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How Aligned is Career and Technical Education to Local Labor Markets?

THOMAS B. FORDHAM INSTITUTE
ADVANCING EDUCATIONAL EXCELLENCE

By Cameron Sublett and David Griffith

Foreword and Executive Summary by Amber M. Northern and Michael J. Petrilli

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Foreword and Executive Summary

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By Amber M. Northern and Michael J. Petrilli

Not long ago, the *New York Times* ran a revealing article titled "The Typical American Lives Only 18 Miles From Mom."

Based on a comprehensive survey of older Americans, the authors reported that, "Over the last few decades, Americans have become less mobile, and most adults—especially those with less education or lower incomes—do not venture far from their hometowns." In fact, "the median distance Americans live from their mother is 18 miles, and only 20 percent live more than a couple of hours' drive from their parents."[1]

The implications they drew from that compelling statistic focused on child and elder care. But there's a big message for education, too: If young people aren't going far from home, then their hometowns need to do far better at readying them to succeed at local colleges and in careers. Which makes it more important than ever that high school career and technical education (CTE) programs mesh with real-world job opportunities in their own and nearby communities. Yet no study to our knowledge has empirically examined the extent to which that message has been heard—that is, the degree to which CTE course-taking in high school aligns with the kinds of work available in local labor markets.

It's not because the field thinks that's unimportant. In fact, the recent reauthorization of the Carl D. Perkins Career and Technical Education Act—the principal federal education program supporting CTE—expressly aims to "align workforce skills with labor market needs."[2] But it does little to define or operationalize such alignment. Likewise, a recent report by ExcelinEd admonishes states to phase out "dead end" CTE programs that "do not reflect labor market demand" and "develop new programs of study to address gaps in industry demand."[3]

"So we embarked on finding out—that is, to determine whether students in high school CTE programs are more likely to take courses in in-demand and/or high-wage industries, both nationally and locally."

But broad goals and exhortation won't get it done, and forging better connections is hard when you don't know what those gaps in industry demand look like.

So we embarked on finding out—that is, to determine whether students in high school CTE programs are more likely to take courses in in-demand and/or high-wage industries, both nationally and locally. Reliably answering those questions, however, meant connecting *multiple* dots. In particular, it meant mapping the zillion different CTE courses offered in U.S. high schools first to their associated "career clusters" then to real-world occupations, as categorized by the Bureau of Labor Statistics.[4]

Those dots, to the best of our knowledge, have never been joined before—and we knew it wouldn't be easy. Fortunately, Cameron Sublett, associate professor of education at Pepperdine University, was undeterred. Having previously examined the link between high school CTE course-taking and postsecondary credentials, Dr. Sublett was keen to see whether that same course-taking might relate to local labor market demand.

Fordham's uber-talented senior research and policy associate, David Griffith, agreed to co-write the report with him.

After much troubleshooting, Dr. Sublett succeeded in linking nationally representative data on CTE course-taking from the High School Longitudinal Survey to employment data from the Bureau of Labor Statistics, making it possible to address these central research questions:

- To what extent do *national* CTE course-taking patterns at the high school level reflect the current distribution of jobs across fields and industries?
- To what extent is CTE course-taking in high school linked to *local* employment and industry wages?
- How do patterns of CTE course-taking differ by student race and gender?

