



**GEORGIA
POLICY LABS**



Opportunities to Improve the Pipeline of Students Into and Through Advanced Placement

Michael D. Bloem, Thomas Goldring,
Monica Mogollon Plazas, and Jonathan Smith

Metro Atlanta Policy Lab for Education

July 2023

Introduction

This report analyzes Advanced Placement (AP) access, course-taking, exam-taking, and exam performance in a metro-Atlanta school district. AP course-taking and exam performance are strongly associated with college success,¹ which has partially contributed to the expansion of AP course-offerings in many school districts. However, there is rarely an equitable distribution of students within or across schools who take AP courses or exams,² or who score high enough on the exam to earn college credit.³ These disparities appear across a host of demographic characteristics, including but not limited to race and ethnicity, sex, and family income.

In this report, we explore AP access, course-taking, exam-taking, and performance focused on strategies to improve equity throughout each step. We spotlight differences in the fraction of students from different demographic groups who receive a 3 or higher on AP exams, a score that typically earns college credit. We then explore where in the pipeline those differences arise:

- Access to the AP course in their high school;
- AP course-taking;
- AP exam-taking; and/or
- AP exam performance.

Data and Analysis

Data Overview

We use administrative data from a district in metro Atlanta between school year (SY) 2010-11 and SY 2021-22. The data include all students along with their basic demographic characteristics, including sex, race and ethnicity, whether they were eligible for free or reduced-price meals (FRPM), and whether they are English learners (EL). The data also include students' eighth-grade standardized test scores⁴ and the high school(s) attended.

We also use data on AP course-taking for each of the possible 33 AP courses that are offered in any high school over the time period. We observe students' AP exam score if students take the corresponding AP exam. Scores are on a 1 to 5 integer scale where 1 is the lowest, 5 is the highest, and scores of 3 or higher often earn college credit at most colleges across the United States.

Analytic Sample

We focus on students entering ninth grade by SY 2015-16 to obtain relatively recent statistics, but appendix tables present results in prior academic years. We only include students who are in the district for at least four years of high school.⁵ Students are assigned to a cohort based on the year in which they first enrolled in ninth grade. We primarily analyze the 2016 to 2019 ninth-grade cohorts (henceforth referred to as cohorts). We create 33 observations per person—one for each potential AP course that was offered in the district from the 2016 cohort onward.⁶ This leads to 46,571 students and approximately 1.5 million student-course observations. In Appendix Table 1, we show the summary statistics of the 46,571 students, including comparisons of AP course-takers and non-takers.

Primary Variables and Analyses

For each of the student and course observations, we create several binary variables (yes/no values):

- *Access to AP Course*: the AP course was offered in the student's high school for at least one year.
- *Took AP Course*: student takes the AP course.
- *Took AP Exam*: student takes the AP exam.⁷
- *Scored 3 or Higher*: student takes the AP exam and scores a 3, 4, or 5.

We then aggregate across students, either by exam, cohort, and/or high school to calculate the fraction of students who had access to an AP course, fraction of students who took an AP course, fraction of students who took an AP exam, and fraction of students who scored 3 or higher on an AP exam.

Finding 1: Access to AP Courses

17 AP courses are accessible to nearly all students in their high school, although some AP courses are only available to a small fraction of students in the district.

We begin by documenting which AP subjects are available to students in the district. This is the first stage in the pipeline, in that students without access cannot take the course.

Figure 1 shows the fraction of students with access to each AP course in their high school. There is a substantial range in AP course access. Some subjects are available to only about 20% of students, such as AP Comparative Government and Politics. On the other hand, 17 AP courses are available to at least 95% of students. The bottom row of Figure 1 shows that the average rate of access across all AP subjects is 78%. Appendix Table 3 shows how these access statistics have evolved over time beginning with the 2011 cohort.

