career indicator.

Student performance in AP and IB courses and on summative exams measures the content, skills, and competencies taught and learned in schools. To date, no study has analyzed the alignment of current California state standards to AP or the Diploma Programme.

About 400 faculty and staff members at 20 research universities developed the Knowledge and Skills for University Success, now known as the Standards for Success. The standards reflect the knowledge and skills necessary for success in entry-level college courses and are benchmarked against AP. These standards were instrumental in the development of the Common Core State Standards (Common Core).

[8] See https://www.ibo.org/recognition/university/index.cfm

Furthermore, the College Board has indicated that AP exams will be revised further to align with the Common Core (The School Superintendents Association, 2013).

Two studies from EPIC examined IB's alignment with college and career preparedness standards. The first study examined alignment with the Standards for Success. 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 alignment with the Common Core. The results show that the standards of IB and Common Core align reasonably well for depth of knowledge required of students (Conley, Drummond, de Gonzalez, Seburn, Rooseboom, & Stout, 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 Foundation, 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 part of an indicator of college and career preparedness.

AP: Strong
IB: Strong Category: Strong

B4. Emphasis on Student Performance

The legislative charge to California's school accountability system prioritizes educational outcomes over 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.

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 may indicate 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 may indicate 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 and around the school that support rigorous course-taking.

AP: Strong
IB: Strong Category: Strong

C. System Utility

Measures to be included in an accountability system have greater utility if they add minimal or no burdens to the educational system, yet include as many students as possible. The measures also are most useful when they apply to various 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 fullest extent possible. This criterion considers direct and indirect effects (e.g., time needed 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.[9] Students who receive free or reduced-price lunch are eligible for a $26 fee reduction (College Board, 2012).[10] In California, school districts can receive up to $48 per AP exam for students whose family income does not exceed 185% of the federal poverty level (California Department of Education, 2012). Students voluntarily enter the Diploma Programme but are required to pay a one-time registration fee of $157 per examination session and a separate $108 per subject exam.[11] 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% 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 most tests are completed in 3 hours or less.[12] 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; students with greater resources can access additional test preparation materials or supports. The direct course time burdens are substantial for both AP and IB. AP courses are typically yearlong and culminate with exams in the month of May. Standard and Higher-level IB courses are typically taught over a two-year span, requiring minimums of 150 and 240 hours of instruction, respectively. Higher-level courses must be taught over two years; Standard-level courses may be taught in a single year. Theory of Knowledge must be taught over a two-year span and requires a minimum of 100 hours.

[9] Students who take a late AP exam are charged an additional $45.
[10] Alternative criteria can be used to determine fee reduction eligibility.
[11] Students who take a late IB exam are charged an unspecified fee.
[12] IB Higher-level exams require students to sit separately for three papers (each with a 1-1.5 hour timeline). Total time can be 4 hours, not including pre-exam instructions and scheduled breaks.

Schools are responsible for the cost of providing an AP course or the 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 start-up and maintenance 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). Costs associated with introducing an IB program into a school are higher than for AP, which can be introduced one course at a time. Higher expense may discourage schools with limited resources and insufficient numbers of highly prepared students from investing in the IB program.

The Diploma Programme requires schools to pay an annual fee of $10,660. In return, the International Baccalaureate Organisation provides curriculum services, communications and recognition services, and other by-request services. Before a school can teach Diploma Programme courses, interested schools typically spend two years as Candidates when they pay annual fees of $9,500 after a one-time application fee of $4,000 (International Baccalaureate Organisation, 2013). Every state in the US has an association, or is a member of a multi-state association, that supports IB implementation. The California Association of International Baccalaureate World Schools supports IB Primary, Middle, or Diploma Programme schools in California.[13]

Both AP and IB expect teachers to attend professional development trainings prior to becoming AP or IB teachers and then to continue with deeper levels of professional development trainings over time. AP trainings range in cost from $185 to $470.[14] IB trainings in the US start at $700 and can exceed $900.[15] IB mandates at least one teacher be trained in each IB subject that the school teaches prior to authorization. The Head of School and IB Coordinator must also be trained. AP does not have such requirements. As a comparison, if a school wanted to decide between offering 10 AP or IB courses and committed to the recommended minimum training, AP would cost $1,850 to $4,700. IB would cost at least $8,400.

California school districts are allocated state funding using the Local Control Funding Formula, which requires school districts to create Local Control and Accountability Plans. Those plans describe how the district's budget will achieve educational goals. These funds can be used to start AP or IB programs or improve participation and performance in existing programs.

The direct costs to the California Department of Education would include ordering scores from the College Board and the International Baccalaureate Organisation, as

[13] See http://www.c-aws.org/
[14] See http://media.collegeboard.com/digitalServices/pdf/ap/ap-professional-development-catalog-2014-2015.pdf
[15] See http://www.ibo.org/events/workshops.cfm?keywords=&workshop_level_1=Y&workshop_level_2=Y&workshop_level_3=Y&region=IBNA&language_of_delivery=all&events_country=US&event_in=01%2F10%2F14&search_events=Search

well as the costs of aggregating, analyzing, and generating the data used to hold public high schools accountable. Exact costs depend on the analyses needed. As a conditional rather than universal measure, burden would continue to be minimal for educators. As a universal measure, AP or IB (or a combination thereof) could be used if students have equal access to the curricula and exams.