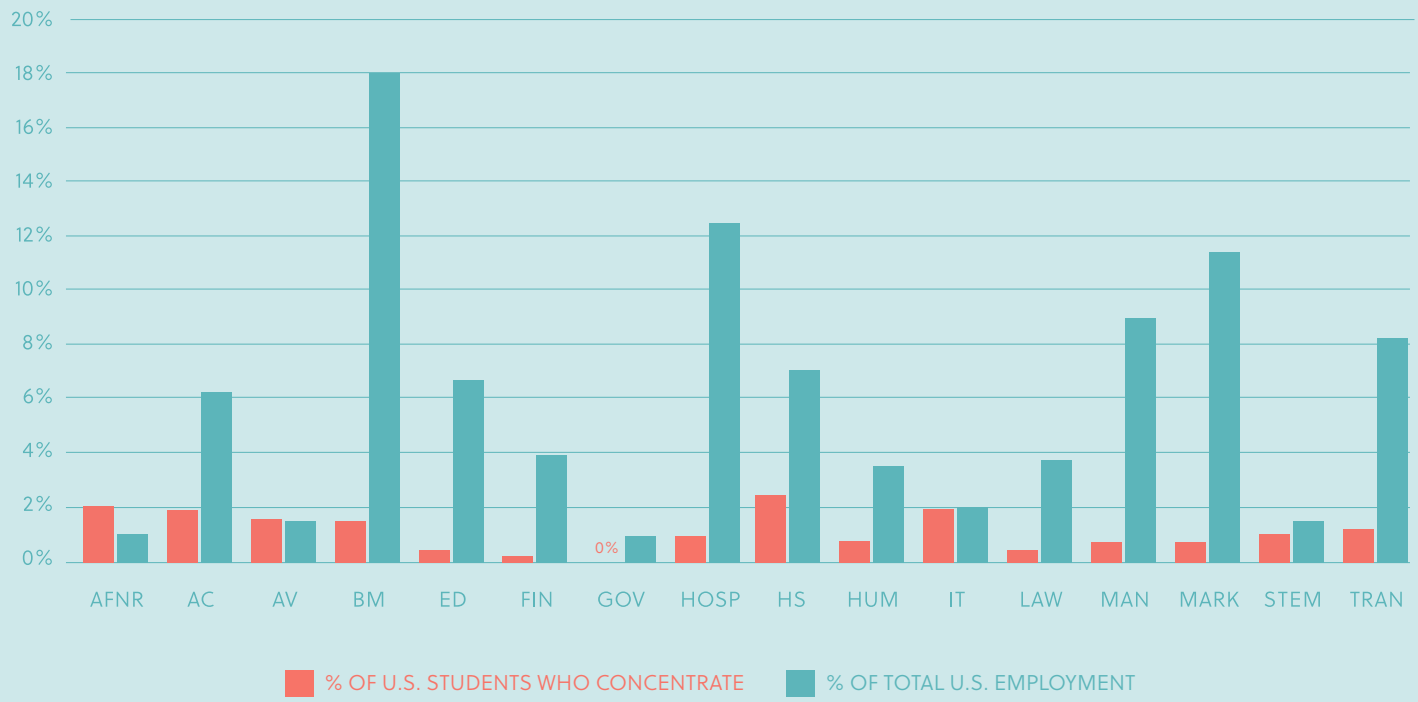
The analysis yielded four key findings.

1. Many fields that support a significant number of U.S. jobs see little CTE course-taking in high school.

Over half the jobs in the U.S. are in four fields: Business Management & Administration (18.0 percent); Hospitality & Tourism (12.5 percent); Marketing (11.6 percent); and Manufacturing (8.9 percent). Yet, collectively, these fields account for only a quarter of CTE course-taking and concentrations.[5]

There is no evident relationship between the proportion of total CTE course-taking or concentrations for which a field accounts and its national employment share. And because only 15.5 percent of U.S. students concentrate in *any* CTE cluster, the concentration rates for most fields are *much* lower than their share of employment. For example, almost no students concentrate in Marketing. In fact, of the sixteen CTE fields, only two—Agriculture, Food & Natural Resources, and Arts, A/V Technology & Communications—have concentration rates that exceed their national employment shares (Figure ES-1).

FIGURE ES-1 **Only two fields have concentration rates that exceed their national employment shares.**



AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

2. In most fields, students take more related CTE courses when there are more *local* jobs.

In contrast to the mismatch between CTE course-taking and *national* labor market demand, many fields exhibit a positive relationship between a specific industry's *local* employment share and a student's probability of taking related coursework.

For example, a 1 percentage point increase in the Information Technology (IT) sector's local employment share is associated with a 10.2 percentage point increase in a student's probability of taking at least one IT course. Similarly, a 1 percentage point increase in employment in Arts, A/V Technology and Communications is associated with a 14.8 percentage point increase in a student's probability of taking related coursework (Figure ES-2).

