



POLICY BRIEF

Expanding Access to Advanced Coursework in Arizona High Schools

Introduction

One of the best predictors of college success is the successful completion of rigorous academic coursework in high school. Such experiences are essential for underserved students to overcome significant barriers to college education.¹

Reflecting national trends, disadvantaged students in Arizona are less likely to enroll in AP or other advanced courses and often attend high schools offering fewer such courses.² Although the number of Arizona students who are taking AP courses is on the increase, the rate of passage on AP exams remains especially low for Hispanic, African American, Native American, and low-income students.³ To achieve true equity, however, Arizona cannot just offer more courses and encourage more students to register for AP and other college prep courses. AP and other advanced course teachers, especially those in low-income schools, must also have access to professional development and quality resources to support their

instruction in these rigorous programs. Students need incentives to participate in more challenging coursework, such as being able to apply AP exam scores towards graduation requirements. They must also be able to take the AP exams or other exams that qualify for college credit without extra costs being imposed, especially on those who are unable to pay. To dramatically increase achievement and college attainment for under-represented students, policy modifications that increase access to advanced coursework and help students succeed in these demanding programs must be a priority in Arizona.

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Advanced Coursework Models

Several well-established programs are available at certain Arizona high schools. The most widely available and best known model is the Advanced Placement™ (AP) program. Other demanding programs of study and assessment include the International Baccalaureate (IB), Cambridge International Examinations (CIE) and College Board's CLEP. All of these programs share the common goal of preparing students for success in post-secondary education through highly demanding curricula and/or examinations.

Advanced Placement (AP)

AP courses introduce high school students to college-level coursework. Students may earn college credit by passing a challenging subject matter exam. Most American colleges and universities grant credit for qualifying AP exam scores.

International Baccalaureate (IB)

IB offers globally-recognized programs for four different age groups of students. Schools must complete a specialized authorization process in order to offer these programs. In Arizona, 36

schools offer IB programs, of which 22 are high schools. Students must successfully complete end-of-course examinations to receive an IB Diploma.

Cambridge International Examinations (CIE)

Cambridge International operates in 160 countries around the world helping to educate nearly one million students each year. Twenty-six Arizona high schools offer the Cambridge curriculum and exams. Students are prepared to take subject matter examinations to earn qualifications that are formally recognized by over 500 colleges and universities throughout the United States.

CLEP

The College Board offers CLEP exams which enable high school students to test out of introductory college coursework, thus saving time and money when earning a degree. Students who pass the exams earn credit that can be applied towards college graduation requirements. Thirty-three exams are available, covering a wide range of subjects such as government, sciences, and several foreign languages.

Advanced Coursework Makes a Significant Difference in Student Success

Improved College Completion Rates

Data indicate that students who take AP courses and gain credit for them have higher college entrance and completion rates than their non-AP counterparts.⁴ A recent study of 62,475 students at 48 postsecondary institutions showed that 56% of students who passed AP, CLEP, or similar assessments completed a degree within seven years as compared to only 22% who had not.⁵ Another study found that students who master AP courses are twice as likely to graduate from college and therefore have a higher paying career.⁶ Further, in

a survey of students who completed CLEP exams, 91% said the credit they received helped them complete their degrees.⁷ This improved college completion rate applies to both two-year and four-year institutions. Research also shows that students who complete advanced coursework have better developed skills in critical thinking, research methods, and time management as well as a stronger sense of civic responsibility.⁸

Closing the Education Attainment Gap

The positive impact on college completion holds

irrespective of the student's gender, race/ethnicity, or income.⁹ Low-income students who complete an AP exam gain multiple benefits. These include higher four-year college-going rates, retention rates, grade point averages, and SAT scores compared to their non-AP peers.¹⁰ One study of the Dallas Independent School District found that African-American and Hispanic students in the district who succeed in AP courses are four times more likely to graduate from college.¹¹ A separate study uncovered a dramatic difference for Hispanic students pursuing bachelor's degrees – 47% of those who had taken prior learning exams earned a degree versus only 6% of those who had not.¹² The opportunity to take AP or other advanced coursework allows a greater diversity of students to be college and career ready.