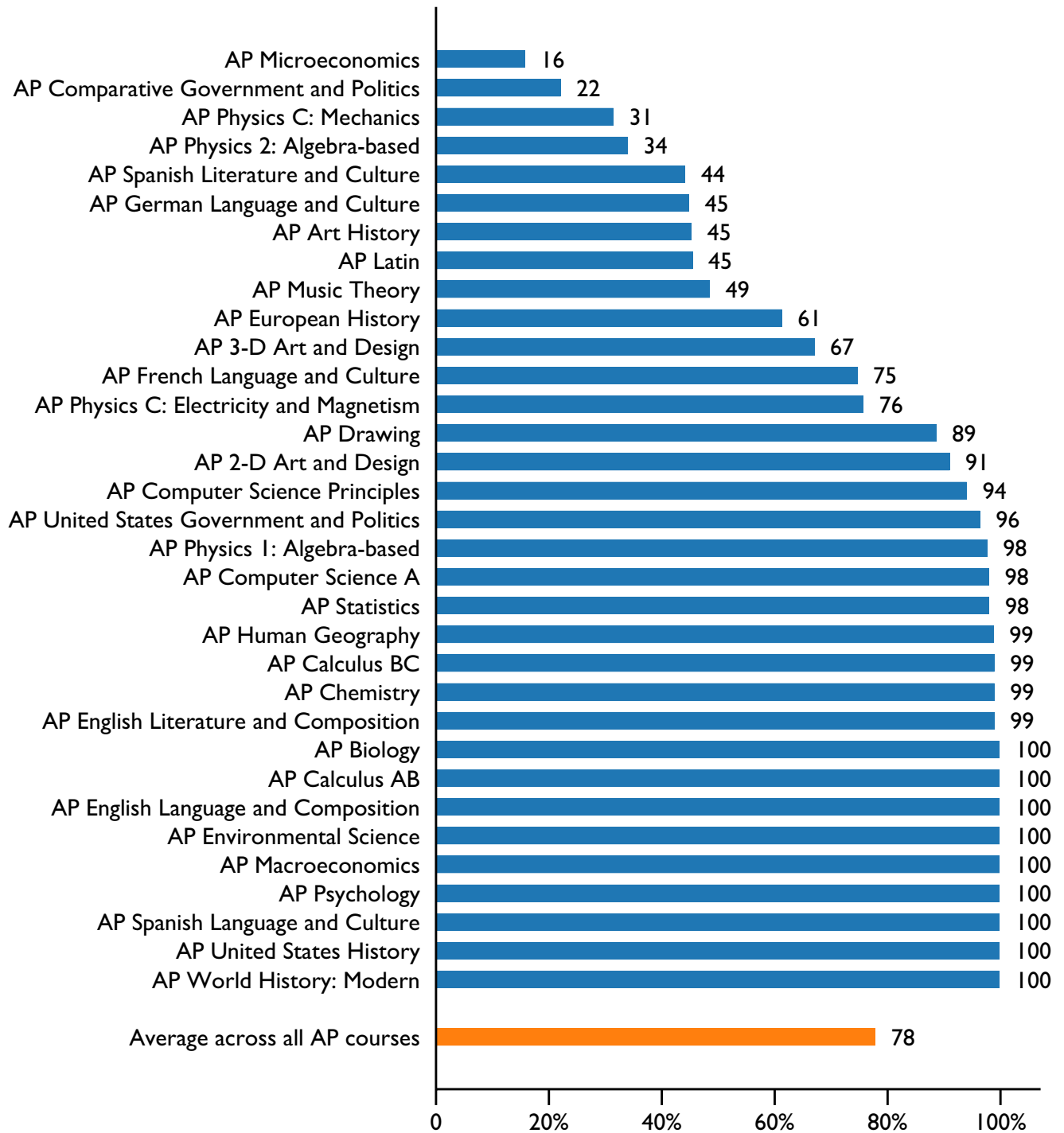
Finding 2: Holes in the AP Pipeline

The divergent rates of scoring a 3 or higher on different AP exams stem from differing course-taking rates, exam-taking rates, and exam performance. This includes meaningful fractions of students who take the AP course but not the corresponding AP exam.

We examine the next stages in the pipeline after AP course access: the fraction of students who take the AP course, the fraction of students who take the AP exam, and the fraction of students who score a 3 or higher on the AP exam. Figure 2 shows these fractions for each of the 17 AP courses where at least 95% of students have AP access, as detailed in the previous section.

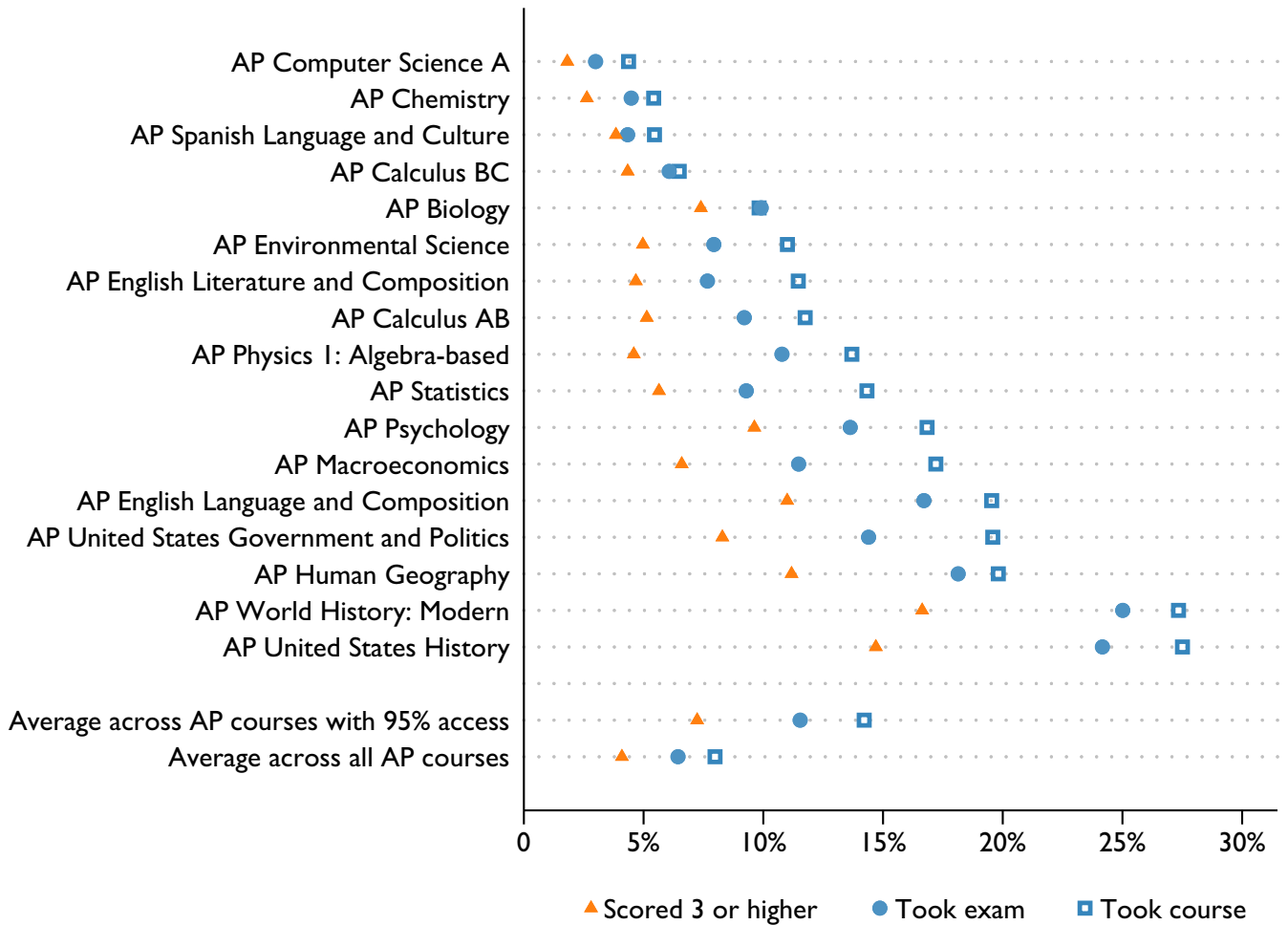
Figure 2 shows that there is substantial variation in the fraction of students scoring a 3 or higher on the AP exam by AP subject. For example, only 2.6% of students score a 3 or higher on AP Chemistry, despite almost all students having access to the course in their high schools. In contrast, 14.7% of students score a 3 or higher on AP U.S. History—a nearly six-fold difference relative to AP Chemistry.