3. In most fields, students also take *fewer* CTE courses when *local* wages are higher.

Somewhat counterintuitively, in most fields, CTE course-taking is negatively correlated with local wages. In other words, students are actually *less* likely to take related CTE courses when local industry wages are higher—perhaps because CTE is not connecting them with the highest paying jobs within those industries.

For example, a $1,000 increase in local IT wages is associated with a 13.6 percentage point *decrease* in the probability that a student will take one or more IT courses. Similarly, a $1,000 increase in local Arts, A/V Technology & Communications wages is associated with a 14 percentage point *decrease* in the probability that a student will take one or more courses in this field. The two exceptions to this rule are Architecture & Construction and Health Science, wherein a $1,000 increase in local wages is associated with 2.3 and 0.7 percentage point *increases*, respectively, in the probability of taking related coursework (Figure ES-3).

FIGURE ES-2 **In most fields, students are more likely to take related CTE coursework when there are more local jobs.**

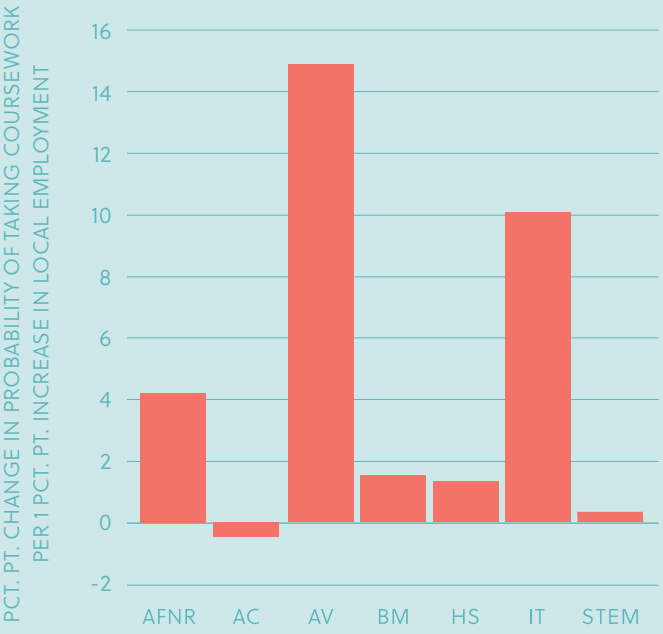
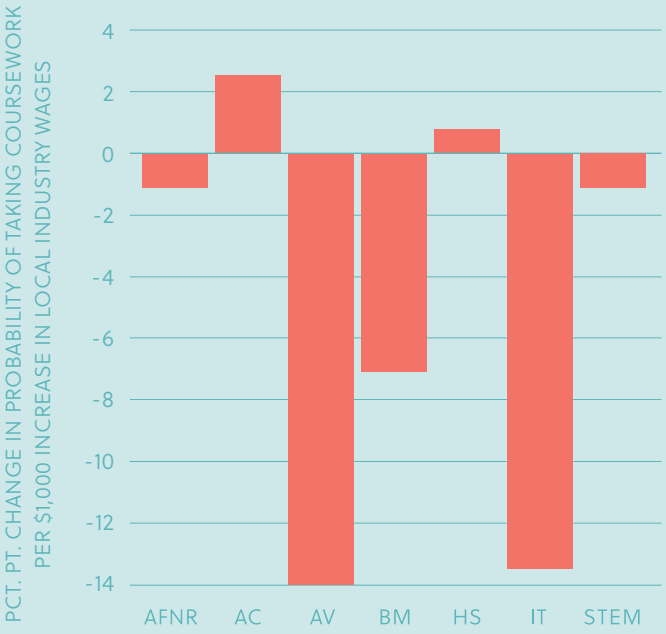


FIGURE ES-3 **In most fields, students are less likely to take related CTE coursework when local industry wages are higher.**



*Because some CTE clusters have very low participation rates, our exploration of local course-taking patterns is limited to the seven clusters with enough data to facilitate a meaningful analysis.