The International Baccalaureate program has demonstrated a profound impact on the educational outcomes of minorities and low-income students. Nationwide, 60% of all public schools offering IB programs are designated as Title 1 schools, meaning a high percentage of their students come from low-income families. The results are encouraging. Of those students who took an IB qualifying exam, 40% were minorities and one-third were low-income. Of these low-income students, a remarkable 79% enrolled in higher education upon high school graduation, as compared to only 46% of their peers in non-IB schools.¹⁴ Those students were well-prepared for the rigors of college coursework. The first year retention rate

AP coursework is a hallmark of the high performing high schools serving low-income populations. A model example in Arizona is the Glendale Union High School District, the 2013 National AP District of the Year.¹⁶ All nine Glendale Union high schools perform at an 'A'-level and hold all students to exceptional academic standards, regardless of serving a majority of low-income students.¹⁷

for low-income IB graduates at four-year universities was an impressive 87%.¹⁵

Financial Savings and Reduced Time-to-Degree:

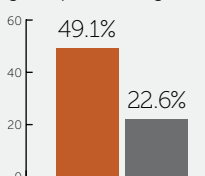
The high cost of a college education is a widely acknowledged barrier for low-income students. In addition, the debt college students accrue can negatively impact their financial situation for decades after graduation. For students coming from families with incomes of less than \$30,000, the average debt upon receipt of a bachelor's degree in 2008 ranged from \$16,500 to over \$30,000 depending on the type of institution. As tuition rises, those numbers go up every year.¹⁸

Students who get college course credit for CLEP or AP exams can earn their degrees quicker and save money in the process. A 2011 study found students with credits earned from an AP or CLEP exam saved between 1.9 and 23.1 months of time in earning bachelor's degrees and between \$1,605 in tuition at a large public university and \$6,000 in tuition at other institutions.¹⁹ These cost savings benefits not only families but also taxpayers who help fund community colleges and universities. In Florida and Minnesota, where AP coursework is widely distributed, families and the states save tens of millions of dollars each year from the rapidly growing number of students passing AP exams.²⁰

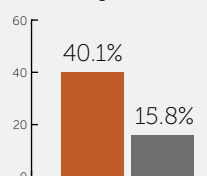
Low-income AP students have an 'A' high school grade point average (49.1 percent) and an SAT score of 1500 or higher (40.1 percent), compared to their non-AP peers (22.6 percent and 15.8 percent, respectively).¹³

■ AP Students ■ Non-AP Students

Percentage of Low Income Students with 'A' high school grade point average



Percentage of Low Income Students with SAT score of 1500 or higher



AP and Other Advanced Coursework Can Prepare Students to Fill Available Science, Technology, Engineering and Math (STEM) Positions

According to the U.S. Department of Commerce, the growth in STEM jobs was three times as fast as growth in non-STEM jobs over the last 10 years.²¹ In Arizona, the Phoenix metro area has one of the fastest-growing high-tech markets among all U.S. metro areas. With an estimated 1.2 million unfilled jobs in STEM predicted by 2018, it is essential that Arizona scholars become interested and educated in STEM fields.²²

Yet African American, American Indian, and Hispanic students are less likely to study math and science in college or pursue related careers than their counterparts.²³ Too often, this lack of interest reflects a lack of exposure. Research shows students who take AP math and science are more likely than non-AP students to earn degrees in physical science, engineering, and life science disciplines.²⁴ Similarly, the curricula for IB and CIE

emphasize advanced mathematics such as trigonometry, calculus, and statistics. These courses help prepare students for the rigors of college level courses in high-demand fields such as medicine, the biosciences, information technology/computer science, and engineering.

In order to develop a strong workforce in Arizona and to ensure students are prepared and competitive when they enter the job market, rigorous STEM courses must be more readily available in the highest need public schools.²⁵ AP, IB, and CIE are some of the solutions to this challenge. Unfortunately, some of the most acute teacher shortages in Arizona are in the subjects of physics and computer science, especially in rural and small communities²⁶. A concerted statewide effort is needed to recruit and train teachers in these subjects.

Arizona Should Radically Increase Student Enrollment and Pass Rates on AP and Other Advanced Coursework

In the 2014-2015 school year, Arizona schools educated approximately 329,611 total high school students.²⁷ Of these students, only 10

percent (35,121 students) were enrolled in AP courses, taking a total of 63,103 AP examinations.^{28 29}

Class of 2013 Student Population Segment	Number of Students in the Graduating 2013 Class in Arizona ³¹	% of 2013 Graduating Class ³²	Total Number of 2013 Graduates Leaving an Arizona High School Having Taken an AP Exam ³³	% of AP Exam Takers ³⁴	Total Number of Graduates Scoring a 3 or Higher on an AP Exam During High School in Arizona ³⁵	% Successful AP Exam Takers ³⁶
Black/African American	3,584	5.9%	571	3.8%	263	3.0%
Hispanic/Latino	22,383	36.8%	4,551	30.4%	2,285	26.1%
American Indian/Alaska Native	2,705	4.4%	344	2.3%	101	1.2%