Figure 1. AP Course Access, by AP Subject



Notes. This figure shows the percentage of students who had access to a given AP course at the high school they attended. The sample includes all high school students who began Grade 9 in a school district in metro Atlanta between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

Figure 2. Pipeline to Scoring 3 or Higher on AP Exams, by AP Course



Notes. This figure shows the percentage of students who took an AP course, took the corresponding AP exam, or scored a 3 or higher on the exam. The sample includes all high school students who began Grade 9 in a school district in metro Atlanta between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

The difference in the fraction of students scoring 3 or higher comes from different stages in the pipeline, also detailed in Figure 2. For example, only 5.4% of students take the AP Chemistry course compared to 27.5% of students taking AP U.S. History.

Figure 2 also reveals that a meaningful fraction of students who take AP courses do not take the AP exam. This is despite sitting through a year-long course and the potential to earn college credit. The exam-taking rate among course-takers also varies by AP subject.

Lastly, Figure 2 shows that different fractions of students score a 3 or higher, depending on the AP subject. This suggests that some AP exams are more difficult than others to attain a 3 or higher.

Appendix Table 4 shows these corresponding statistics for each of the 33 AP subjects. Appendix Table 5 averages across the 33 AP subjects, which corresponds to the last row of Figure 2 that shows the average fractions of AP course-taking, exam-taking, and exam performance across all AP subjects.⁸

Finding 3: Some Academically Qualified Students Do Not Take AP Exams

There are students in nearly all AP subjects predicted to score a 3 or higher on an AP exam who do not take the AP course and/or AP exam.

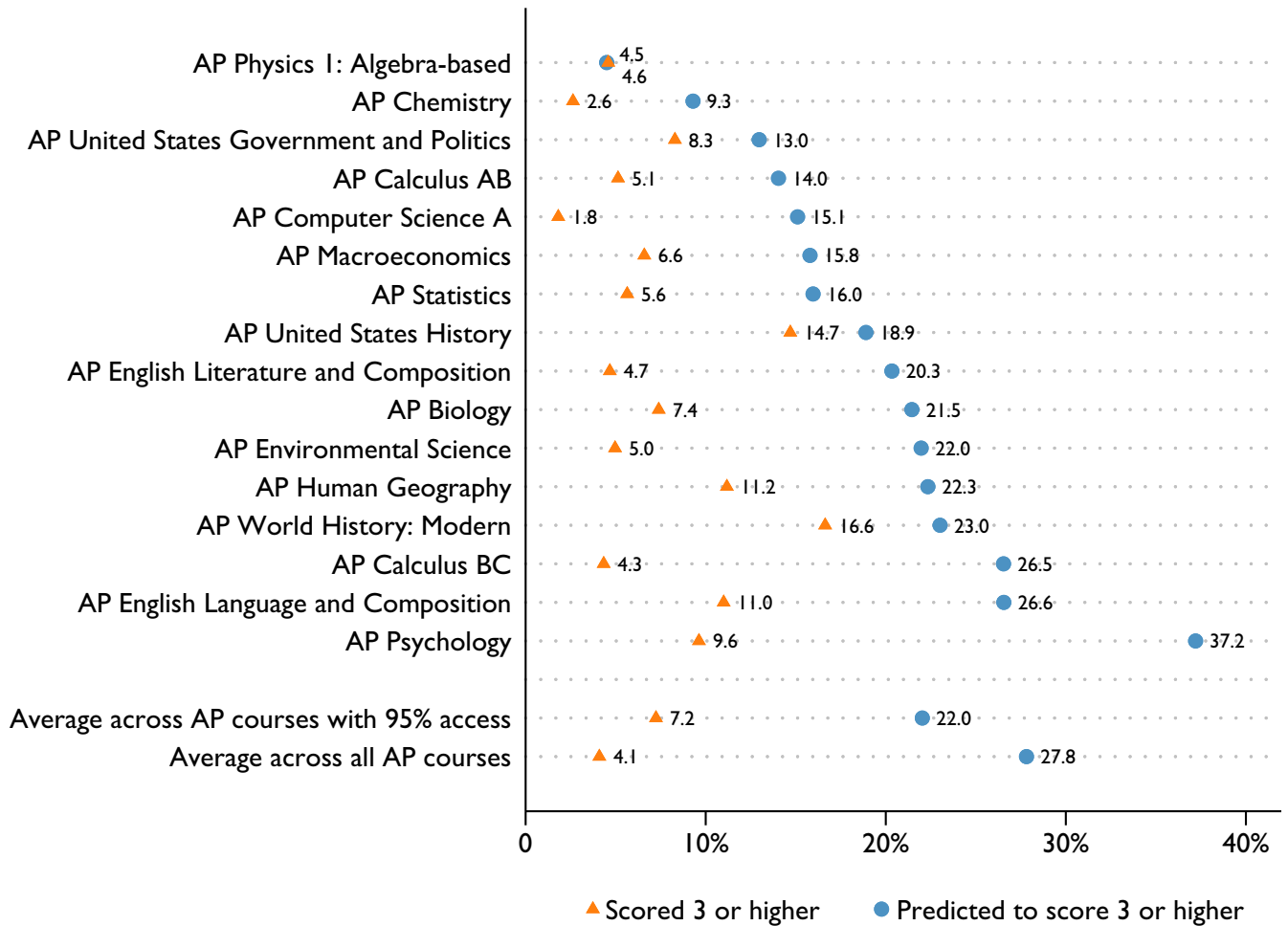
The previous results suggest that a meaningful fraction of students do not take the AP exam, some of whom never take the AP course and some of whom take the AP course but do not take the AP exam. In both stages of the pipeline, there is the potential for students to score a 3 or higher on the AP exam, but they never take the exam.