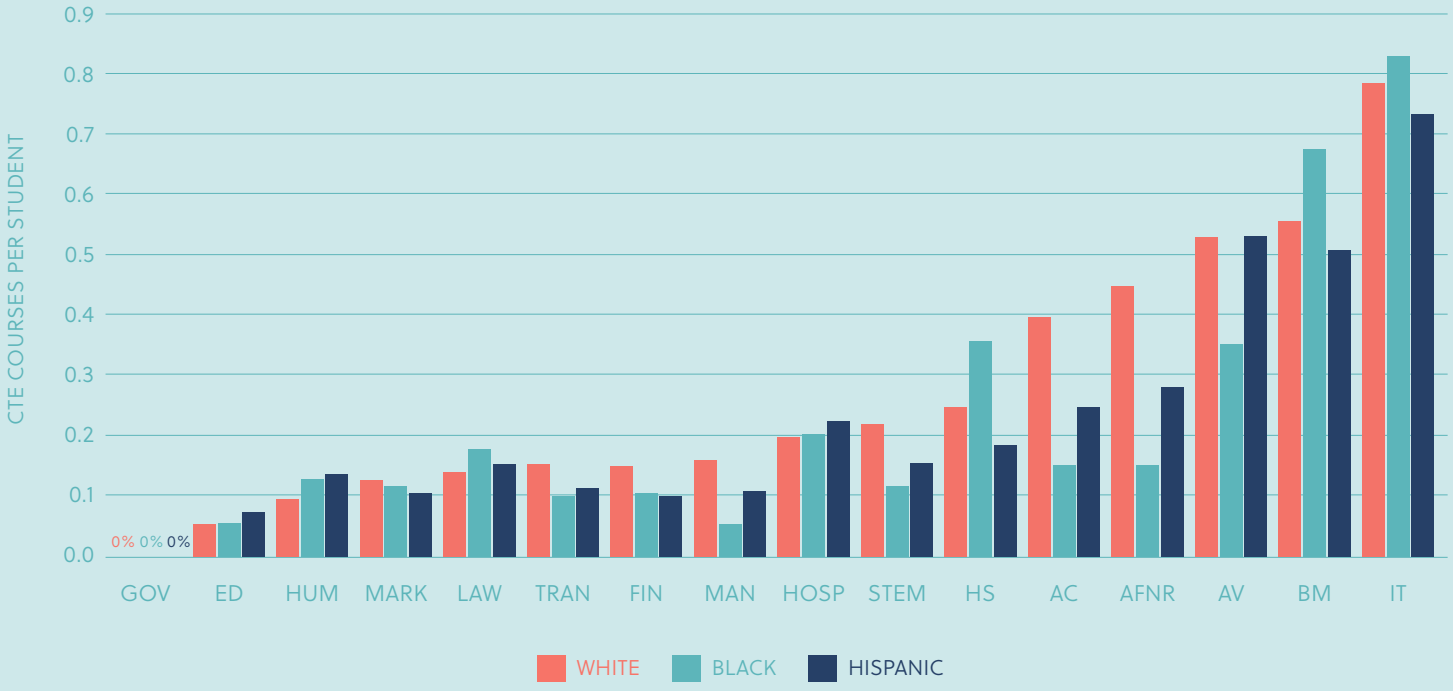
4. Although national CTE course-taking patterns differ significantly by race and gender, all student groups exhibit similar responses to local labor market demand.

Male and female students exhibit strikingly different patterns of CTE course-taking at the national level. For example, male students take *far* more courses in STEM; Manufacturing; Architecture & Construction; and Transportation, Distribution & Logistics. Conversely, female students take significantly more courses in Health Science; Human Services; Education & Training; and Arts, A/V Technology & Communications.

National CTE course-taking patterns also differ by race. For example, roughly 18 percent of white students concentrate in *any* CTE field—versus 15 percent of black students and 13 percent of Hispanic students. Yet black students take a disproportionate number of courses in high-paying paying fields like Health Science and IT, while substantially larger numbers of white students are taking coursework in the low-paying Agriculture, Food & Natural Resources field, where there may not be enough jobs to go around (Figure ES-4).