Of the students enrolled in AP courses, there is a significant equity gap for many traditionally underserved students. An equity gap exists when the racial/ethnic group accounts for a smaller percentage of AP Exam takers (e.g., fifth column) or successful AP Exam takers (e.g., seventh column) than of the graduating class (e.g., third column).³⁰

Another significant disparity in Arizona surrounds the performance of low-income students on AP exams. In the class of 2013, there were 4,459 graduates leaving high school having taken an AP Exam who were from low-income backgrounds, equating to 29.8% of the students in the graduating class who were eligible for free or reduced-price lunch.³⁷ Only 2,212 graduates from low-income backgrounds scored a passing grade of 3 or greater on an AP Exam during high school.³⁸

The reality of these low participation and pass rates is particularly painful for Arizona, where a majority of our students are Hispanic. One of the largest gaps in Arizona involves the issue of access to AP for low-income students.³⁹ Closing AP participation and pass rate gaps requires a focus on student preparation before high school. While we should responsibly expand AP and other advanced coursework to more schools throughout Arizona, we must also close the preparation gaps before high school.⁴⁰

The largest barrier for providing meaningful AP and other college-level coursework is having a sufficient number of teachers prepared to do so.⁴² Students in low-income communities receive less instruction than their middle-class peers and are more likely to be taught by less qualified teachers.⁴³ Effective AP teachers require a higher level of preparation and are currently far less likely to be teaching in low-income schools.⁴⁴ Professional development and quality resources are essential to prepare teachers for the demands of teaching AP or other advanced coursework.⁴⁵

To raise the number of high ability low-income students entering and successfully completing

COMMITMENT TO IMPROVE

In November 2015, Tucson Unified School District was placed on the 6th Annual AP® District Honor Roll for increasing access to AP coursework while simultaneously increasing the percentage of students earning passing scores of 3 or higher on AP exams. In 2014, the district had 5,381 students enrolled in AP classes. Of those, 3,051 were minority students. In 2016, the district has 5,759 students enrolled in AP classes. Of those, 3,205 are minority students.⁴¹ The district's dedication to continue expanding AP access and helping TUSD students achieve at high levels of performance on AP exams is a real testament to their belief that a more diverse population of young people are ready for the rigorous coursework in college.

college-level courses, it is also important to ensure that students are matched with advanced curriculum when they show the promise and ability to succeed with it.⁴⁶ In Arizona public schools, for example, recent data from CollegeBoard shows that nearly 5,000 Arizona students (44%) in the graduating class of 2015 with AP potential did not participate in even one matched AP exam.⁴⁷

The Preliminary Scholastic Aptitude Test (PSAT) is an optional standardized test taken by high school sophomores and juniors to evaluate academic ability. It is often used as a way to measure a student's potential for success in advanced high school coursework and in college. Approximately 3.5 million students take the PSAT each year, but the

majority of these come from families where college enrollment is an expected outcome. Relative few PSAT takers come from low-income families, and minorities are under-represented, despite the availability of college scholarships for students who score well enough to be eligible for the National Merit Scholarship or National Achievement Scholarship programs.⁴⁸

A recent study from Columbia University examined whether information supplied on a student's PSAT Results Report about their potential for success in at least one AP course would impact that student's decision to enroll in AP classes.⁴⁹ Analysts found that the disadvantaged students who scored well on the PSAT revised their beliefs about their own ability and future academic plans. These students were more likely to enroll in AP classes and successfully pass one or more AP exams, thus putting them on a path for post-secondary education. The cost of the PSAT is \$12.75 per student, making it a relatively inexpensive means of encouragement. The results from the study suggest that providing a credible, individualized signal of ability is a

Thanks in large part to a generous grant from the Helios Education Foundation, the entire Yuma Union High School District has implemented the Cambridge International Curriculum as part of the Yuma Ready Now initiative. Tutoring is available to struggling students, and teachers receive special professional development to prepare them to effectively teach the demanding curriculum. The goal is to have a high expectations culture for all students and to encourage graduates to enroll in post-secondary education.⁵¹

cost-effective way to increase enrollment and pass rates on AP coursework among disadvantaged students.⁵⁰

Several Specific Options are Available to Improve the Number of Schools that Offer Quality AP or Other Advanced Curriculum and to Increase Enrollment in Available Courses and Pass Rates

Some of these recommendations do not require legislation, but are just a reprioritization of funds and resources within individual school campuses and Local Education Agencies (LEAs).