We assess the magnitude of the academically qualified students not taking the AP exam by predicting which students will score a 3 or higher on each exam. This allows us to estimate which students are predicted to perform well on AP exams, even when they do not take the exams.

Analyzing one AP exam at a time, we regress exam-takers' exam scores on their eighth-grade standardized test score and a set of demographic and high school variables. We then predict the AP exam scores for all students, regardless of exam-taking.

Figure 3 compares the fraction of students who score a 3 or higher on an AP exam with the fraction of students who we predict would score a 3 or higher on an AP exam, among those with AP course access.⁹ The difference between the two fractions is the set of students who either did not take the course and/or did not take the exam.

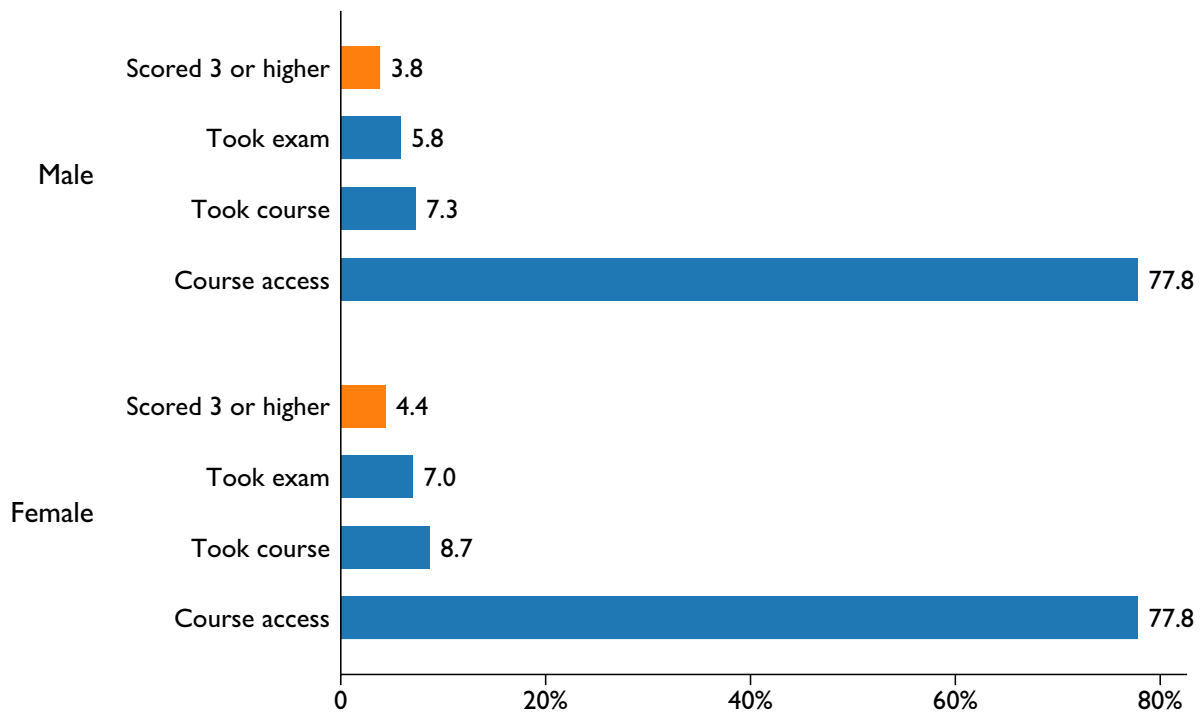
Figure 3. Fraction of Students Scoring 3+ Compared to the Fraction Predicted to Score 3+



Notes. This figure shows the percentage of students who scored a 3 or higher on the AP exam and the percentage predicted to score a 3 or higher if they took the exam. The prediction is based on Grade 8 standardized test scores and a set of demographic and high school variables. The sample includes all high school students who began Grade 9 in a school district in metro Atlanta between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

Figure 3 demonstrates that some AP subjects are difficult to score a 3 or higher, such as AP Physics I. Expanding course-taking or exam-taking in similarly difficult subjects is unlikely to result in many new students scoring a 3 or higher on an exam. Conversely, we predict that 37.2% of students could score a 3 or higher on the AP Psychology exam, but only 9.6% of students do so. The gap between the prediction and the reality is driven by students not taking the AP course or taking the course but not the exam, as shown earlier.

Figure 4. Pipeline to Scoring 3 or Higher on AP Exams, Averaged Across All AP Subjects, by Sex