Despite these differences, there is no evidence that students respond differently to the demands of the local labor market—that is, to local variation in employment or wages—based on their race or gender. In other words, all students are *more* likely to take CTE coursework in fields that support more local jobs but *less* likely to do so when those jobs pay a higher wage. Finally, there are no significant differences (descriptive or otherwise) between the CTE course-taking patterns exhibited by poor versus non-poor students.

FIGURE ES-4 **White and Hispanic students take more courses in STEM and Agriculture, Food & Natural Resources, while black students take more courses in Health Science and IT (among other differences).**



"Since most students who don't attend four year colleges will stay close to home, it's critical that CTE course-taking match local labor market opportunities. The good news is that this appears to be happening to some extent in most of the ten regions we studied; the bad news is that those same regions see little CTE activity in many high demand fields."

Based on these findings, Sublett and Griffith conclude that there is significant potential for greater alignment in most fields, especially because only one in six high school students concentrates in *any* CTE field. However, this discussion is complicated by the inherent complexity of alignment and the fact that the results for course-taking and concentrations do not mirror one another. Moreover, some fields and careers rely much more heavily than others on postsecondary training.[6]

The authors also note that, although historical inequities persist, there is no evidence of "tracking" students of color into lower-paying professions. Still, the national data suggest that we have a long way to go when it comes to encouraging girls to enter fields like IT; STEM; and Business Management & Administration.

Findings from the ten metro areas were also of interest to us, and are a decidedly mixed bag overall. Since most students who don't attend four-year colleges will stay close to home, it's critical that CTE course-taking match local labor market opportunities. The good news is that this appears to be happening to some extent in most of the ten regions we studied; the bad news is that those same regions see little CTE activity in many high-demand fields.

Take Atlanta. Of the four industries that comprise the majority of jobs there, only one—Business Management & Administration—sees a significant level of CTE course-taking. In contrast, few students concentrate in Marketing or Transportation, Distribution & Logistics, despite the large number of jobs they support. And even fewer focus on higher wage opportunities in Architecture & Construction (including the building trades), which might offer a practical route to employment for some CTE students.

Similarly, consider Chicago, where two industries—IT and STEM—account for almost one third of CTE concentrations in high school, but just 3 percent of local jobs. Once again, of the four large industries that support the majority of jobs in the Windy City—Business Management & Administration; Hospitality & Tourism; Marketing; and Manufacturing—only the first sees meaningful levels of CTE course-taking.

"[W]e are not suggesting that high school CTE courses should bear the full burden of connecting students to the local job market—or even that today's local job market should govern what kids study in preparation for tomorrow's careers."