Teacher Incentives and Support

- Offer bonuses to teachers for each student earning a qualifying passing score on AP, CLEP, or CIE exams, with additional incentives for teachers in schools with traditionally underserved student populations;⁵²
- Provide teachers with adequate materials, and support to effectively teach AP and other advanced courses;
- Create partnership with the College Board, as Florida and North Carolina have done, to provide professional development and support to AP teachers and teachers in schools with traditionally underserved student populations who wish to teach AP;
- Ensure that pre-AP and AP, IB, and CIE workshops and trainings qualify as professional development hours;

- Provide each AP, IB, or CIE teacher with a few sub-days to be used for grading time during the year, with an option to split into multiple half-days, in order to give constructive feedback on major assignments and exams;⁵³
- Seek mentoring opportunities for teachers and administrators with the 2011-2015 Arizona AP Honor Roll Winners – Glendale Union High School District, Flagstaff Unified School District, Deer Valley Unified School District, Higley Unified School District, Scottsdale Unified School District, Gilbert Public Schools, Yuma Union High School District, Amphitheater Unified School District, Mingus Union High School District, Diocese of Phoenix and Diocese of Tucson;
- Partner with universities and community colleges to provide incentives for higher education faculty to teach AP, IB, and CIE courses in high schools;
- Create partnerships with community colleges and universities to give AP, IB, and CIE teachers access to college aides for assistance with grading, editing rough drafts, and lab set-up and break-down or scoring lab reports;⁵⁴ and
- Focus teacher recruitment efforts and provide differentiated pay for high-demand subjects such as physics and computer science. Expand alternative and expedited certification programs for scientists and engineers who wish to join the teaching profession.

Student Incentives:

- Encourage the Arizona Department of Education to provide more low-income students access to advanced courses and exams through the recent U.S. Department of Education \$682,609 grant issued to Arizona, which covers all but \$12 of the cost of each AP, IB and CIE test taken;⁵⁵
- Provide state financial support to offset any AP, IB, or CIE test cost for low-income public school students who take AP exams. In 2013, prior to the abovementioned grant, an additional \$81,000 from the State of Arizona would have paid all the AP exam costs for the approximately 4,500 low-income students who took an AP exam that year;⁵⁶
- Take advantage of CollegeBoard’s reduced AP fees for low-income students (a \$26 fee reduction per exam);
- Allow students to use AP coursework and passing exam scores to fulfill end-of-course and statewide graduation requirements, upon determination that the courses align to state standards and that the assessments accurately measure student mastery of the standards;
- Ensure that public colleges and universities develop AP, IB, CIE, and CLEP exam credit and placement policies based on institutional goals, alignment with corresponding courses, and objective outcomes research;
- Conduct AP, IB, or CIE Summer Bridge programs for students to improve study skills and basic course knowledge gaps to succeed in their upcoming college-level course(s) ;⁵⁷
- Create AP resource rooms as a place for students to study after school and hold study sessions with an AP teacher or highly qualified AP student tutors. Teachers can provide tutoring for \$0 to the school in lieu of being released from after-school duty hours or other responsibilities⁵⁸;
- Move K-8 Gifted students automatically into AP or advanced coursework track;
- Provide opportunities to enroll in AP, IB, or CIE courses at other campuses using distance learning and video technology;
- Pay for the \$12.75 cost of providing the PSAT statewide per student, which totals approximately \$1.2 million for roughly 80,000 Arizona sophomores.⁵⁹ Students can then be alerted to their AP Potential by subject and course;
- Establish a partnership with the College Board, as Florida and North Carolina have done, to target students who are capable of AP and other rigorous courses but are not aware that they are and to assist students who could be capable of AP and other rigorous courses with some additional help.

School Incentives:

- Offer formulaic bonuses to schools for each student earning a qualifying passing score on college-level exams, with additional incentives for teachers in schools with traditionally underserved student populations who have one or more students pass an AP, IB, or CIE exam;
- Include college and career readiness indicators in the school accountability system such as students earning qualifying scores on AP (3 or higher), IB (4 or higher), or earning an industry certification in a high-demand field;
- Provide local districts and schools with start-up and expansion funds for AP, IB, or CIE training, textbooks, and classroom materials in communities with traditionally underserved student populations;
- Provide school grants for improving the quality of the curriculum students will take prior to their college-level coursework;
- Develop philanthropic grant opportunities for family outreach programming to increase the number of low-income and minority families that will encourage and support their student(s) to enroll in a college-level course;⁶¹ and
- Allow summer school funding to cover the costs of implementing AP, IB, or CIE Summer Bridge programs.