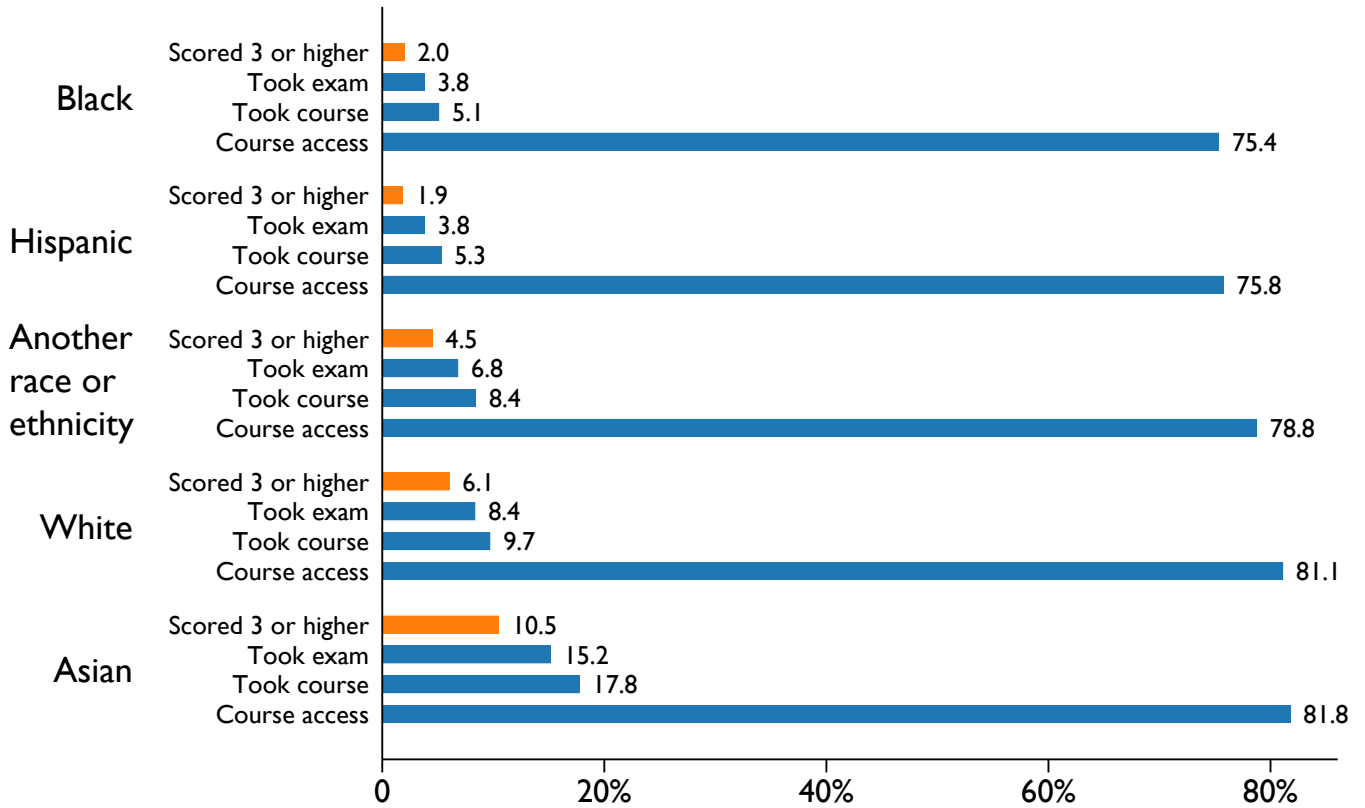
Notes. This figure shows the average rates of course access, course-taking, exam-taking, and scoring 3 or higher across all 33 AP subjects offered across a school district in metro Atlanta, by students' sex. The sample includes all high school students who began Grade 9 in the district between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

Finding 4: Disparities in the AP Pipeline to Scoring 3 or Higher on AP Exams

We find large disparities in the fraction of students scoring a 3 or higher on AP exams by race and ethnicity, FRPM-eligibility status, and EL status. These disparities come from all stages of the pipeline and are most pronounced by differences in academic preparedness prior to the AP course.

Next, we examine the pipeline to scoring a 3 or higher on an AP exam by student subgroups. To do so, we aggregate across all AP subjects, so the figures that follow show the averages of the rates of course access, course-taking, exam-taking, and scoring 3 or higher across all 33 AP subjects.

Figure 5. Pipeline to Scoring 3 or Higher on AP Exams, Averaged Across All AP Subjects, by Race and Ethnicity

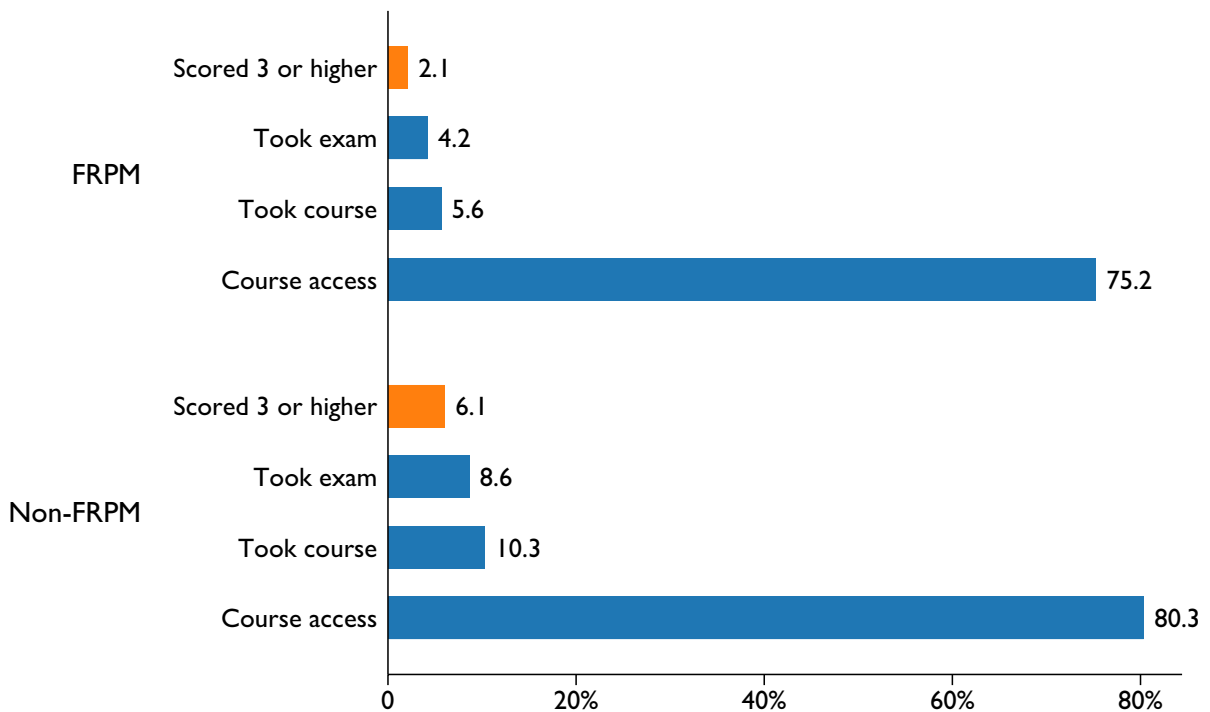


Notes. This figure shows the average rates of course access, course-taking, exam-taking, and scoring a 3 or higher across all 33 AP subjects offered across a school district in metro Atlanta, by students' race and ethnicity. The sample includes all high school students who began Grade 9 in the district between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

Figure 4 splits the statistics by male and female students. For male students, an average of 3.8% of students score a 3 or higher on an AP exam across all 33 AP subjects. In comparison, this statistic is 4.4% for female students, or 16% higher than males. The modest differences are not driven by substantial differences in any single stage of the pipeline.