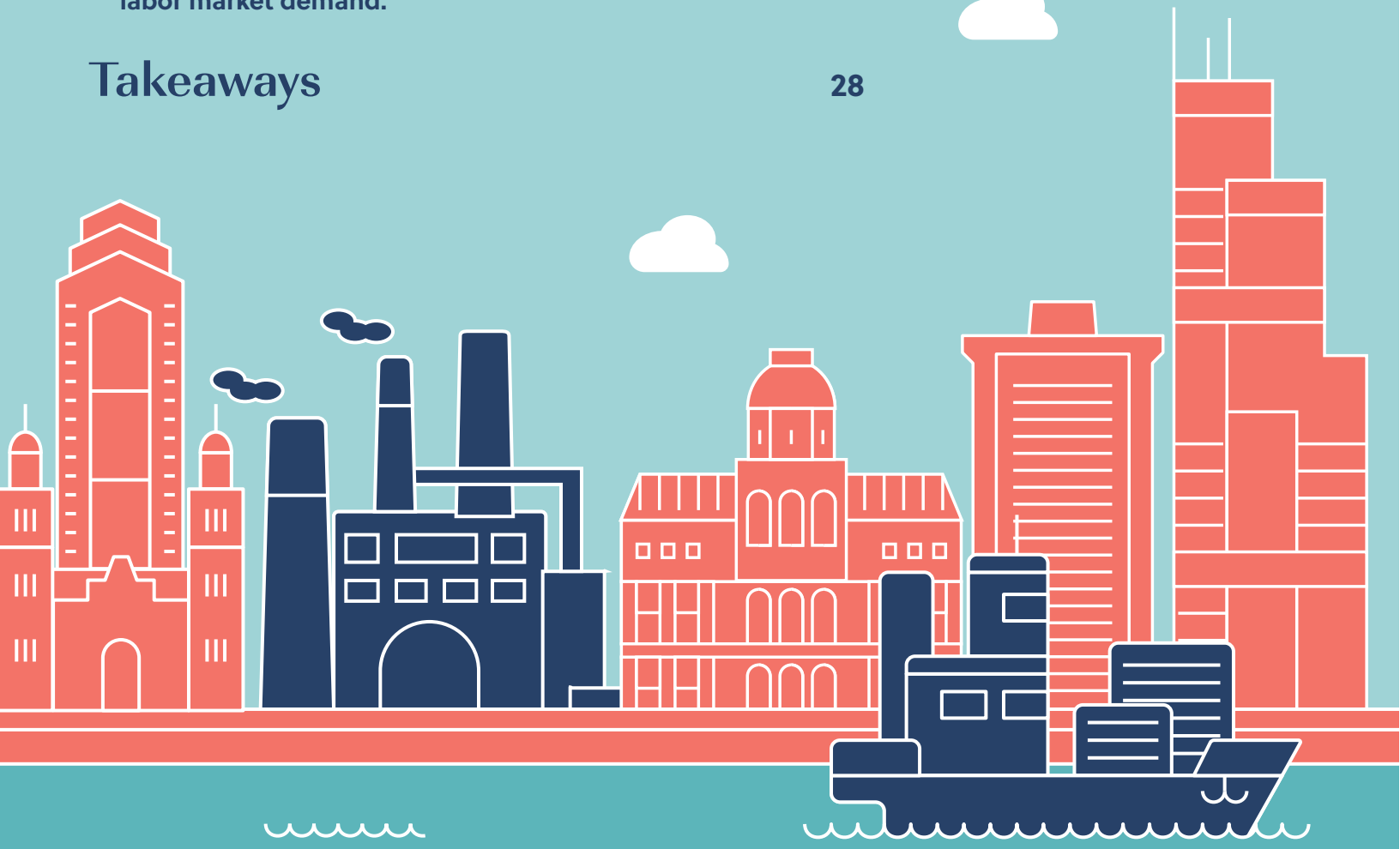
So what's the bottom line? On the one hand, these results show that CTE programs need to do a better job of connecting students with *higher-paying* jobs. As recent research from the Brookings Institution and others finds, different sectors of the economy have vastly different opportunities for the kind of good jobs that allow people to make it into the middle class, especially in the absence of a college degree.[7] But we also have a hard time finding fault with students taking CTE courses in industries that support *more* local jobs, even if they earn lower wages; any job is better than no job for young people just getting started.

Regardless of how you view that trade-off, we are not suggesting that high school CTE courses should bear the full burden of connecting students to the local job market—or even that *today's* local job market should govern what kids study in preparation for tomorrow's careers.

What we *are* suggesting—and what these results show—is that the country needs the local business, industrial, and secondary and postsecondary education sectors to join hands. At the top of their to-do list should be better integration of what is taught in high school CTE programs with the skills, knowledge, and positions needed in local labor markets, both now and in the future—perhaps through more paid work apprenticeships and "sector strategies" that incorporate high school CTE into employer-driven partnerships that focus on regional, industry-specific needs.[8]

In a handful of cities, such as Louisville and Nashville, industry and education leaders are already collaborating to make that vision a reality for their students.[9] For the sake of all of the young Americans who will live no more than eighteen miles from mom, we hope that more communities follow in their footsteps.