Conclusion

The key to expanding the number of students accessing and succeeding in advanced coursework is simply the decision to do so. Teachers, school administrators, school boards, and state officials can all greatly influence the quality of education

in Arizona by insisting that all students have access to Advanced Placement, International Baccalaureate, Cambridge International Examinations, or other similarly challenging coursework.

End Notes

1. Adelman, C. (1999). Answers in the tool box: academic intensity, attendance patterns, and bachelor's degree attainment. Washington, D.C.: U.S. Department of Education, Executive Summary. Retrieved from: <http://www2.ed.gov/pubs/Toolbox/Exec.html>; Burton, N.W., Whitman, N.B., Yepes-Baraya, M., Cline, F., & Kim, R.M. (2002). *Minority Student Success: The Role of Teachers in Advanced Placement Program® Courses*. New York, NY: College Entrance Examination Board, p. 11. Retrieved from: <http://professionals.collegeboard.com/data-reports-research/cb/minority-student-success>.
2. Handwerk, P., Tognatta, N., Coley, R.J., & Gitomer, D.H. (2008). Access to success: Patterns of Advanced Placement participation in U.S. high schools, p. 23. Retrieved from: www.ets.org/Media/Research/pdf/PIC-ACCESS.pdf.
3. Faller, M.B. (2014). More Arizona students taking AP courses. Retrieved from: <http://www.azcentral.com/story/news/local/scottsdale/2014-05/19/more-arizona-students-taking-ap-courses/2248452/>.
4. Murphy, D., & Dodd, B. (2009). *A Comparison of College Performance of Matched AP and Non-AP Student Groups*. New York, NY: CollegeBoard Research Department, p. 1.9. Retrieved from: <http://research.collegeboard.org/publications/content/2012/05/comparison-college-performance-matched-ap-and-non-ap-student-groups>; Wyatt, J., & Mattern, K. (2012). *The Validity of the Academic Rigor Index for Predicting FYGPA*. New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: research.collegeboard.org/sites/default/files/info2go/2012/8/
- 5/ Klein-Collins, R. (2010). *Fueling the Race to Postsecondary Success: A 48-Institution Study of Prior Learning Assessment and Adult Student Outcomes*. Council for Adult and Experiential Learning (NJ1), p. 7-8. Retrieved from: <http://eric.ed.gov/?id=ED524753>.
6. McCauley, D. (2007). *The Impact of Advanced Placement and Dual Enrollment Programs on College Graduation Applied Research Projects*, Texas State University-San Marcos, p. 32-34. Retrieved from: <http://ecommons.txstate.edu/arp/206>; *The Advanced Placement Training and Incentive Program (APTIP) Works*. Retrieved from: iei.nd.edu/assets/78204/how_ap_tip_works.pdf.
7. CollegeBoard. (2005) *CLEP Candidate Survey: Summary of Results*. New York, NY: CollegeBoard Research Department, p. 2. Retrieved from: https://secure-media.collegeboard.org/digitalServices/pdf/clep/CLEP_Candidate_Survey_2004-05.pdf.
8. U.S. Department of Defense Education Activity (2016). *Advanced Placement: Why Take AP?*, p. 1. Retrieved from <http://www.dodea.edu/Curriculum/AP/why.cfm>; Hopkins, K. (2012). *Weigh the Benefits, Stress of AP Courses for Your Student*. *US News & World Report*, p. 1. Retrieved from: <http://www.usnews.com/education/high-schools/articles/2012/05/10/weigh-the-benefits-stress-of-ap-courses-for-your-student>.