The state should consider possible unintended opportunity costs associated with offering AP or IB. The best teachers might be reserved for AP or IB courses (Klopfenstein & Thomas, 2010), leaving students who do not take those programs with less experienced or less effective teachers. Also, non-AP or IB course offerings in a school may be reduced to ensure sufficient funding and staff for the college-level courses. The potential for harmful opportunity costs raises the importance of creating an accountability index that allows schools to employ multiple methods for developing students' preparedness. Failure to do so could privilege a measure related to AP or IB creating the unintended consequence that overinvestment in AP or IB may be benefit some students but be detrimental to those who do not participate. To mitigate these potential effects, some schools adopt a pre-AP track in Grades 8-10 or the IB's Middle Years Programme to build students' capacity in Grades 6-10 before beginning Diploma Programme coursework.

AP: Moderate
IB: Weak Category: Moderate

C2. Student Coverage

The Academic Performance Index Guiding Principles state that the Academic Performance Index should include as many students as possible in each school and district. This inclusion principle was cornerstone to an accountability system based entirely on 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 for all students to do so. Students and their parents retain the right to choose which path makes the most sense for them; college is only one option among many. In addition, students can demonstrate preparedness through an array of measures that are linked empirically 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 rapidly during the past two decades, and enrollment in AP courses tripled during the first decade of the 21st century (The Broad Foundation, 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 report that California high schools offered an average of 11 AP subjects to students in 2013. 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 587,257 AP exam scores from 313,365 California public high-school students in 2014 (College Board, 2014f).

On Nov. 1, 2014, 88 California public high schools offered the Diploma Programme, representing approximately 6% of high schools. In 2009, California had 1,705 IB candidates, with approximately 70% of these students receiving diplomas,[16] compared to 79% worldwide in the same examination session (International Baccalaureate Organisation, 2009).[17] California IB candidates represent less than 1% of California public high-school students. The almost ubiquitous access to AP courses allows for the possibility of having AP as a universal measure in the accountability system. IB would remain a conditional option. Still, both AP and IB allow schools to determine participation criteria. Some schools privilege opportunities to learn AP and/or IB based on teacher recommendations, prior coursework, GPA, or other criteria.

AP: Moderate
IB: Weak Category: Moderate

C3. Various Postsecondary Pathways

The last criterion is less an evaluation of a measure than a categorization to inform more global decisions about the Academic Performance Index. A college and career indicator must include component measures that collectively or individually recognize a diverse set of postsecondary pathways. Thus, this criterion evaluates the extent to which a measure assesses college- and career-going pathways simultaneously.

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 résume builders to demonstrate the skills and dispositions one needs 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. Schools that offer both the Diploma Progamme and IB Career-Related Certificate would provide a strong mechanism to support multiple postsecondary pathways. Currently, only four of California's 88 public schools offering the Diploma Programme (Claremont, Granite Bay, San Jose High Academy, and Walnut) have added the IB Career-Related Certificate.

AP: Moderate
IB: Moderate Category: Moderate

Summary

Both AP and IB appear to be technically strong measures of college and career preparedness. Strong evidence suggests performance in AP and/ or IB positively relates to postsecondary success; however, participation in AP and/or IB seems to have

[16] California is home to 10% of all U.S. schools offering the IB Diploma Programme.
[17] See http://www.ibo.org/facts/statbulletin/dpstats/documents/May2009Statisticalbulletin.pdf

little predictive value. Furthermore, whether the relationship between AP/IB and postsecondary success is causal remains an unanswered question. AP allows for partially fair comparisons because not all students who take AP courses have an equal chance of passing the exam—minority students pass at significantly lower rates than white students. Not enough research exists to determine if IB provides fair comparisons across schools. Finally, both AP and IB appear to be stable measures; 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. Tables 2, 3, and 4 summarize the evaluative criteria ratings.

Table 2. Technical Quality Ratings

Test	A. Technical Quality		
	A1	A2	A3
AP	Strong	Moderate	Strong
IB	Moderate	Moderate	Strong
Category	Strong	Moderate	Strong

Table 3. Stakeholder Relevance Ratings

Test	B. Stakeholder Relevance			
	B1	B2	B3	B4
AP	Strong	Moderate	Strong	Strong
IB	Strong	Weak	Strong	Strong
Category	Strong	Moderate	Strong	Strong

Table 4. System Utility Ratings

Test	C. System Utility		
	C1	C2	C3
AP	Moderate	Moderate	Moderate
IB	Weak	Weak	Moderate
Category	Moderate	Moderate	Moderate

Incorporating AP and/or IB as measures of preparedness serves multiple purposes for a variety of stakeholders. Students gain significant educational currency in the forms of college credit and résume building. AP and IB data reported on schools would be understandable to a variety of stakeholders, including the general public that might be interested in how schools are preparing students for college. The stakeholder relevance in this case stems from AP and IB exam scores' ability to provide evidence about content, skills, and competencies rather than educational processes.

Most high school students in California have access to either AP or IB. Though IB is available in only 6% of California public high schools, AP coverage provides nearly ubiquitous access. As a result, these programs have utility for incorporation into an accountability system. Students and schools incur smaller costs with AP than IB. However, fee reductions are available for students who cannot afford to take AP or IB

exams. Finally, both AP and IB represent progress toward predominantly the college-going pathway.

Some states include a combination of AP and/or IB participation and performance within accountability systems. Some states use only performance, and others only report AP and/or 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 and/or IB courses and exams. A measure based solely on performance produces the incentive to encourage only high-achieving students to take AP and/or IB. Including both performance and participation has the potential to minimize incentives that lead schools to privilege high-achieving students.

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