Part 1



Overview

Career and technical education (CTE) is enjoying renewed attention from policymakers and practitioners as part of the shift from "college for all" to "readiness for college and career." And despite the shameful history of tracking low-income and minority students[10] into low-paying jobs through "vocational education" programs, today's high school CTE is critical to the success of that new mission. Unlike its predecessors, contemporary CTE aspires to be academic *and* vocational by preparing a wide swath of students for the twenty-first-century job market. And in fact, almost 90 percent of today's high school students take at least one CTE course.[11]

In recent years, mounting interest in CTE has been accompanied by a wave of empirical research linking CTE participation to a range of positive educational and labor market outcomes.[12] (See *What do we already know about high school CTE?*) Yet the conditions under which CTE achieves those results remain poorly understood. The recent reauthorization of the Carl D. Perkins Career and Technical Education Act—the principal federal education program supporting CTE—is a potential turning point. In addition to authorizing $1 billion in annual funding, the *Strengthening Career and Technical Education for the 21st Century Act* aims to "align workforce skills with labor market needs" through a new competitive grant program.[13,14] But how aligned are existing CTE programs? And what does labor market "alignment" actually mean?

Notably, numerous studies suggest that Americans have become less mobile in recent decades. (One analysis found that the median American now lives "18 miles from mom.")[15] So arguably, it's more important than ever that high school CTE mesh with real-world job opportunities in the places where many of today's young people will live tomorrow. Yet no study has examined the extent to which that goal is being met—that is, the degree to which CTE course-taking in high school aligns with opportunities in local labor markets. (See *What does it mean for high school CTE to be "aligned" with labor market demand?*)

Accordingly, this study addresses the following research questions:

1. **To what extent do national CTE course-taking patterns—at the high school level—reflect the current distribution of jobs across fields and industries?**
2. **To what extent is CTE course-taking in high school linked to local employment and industry wages?**
3. **How do patterns of CTE course-taking differ by student race and sex?**

What do we already know about high school CTE?

Prior research has found that taking CTE courses in high school is associated with a number of positive outcomes. Specifically, students who take CTE courses are more likely to graduate high school, are more likely to enroll in and complete college, and earn significantly more after high school (even if they decide against pursuing a postsecondary degree).[16]

In a similar vein, one study also found that CTE "concentrators" (i.e., students who completed three or more courses in the same career cluster) were 50 percent likelier than non-concentrators to earn postsecondary degrees, and 43 percent likelier to earn bachelor's degrees if they completed postsecondary coursework in a related field.[17] And other studies have found that students who complete CTE courses related to science, technology, engineering, and math (STEM) are more likely to enroll in advanced STEM coursework and to major in a related field.[18]

Finally, numerous studies have documented efforts to promote labor market "alignment" through partnerships between community colleges and local employers.[19] However, to our knowledge, this study is the first to provide empirical evidence on the extent to which CTE course-taking in high school is aligned with the demands of local labor markets.

Data Sources & Methodology

Data for the current study come from two primary sources: the High School Longitudinal Study of 2009 (HSLS:2009), conducted by the National Center for Education Statistics (NCES), and the Occupational Employment Statistics (OES), published by the Bureau of Labor Statistics (BLS).

The HSLS:2009 data include information on the specific CTE courses taken by a nationally representative cohort of roughly 16,500 students who entered high school in the fall of 2009, as well as information on the demographic characteristics of those students. The OES data include information on the total number of jobs in a given occupation, as well as the average annual wages for said occupation by metropolitan statistical area (MSA)—a geographic unit defined by the United States Office of Management and Budget.

To link these data sets, we had to overcome two challenges:

First, the HSLS:2009 data only include the NCES code of each student's school, so we had to link them to the Common Core of Data (CCD) maintained by NCES to determine the geographic location of each school—and from there, the specific MSA in which it was located.

Second, the U.S. Department of Education (DOE) has organized CTE into sixteen career clusters and over seventy career pathways, which states and localities use to organize their curricula. (See *The Sixteen Career Clusters.*)[20] However, BLS uses the federal Standard Occupational Classification (SOC) System, which divides a total of 459 "occupations" into 98 "minor groups" and 23 "major groups." To overcome this challenge, we used a crosswalk published by the National Research Center for Career and Technical Education (NRCCTE) to assign each of the 459 occupations in the SOC system to one of the sixteen CTE career clusters. For example, we assigned the BLS occupation "Food Scientists and Technologists" to the "Agriculture, Food & Natural Resources" cluster.