9. Murphy, D., & Dodd, B. (2009). *A Comparison of College Performance of Matched AP and Non-AP Student Groups*. New York, NY: CollegeBoard Research Department, p. 1.9. Retrieved from: <http://research.collegeboard.org/publications/content/2012/05/comparison-college-performance-matched-ap-and-non-ap-student-groups>; Wyatt, J., & Mattern, K. (2012). *The Validity of the Academic Rigor Index for Predicting FYGPA*. New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: research.collegeboard.org/sites/default/files/info2go/2012/8/...
10. Mattern, K., Shaw, E., & Xiong, X. (2009). *The Relationship Between AP Exam Performance and College Outcomes*. New York, NY: CollegeBoard Research Department, p. 12. Retrieved from: <http://research.collegeboard.org/publications/content/2012/05/relationship-between-ap-exam-performance-and-college-outcomes>; Murphy, D., & Dodd, B. (2009). *A Comparison of College Performance of Matched AP and Non-AP Student Groups*. New York, NY: CollegeBoard Research Department, p. 1.9. Retrieved from: <http://research.collegeboard.org/publications/content/2012/05/comparison-college-performance-matched-ap-and-non-ap-student-groups>.
11. The Hub. (2014). *A Closer Look: Minority Students Close the Achievement Gap*. Retrieved from: <https://thehub.dallasisd.org/2014/11/04/a-closer-look-minority-students-close-the-achievement-gap-on-ap-exams/>; CollegeBoard (2014). *College Board Program Results Reveal Missed Opportunities and Areas of Promise for Students*. Retrieved from: <https://www.collegeboard.org/releases/2014/program-results-reveal-missed-opportunities-areas-promise-students>.
12. Council for Adult and Experiential Learning. (2015) *Fueling the Race to Post-secondary Success: A 48 Institution Study of Prior Learning Assessment and Adult Student Outcomes*, (Funded by Lumina Foundation for Education.), p. 50. Retrieved from: http://www.cael.org/pdfs/pla_fueling-the-race.
13. Murphy, D., & Dodd, B. (2009). *A Comparison of College Performance of Matched AP and Non-AP Student Groups*. New York, NY: CollegeBoard Research Department, p. 1.9. Retrieved from: <http://research.collegeboard.org/publications/content/2012/05/comparison-college-performance-matched-ap-and-non-ap-student-groups>; Wyatt, J., & Mattern, K. (2011). *Validity*. New York, NY: CollegeBoard Research Department, p. 10; Hargrove, L., Godin, D., and Dodd, B. (2008). *College Outcomes Comparisons by AP and Non-AP High School Experiences*. New York, NY: CollegeBoard Research Department, p. 41-45. Retrieved from: <https://aphighered.collegeboard.org/research-reports>.
14. Gordon, M., VanderKamp, E., and Halic, O. (2015) *International Baccalaureate Programmes in Title 1 Schools in the United States: Accessibility, Participation and University Enrollment*, IB Global Research, p.4. Retrieved from: <http://www.ibo.org/en/about-the-ib/research/programme-impact-research/diploma-studies/>.
15. Caspary, K., Woodworth, K., Keeting, K. and Sands, J. (2015) *International Baccalaureate: National Trends for Low-Income Students, 2008-2014*, SRI International, p. 2. Retrieved from: <https://www.sri.com/work/publications/international-baccalaureate-national-trends-low-income-students-2008-2014>.
16. Glendale Union High School District. (2013). *College Board Honors GUHSD For Being National AP District of the Year*. Glendale, AZ, p. 1. Retrieved from: <http://www.guhsdaz.org/cms/One.aspx?pageId=17681222>.