Figure 5 is analogous to the previous figure but splits the statistics by race and ethnicity. On average, only 1.9% of Hispanic students score a 3 or higher on an AP exam across all 33 AP subjects, the lowest among all races or ethnicities. In contrast, an average of 10.5% of Asian students score a 3 or higher on an AP exam, the highest among all races and ethnicities and almost six times as likely as Hispanic students. In contrast, we see that an average of 2%, 4.5%, and 6.1%

Figure 6. Pipeline to Scoring 3 or Higher on AP Exams, Averaged Across All AP Subjects, by FRPM-Eligibility Status



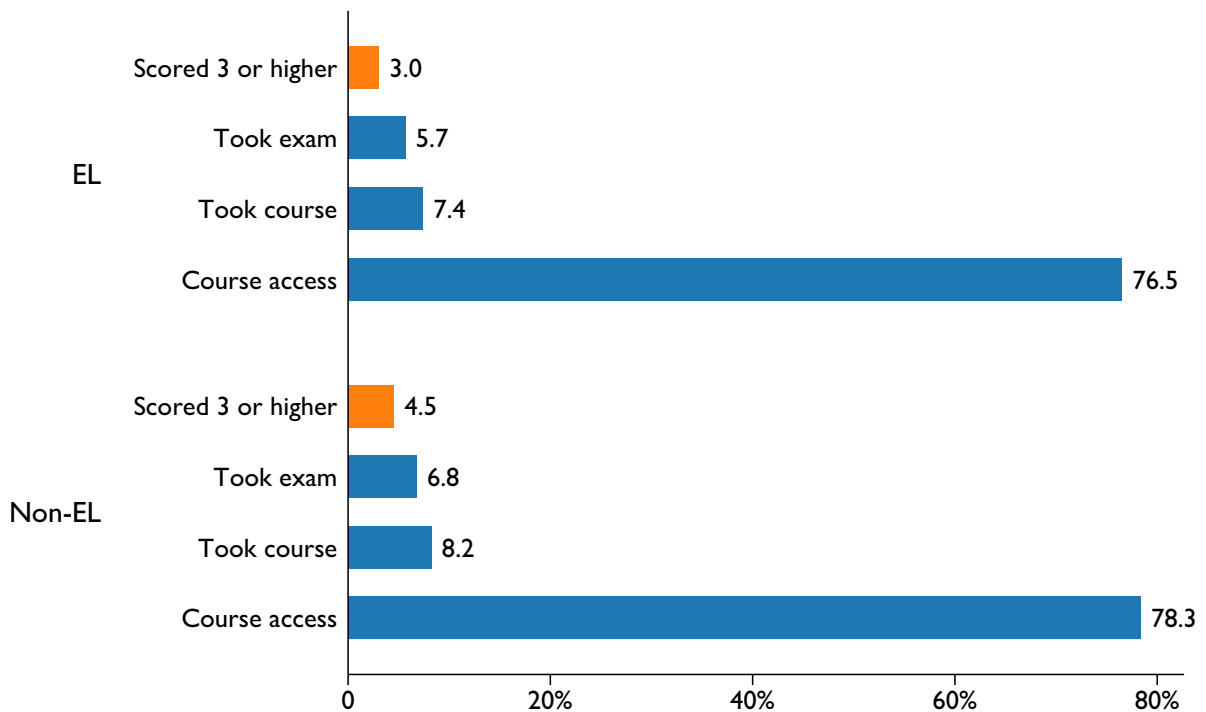
Notes. This figure shows the average rates of course access, course-taking, exam-taking, and scoring 3 or higher across all 33 AP subjects offered across a metro-Atlanta school district, by students' eligibility status for free or reduced-price meals. The sample includes all high school students who began Grade 9 in the district between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

of Black students, students of another race, and White students, respectively, score a 3 or higher on AP exams.

Figure 5 also shows that the gaps between Black and Hispanic students begin with lower rates of access to AP courses in their high school than White and Asian students. But the final six-fold gaps culminate with drastically different rates of scoring a 3 or higher, even among exam-takers. Roughly 70% of White and Asian exam-takers score a 3 or higher compared to roughly 50% among Black and Hispanic students.

Figure 6 is analogous to the previous figures but splits the statistics by FRPM-eligibility status, a crude measure of poverty. Only an average of 2.1% of students eligible for free or reduced-price meals score a 3 or higher on AP exams across the 33 AP subjects. In comparison, this statistic is 6.1% among students not eligible for free or reduced-price meals, which is three times the FRPM-eligible students. The gap in scoring a 3 or higher comes in part from

Figure 7. Pipeline to Scoring 3 or Higher on AP Exams, Averaged Across All AP Subjects, by EL Status



Notes. This figure shows the average rates of course access, course-taking, exam-taking, and scoring 3 or higher across all 33 AP subjects offered across a school district in metro Atlanta, by students' English learner status. The sample includes all high school students who began Grade 9 in the district between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

exam performance—nearly a 20-percentage point difference in scoring a 3 or higher among exam-takers.

Figure 7 is analogous to the previous figures but splits the statistics by EL status. Three percent of English learners score 3 or higher on an AP exam across all 33 AP Subjects. In comparison, this statistic is 4.5% for non-English learners, which is a 50% higher rate. The gap in scoring a 3 or higher comes disproportionately from the difference in scoring a 3 or higher among exam-takers.