17. Glendale Union High School District. (2014). Glendale Union High School District earns an "A" Ranking. Glendale, AZ, p. 1. Retrieved from: <http://www.guhsdaz.org/cms/One.aspx?pageId=21488858>.
18. Council for Adult and Experiential Learning (2011) Underserved Students Who Earn Credit through Prior Learning Assessment Have Higher Degree Completion Rates and Shorter Time-to-Degree, p. 3. Retrieved from: <http://eric.ed.gov/?id=ED524578>.
19. Ibid
20. Minnesota Department of Education (2014). More Students Taking Advanced Placement Courses, Earning College Credit, p. 1. Retrieved from: <http://education.state.mn.us/MDE/Welcome/News/PressRel/054236>; Matus, R. (2010). AP classes save families money, but for taxpayers the jury is out. Tampa Bay, FL: Tampa Bay Times, p. 1. <http://www.tampabay.com/news/education/k12/ap-classes-save-families-money-but-for-taxpayers-the-jury-is-out/1131387>.
21. CollegeBoard. (2015). AP STEM Access Program Overview. Retrieved from: <http://apcentral.collegeboard.com/apc/html/ap-stem-access-program/ap-stem-access-program.html>.
22. Bertram, V. (2014). STEM-educated workforce vital to Arizona's economy. Arizona Republic. Retrieved from: <http://www.azcentral.com/story/opinion/op-ed/2014/08/10/stem-arizona-economy-workforce/13879089/>; Rothwell, J. (2014). Still Searching: Job Vacancies and STEM Skills. Brookings Institute. Retrieved from: <http://www.brookings.edu/research/interactives/2014/job-vacancies-and-stem-skills#/M10420>.
23. CollegeBoard. (2015). AP STEM Access Program Overview. Retrieved from: <http://apcentral.collegeboard.com/apc/html/ap-stem-access-program/ap-stem-access-program.html>.
24. CollegeBoard. (2015). AP STEM Access Program Overview. Retrieved from: <http://apcentral.collegeboard.com/apc/html/ap-stem-access-program/ap-stem-access-program.html>.
25. Edwards, K., & Sawtell, E. (2013). The Demographic Wave: Rethinking Hispanic AP Trends, 12-14. Las Vegas, NV: AP Annual Conference. Slides 59-60. Retrieved from: <http://research.collegeboard.org/publications/demographic-wave-rethinking-hispanic-ap-trends/>; Arizona Hispanic Chamber of Commerce (2015). DATOS: The State of Arizona's Hispanic Market, 139-147. Phoenix, AZ: Arizona State University DATOS Content Research Team, p. 210-214. Retrieved from: http://issuu.com/azhcc/docs/datos_az15_book_issuu_1dbfd5e58dd830.
26. Arizona Department of Education. (2015). Educator Retention and Recruitment Report, p. 23. Retrieved from: [http://www.azed.gov/search-results?q=teacher%20shortages/](http://www.azed.gov/search-results?q=teacher%20shortages;); American Board for Certification of Teacher Excellence (2014). Most States Adopt Common Core Standards; Yet Many Face STEM Teacher Shortage, p. 1. Retrieved from: <http://abccte.org/high-standards-low-supply-states-sets-high-standards-but-face-stem-teacher-shortages/>.
27. Arizona Department of Education. (2014). October 1 2014 Enrollment Count. Retrieved from: <http://www.azed.gov/research-evaluation/arizona-enrollment-figures/>.
28. CollegeBoard. (2015). AP Exam Volume By Region. New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: <http://research.collegeboard.org/programs/ap/data/participation/ap-2015>.
29. CollegeBoard. (2015). School Report of AP Examinations By State. New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: <http://research.collegeboard.org/programs/ap/data/participation/ap-2015>; CollegeBoard. (2015). AP Exam Volume By Region. New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: <http://research.collegeboard.org/programs/ap/data/participation/ap-2015>.
30. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Appendix D, "Equity Gaps in Participation and Success Among Traditionally Underserved Students, U.S. Public Schools: 2003, 2008, 2012, 2013." New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: <http://apreport.collegeboard.org/>.
31. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Arizona State Supplement. New York, NY: CollegeBoard Research Department, p. 9-11. Retrieved from: <http://apreport.collegeboard.org/>.
32. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Appendix D, "Equity Gaps in Participation and Success Among Traditionally Underserved Students, U.S. Public Schools: 2003, 2008, 2012, 2013." New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: <http://apreport.collegeboard.org/>.
33. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Arizona State Supplement. New York, NY: CollegeBoard Research Department, p. 9-11. Retrieved from: <http://apreport.collegeboard.org/>.
34. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Appendix D, "Equity Gaps in Participation and Success Among Traditionally Underserved Students, U.S. Public Schools: 2003, 2008, 2012, 2013." New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: <http://apreport.collegeboard.org/>.
35. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Arizona State Supplement. New York, NY: CollegeBoard Research Department, p. 9-11. Retrieved from: <http://apreport.collegeboard.org/>.
36. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Appendix D, "Equity Gaps in Participation and Success Among Traditionally Underserved Students, U.S. Public Schools: 2003, 2008, 2012, 2013." New York, NY: CollegeBoard Research Department, p. 1. Retrieved from: <http://apreport.collegeboard.org/>.
37. CollegeBoard. (2014). The 10th Annual AP® Report to the Nation: Arizona State Supplement. New York, NY: CollegeBoard Research Department, p. 8. Retrieved from: <http://apreport.collegeboard.org/>.
38. Ibid
39. Faller, M.B. (2014). More Arizona students taking AP courses. Retrieved from: <http://www.azcentral.com/story/news/local/scottsdale/2014-05/19/more-arizona-students-taking-ap-courses/2248452/>.
40. Malkus, Nat, (January 2016). AP at Scale: Public School Students in Advanced Placement, 1990-2013. American Enterprise Institute, p. 11. Retrieved from: <http://www.aei.org/publication/ap-at-scale-public-school-students-in-advanced-placement-1990-2013/>.

41. Boe, S. (November 2015). Tucson Unified makes College Board's AP Honor Roll for gains. Tucson, AZ: Tucson Unified School District, p. 1. Retrieved from: <http://www.tusd1.org/contents/distinfo/spotlight/112315highschool.asp>.
42. Paek, P.L., Braun, H., Trapani, C., Ponte, E., & Powers, D. (2007). The Relationship of AP® Teacher Practices and Student AP Exam Performance. New York, NY: CollegeBoard Research Department, p. 22. Retrieved from: <http://research.collegeboard.org/publications/content/2012/05/relationship-ap-teacher-practices-and-student-ap-exam-performance>; Laitusis, V. (2012). An Analysis of the Relationship Between School-Level AP® Professional Development Activity and Subsequent Student AP Performance. New York, NY: CollegeBoard Research Department, p. 8. Retrieved from: <http://research.collegeboard.org/publications/analysis-relationship-between-school-level-ap-professional-development-activity-and>.
43. Burton, N.W., Whitman, N.B., Yepes-Baraya, M., Cline, F., & Kim, R.M. (2002). Minority Student Success: The Role of Teachers in Advanced Placement Program® Courses. New York, NY: College Entrance Examination Board. Retrieved from: <http://professionals.collegeboard.com/data-reports-research/cb/minority-student-success>.
44. Bausmith, J.M. & Laitusis, V. (2012). The Impact of AP® Achievement Institute I on Students' AP Performance. New York, NY: CollegeBoard Office of Research and Analysis. Retrieved from: <https://research.collegeboard.org/publications/impact-ap-achievement-institute-i-students-ap-performance>.
45. Laitusis, V. (2012). An Analysis of the Relationship Between School-Level AP® Professional Development Activity and Subsequent Student AP Performance. New York, NY: CollegeBoard Research Department, p. 8. Retrieved from: <http://research.collegeboard.org/publications/analysis-relationship-between-school-level-ap-professional-development-activity-and>.
46. Northern, Amber. (2015). How students react to news of their AP potential. Thomas Fordham Institute. Retrieved from: <http://edexcellence.net/articles/how-students-react-to-news-of-their-ap-potential>.
47. CollegeBoard. (2015). A Right to Rigor: Fulfilling Student Potential in Arizona. New York, NY: CollegeBoard Research Department.
48. National Merit Scholarship is available to all students whereas the National Achievement Scholarship is available only to African-American students.
49. Gonzales, N. (2014). Information Shocks about Ability and the Decision to Enroll in Advanced Placement: Evidence from the PSAT. New York City, NY: Columbia University, p. 1. Retrieved from: www.columbia.edu/~ndg2109/PSAT.pdf.
50. Gonzales, N. (2014). Information Shocks about Ability and the Decision to Enroll in Advanced Placement: Evidence from the PSAT. New York City, NY: Columbia University, p. 44. Retrieved from: www.columbia.edu/~ndg2109/PSAT.pdf.
51. Retrieved from: http://www.yumaunion.org/pages/Yuma_Union_HighSchool_Dist/Ready_Now_Yuma/RNY_Pages/FAQ.
52. Jackson, C. (2008). Cash for Test Scores. Education Next. Retrieved from: <http://educationnext.org/cash-for-test-scores/>; Model legislation example Florida Statute, Title XLVIII, Chapter 1011.62(1)(d)3L-O.
53. For example, see Koshy, S. (2015-2016). AP Action Plan. Long Beach Polytechnic High School.
54. Ibid
55. Camera, L. (August 2015). Education Department Awards Grants to Defray Costs of AP Tests. Education Week, p. 1. Retrieved from: http://blogs.edweek.org/edweek/campaign-k-12/2015/08/education_department_awards_AP.html.
56. This calculation is based on the \$18 gap that remained for schools to cover exam costs for low-income students, after the College Board waived \$26 of the exam fee for low-income students in Arizona. Faller, M.B. (2014). More Arizona students taking AP courses. Retrieved from: <http://www.azcentral.com/story/news/local/scottsdale/2014-/05/19/more-arizona-students-taking-ap-courses/2248452/>.
57. For example, see Brown, Q. (October 2015). Advanced Placement Action Plan. Renaissance High School for the Arts.
58. For example, see Koshy, S. (2015-2016). AP Action Plan. Long Beach Polytechnic High School.
59. The cost of providing the PSAT statewide is approximately \$12.75 per student. The price can fluctuate based on the number of students participating and the Free and Reduced Lunch rate. At roughly 80,000 sophomores, the approximate cost for all students is \$1,020,000. Our assessment prices include registration and standard reporting to students, parents, schools, the district, and to the state, as well as a number of other comprehensive systems for student and stakeholder support and engagement.
60. Matthews, Lowell D. (2016) College and Career Readiness: Building a Global Workforce PowerPoint, Foundation for Excellence in Education. Retrieved from: <http://excelined.org/downloads/college-career-readiness-building>
61. For example, see Brown, Q. (October 2015). Advanced Placement Action Plan. Renaissance High School for the Arts.



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