Additional Analyses

We generate more detailed results by cohort, high school, and AP course in a series of appendix tables, described below:

- *By Cohort (Appendix Table 7):* We reproduce the statistics in Appendix Table

5—averaged across all 33 AP subjects—but do so for each cohort between 2011 and 2019. We do not break out into student subgroups.

- *Course Taking Rates, by Cohort and Exam (Appendix Table 8):* We show the course-taking rates by each AP exam for each cohort 2011 to 2019, among those with access.
- *Exam Taking Rates, by Cohort and Exam (Appendix Table 9):* We show the exam-taking rates by each AP exam for each cohort 2011 to 2019, among those who took the course.
- *Scoring 3 or Higher Rates, By Cohort and Exam (Appendix Table 10):* We show the fraction of students scoring a 3 or higher by each AP exam for each cohort 2011 to 2019, among who took the exam.

Lastly, we summarize many of our results and documented disparities by focusing on the students and not the AP subjects. The first columns of Table 1 show the average number of AP courses, exams, and high-scoring exams across all students. Although students score a 3 or higher on an average of 1.35 AP exams, the number of high-scoring AP exams is not evenly distributed across students. In fact, only 32.4% and 23% of students score a 3 or higher on at least one and two AP exams, respectively. The characteristics of such students are shown in the columns that follow and are consistent with our previous analyses—Black and Hispanic students and those eligible for FRPM are much less likely to score a 3 or higher on at least one, two, three, or four AP exams than White and Asian students and those not eligible for FRPM.

Conclusion and Recommendations

This report shows how students in a school district in metro Atlanta progress through the AP pipeline, including course access, course-taking, and exam-taking, to scoring a 3 or higher on AP exams. We explore the difference in the fraction of all possible combinations of students with AP courses resulting in scoring a 3 or higher on the AP exam by several student subgroups. We see meaningful gaps in scoring high on the exams by FRPM and EL status and between Hispanic and Black students compared to Asian and White students.

Gaps often emerge at all stages in the AP pipeline. But the gaps also tend to be pronounced in our predictions of students scoring a 3 or higher. Increasing the fraction of students who score a 3 or higher after taking the course is a difficult stage in the pipeline to address beyond the district's current educational

Table 1. Overall Statistics, Cohorts 2016–2019

	All students	By gender		By race/ethnicity					By FRPM status		By race/ethnicity & FRPM status				By EL status	
		Female	Male	White	Black	Hispanic	Asian	Other race or ethnicity	FRPM	Non-FRPM	Black FRPM	Black non-FRPM	Hispanic FRPM	Hispanic non-FRPM	EL	Non-EL
Number of AP courses taken	2.64	2.87	2.41	3.21	1.69	1.75	5.86	2.79	1.86	3.40	1.37	2.14	1.56	2.38	2.44	2.72
Number of AP exams taken	2.12	2.32	1.93	2.76	1.25	1.26	5.00	2.26	1.39	2.85	0.98	1.63	1.08	1.85	1.87	2.23
Number of AP exams scored 3 or higher	1.35	1.44	1.27	2.00	0.66	0.61	3.47	1.49	0.70	2.00	0.45	0.95	0.44	1.16	1.00	1.49
Took at least 1 AP course	0.544	0.604	0.484	0.652	0.429	0.455	0.817	0.558	0.440	0.646	0.371	0.510	0.423	0.555	0.520	0.554
Took at least 1 AP exam	0.462	0.522	0.402	0.589	0.342	0.351	0.762	0.481	0.344	0.578	0.279	0.428	0.315	0.463	0.421	0.479
Scored 3 or higher on at least 1 AP exam	0.324	0.365	0.285	0.466	0.194	0.215	0.616	0.352	0.203	0.444	0.140	0.269	0.177	0.338	0.273	0.346
Took at least 2 AP courses	0.418	0.466	0.371	0.526	0.302	0.308	0.745	0.441	0.310	0.525	0.248	0.376	0.276	0.409	0.381	0.434
Took at least 2 AP exams	0.353	0.397	0.310	0.472	0.236	0.233	0.680	0.378	0.241	0.463	0.186	0.305	0.201	0.335	0.305	0.373
Scored 3 or higher on at least 2 AP exams	0.230	0.253	0.208	0.355	0.125	0.113	0.508	0.258	0.123	0.336	0.084	0.181	0.082	0.212	0.168	0.256
Took at least 3 AP courses	0.344	0.382	0.307	0.438	0.234	0.238	0.683	0.366	0.245	0.442	0.188	0.296	0.207	0.320	0.311	0.358
Took at least 3 AP exams	0.287	0.322	0.252	0.388	0.175	0.177	0.615	0.307	0.187	0.385	0.133	0.233	0.150	0.262	0.247	0.303

Table 1. Overall Statistics, Cohorts 2016–2019

	All students	By gender		By race/ethnicity					By FRPM status		By race/ethnicity & FRPM status				By EL status	
		Female	Male	White	Black	Hispanic	Asian	Other race or ethnicity	FRPM	Non-FRPM	Black FRPM	Black non-FRPM	Hispanic FRPM	Hispanic non-FRPM	EL	Non-EL
Scored 3 or higher on at least 3 AP exams	0.182	0.198	0.167	0.281	0.091	0.081	0.442	0.204	0.092	0.271	0.060	0.136	0.056	0.160	0.130	0.204
Took at least 4 AP courses	0.290	0.319	0.260	0.368	0.185	0.187	0.627	0.309	0.200	0.378	0.146	0.240	0.164	0.262	0.262	0.301
Took at least 4 AP exams	0.237	0.263	0.211	0.321	0.136	0.135	0.557	0.252	0.149	0.324	0.101	0.183	0.114	0.204	0.205	0.250
Scored 3 or higher on at least 4 AP exams	0.148	0.158	0.138	0.227	0.069	0.060	0.385	0.167	0.072	0.223	0.045	0.101	0.040	0.123	0.105	0.166
Number of students	46,571	23,110	23,461	11,434	14,882	12,771	5,732	1,752	23,127	23,444	8,666	6,216	9,706	3,065	13,587	32,984

Notes. This table reports summary statistics for the main analysis sample. The sample includes all high school students who began Grade 9 in a school district in metro Atlanta between school year (SY) 2015–16 and SY 2018–19 and who remained enrolled for at least four years.

practices and goals. As such, it is relatively simpler to close the gaps at other stages of the pipeline, especially course-taking among those with access, and exam-taking among those who take the course.

Specific actions we recommend include:

- Examine the AP courses with the biggest gaps between course-taking and exam-taking to implement strategies to remove that gap.
- Ensure that FRPM-eligible students who are eligible for a free AP exam know about that policy to reduce disparities in that part of the pipeline.
- Use predictions for scoring 3 or higher (e.g., AP potential) to encourage students, especially Hispanic, Black, FRPM-eligible, and EL students, to enter and stay in the AP pipeline through nudges or course counseling.
- Focus on efforts at high schools and on subjects showing the biggest gaps in course taking and exam taking.

Endnotes

1. Smith, J., Hurwitz, M., & Avery, C. (2017). Giving college credit where it is due: Advanced Placement exam scores and college outcomes. *Journal of Labor Economics*, 35(1), 67-147.

Gurantz, O. (2021). How college credit in high school impacts postsecondary course-taking: The role of Advanced Placement exams. *Education Finance and Policy*, 16(2), 233-255.

Beard, J. J., Hsu, J., Ewing, M., & Godfrey, K. E. (2019). Studying the relationships between the number of APs, AP performance, and college outcomes. *Educational Measurement: Issues and Practice*, 38(4), 42-54.

Conger, D., Kennedy, A. I., Long, M. C., & McGhee, R. (2021). The effect of Advanced Placement science on students' skills, confidence, and stress. *Journal of Human Resources*, 56(1), 93-124.

2. Owen, S. (2023). The Advanced Placement Program and Educational Inequality. EdWorkingPaper: 23-738. Retrieved from Annenberg Institute at Brown University: <https://doi.org/10.26300/g1eb-vz54>

3. Fazlul, I., Jones, T., & Smith, J. (2021). College Credit on the Table? Advanced Placement Course and Exam Taking. *Economics of Education Review*, 84, 102155.

4. These standardized test scores include come from the Georgia Milestones End-of-Grade exams, and for older cohorts, the CRCT (Criterion-Referenced Competency Tests).

5. Students can and do switch high schools. Students are assigned to the high school in which they are enrolled the longest. We also exclude students assigned to three high schools that were either established in the middle of the analysis period or are specialty schools that do not typically offer any AP courses.

6. We note that students cannot practically take 33 AP courses; however, this analytical strategy provides more detailed views at the course and high-school levels.

7. We do not observe AP exam taking for those who do not take the AP course in the 2016-2019 cohorts. But we assess that issue in the 2011-15 cohorts where 18.7% of AP exam-takers did not take the AP course. Appendix Table 2 shows that these students are more likely to be Asian students, students identified as gifted, and students not eligible for free and reduced-price meals. This implies that our results on disparities by student subgroups are likely to be underestimates.

8. Appendix Table 6 shows the main statistics for the 2011–15 cohorts inclusive of AP exam-takers who did not take the corresponding AP course. Results suggest that not observing such students in the 2016–19 cohorts does not meaningfully change our results.

9. Appendix Tables 4, 5, and beyond show additional statistics that rely on these predictions. For example, the fraction of students who are predicted to score a 3 or higher among non-exam takers who took the course.

About the Authors

Michael D. Bloem

Michael D. Bloem was a graduate research assistant with the Georgia Policy Labs. He received his Ph.D. in economics from Georgia State University. He holds a bachelor's degree in economics from Calvin College and a master's degree in public policy from the Gerald R. Ford School of Public Policy at the University of Michigan. His research areas of interest lie broadly in applied microeconomics, the economics of education, and public policy.



Thomas Goldring

Thomas Goldring is the director of research at the Georgia Policy Labs. He supports the faculty directors in managing research projects and providing analytical and technical support across GPL's three components. His research focuses on K–12 education, including educational accountability, school finance, and graduation rates; early childhood education; career and technical education; post-secondary education; and education and mortality. He received his doctorate in public policy and management from Carnegie Mellon University and completed a post-doctoral fellowship at the University of Michigan.



Monica Mogollon Plazas

Monica Mogollon Plazas is senior research associate at the Georgia Policy Labs. Her research interests are in the economics of education and public economics. Specifically, her research has looked at the long-term outcomes of postsecondary education, social safety nets programs, and behavioral interventions improving public sector management. Before joining GPL, she worked as a research fellow at the World Bank Group, Development Impact Evaluation Unit. She received her Ph.D. in economics from Rutgers University, and she holds an M.A. and B.A. degree from the National University of Colombia.



Jonathan Smith

Jonathan Smith is an associate professor of economics at Georgia State University and a faculty fellow with the Georgia Policy Labs. His research focuses on the behavioral and institutional factors that determine how students transition from high school to college and the consequences of those decisions. Prior to joining Georgia State University, he worked as a policy research scientist at the College Board. He received his Ph.D. in economics from Boston University and a B.A. in economics from Tufts University.



About the Georgia Policy Labs

The Georgia Policy Labs is an interdisciplinary research center that drives policy and programmatic decisions that lift children, students, and families—especially those experiencing vulnerabilities. We produce evidence and actionable insights to realize the safety, capability, and economic security of every child, young adult, and family in Georgia by leveraging the power of data. We work alongside our school district and state agency partners to magnify their research capabilities and focus on their greatest areas of need. Our work reveals how policies and programs can be modified so that every child, student, and family can thrive.

Housed in the Andrew Young School of Policy Studies at Georgia State University, we have three components: the Metro Atlanta Policy Lab for Education (metro-Atlanta K–12 public education), the Child & Family Policy Lab (supporting children, families, and students through a cross-agency approach), and the Career & Technical Education Policy Exchange (a multi-state consortium exploring high-school based career and technical education).

Learn more at gpl.gsu.edu.