What does it mean for high school CTE to be "aligned" with labor market demand?

For many reasons, defining labor market "alignment" is challenging—especially for high school CTE.

First, for any given student, there are actually multiple labor markets to consider, from local to national, and no two markets are exactly the same. (Though, as noted, most students will likely remain close to home.)

Second, we don't know what tomorrow's economy will look like or how far ahead today's students should be looking. So the best we can do—and the approach taken in this study—is to examine the characteristics of labor markets as they currently exist.

Third, there is no bright line between general and sector-specific training. For example, the skills students learn in a computer science course may be useful regardless of which career they pursue—or not, if, for example, they are learning an obscure coding language.

Finally, there are some inherently normative questions that are tough to resolve. For example, should we encourage or discourage course-taking in fields that support lots of local jobs but aren't well paid? And should we *really* dissuade creatively-disposed students from taking arts courses—perhaps at the expense of more lucrative pathways, like IT—because most won't become professional artists?

Taking these steps left us with a unique data panel that linked detailed high school CTE course-taking data to regional (MSA) employment and wage data for each of the sixteen CTE career clusters and each of four years (2009–2012). However, because we had one cohort of students, we examined the relationship between labor market demand and *total* course-taking and concentrations over all four years of high school rather than looking at changes over time.

More specifically, nationally and for each of the 215 MSAs in the sample, we determined:

1. the average number of courses that students took in each of the sixteen CTE career clusters;
2. the percentage of jobs associated with each of the sixteen clusters, and
3. the average annual wages (weighted by employment) in each cluster.

We used these data to examine the relationship between CTE course-taking and concentrations and local labor market demand using a series of linear probability models.[20] (See Findings 2 and 3.) These models estimate the association between higher industry wages or local employment and the probability of CTE course-taking or concentration in a given field while holding other important variables constant.[21]

Specifically, the models control for:

- Gender;
- Race;
- The student's cumulative high school GPA;
- Credits earned in advanced/enriched coursework;
- A standardized measure of school engagement;[22]
- U.S. Census region (Northeast, South, Midwest, West);
- Rates of BA attainment within a student's home state;
- Whether a student was below the 2008 Census Bureau poverty level;
- Whether a student had a parent who worked in a given CTE cluster;

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market alignment. For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

- Whether a student was disabled, i.e., had an Individualized Education Program (IEP);
- Whether a student experienced a "dropout event" (defined as an unexcused stoppage of high school attendance for a period of four weeks or more);
- Whether a student completed dual-enrollment coursework; and
- Whether a student planned to attend a four-year postsecondary institution after high school.

The models also control for between-school differences using school fixed effects, which is important because the school a student attends has the potential to affect the courses they do and do not take. (See *Limitations.*)

Because some CTE clusters have very low participation rates, our inferential analysis of CTE course-taking patterns across the 215 MSAs in our sample is limited to the seven clusters where enough data exist to facilitate a meaningful analysis:

1. Agriculture, Food & Natural Resources;
2. Architecture & Construction;
3. Arts, A/V Technology & Communications;
4. Business Management & Administration;
5. Health Science;
6. Information Technology (IT); and
7. Science, Technology, Engineering & Mathematics (STEM).

That means we had to omit the following clusters:

8. Education & Training;
9. Finance,
10. Government & Public Administration;
11. Hospitality & Tourism;
12. Human Services;
13. Law, Public Safety, Corrections & Security;
14. Manufacturing;
15. Marketing; and
16. Transportation, Distribution & Logistics.

Limitations

Although our analysis is strengthened by the use of nationally representative data and a rich set of statistical controls, it has important limitations.

First, although we controlled for a host of student and school-level variables that are plausibly related to CTE participation, it was impossible to account for every potentially explanatory factor– and in particular, for factors we did not observe (e.g., local culture or economic trends). Consequently, the associations between CTE course-taking and labor market characteristics uncovered in this study should not be viewed as causal.

Second, although NCES employed a rigorous sampling methodology to arrive at a representative sample of high school students, it is still possible that–due to sampling error–our results do not generalize to the full population of U.S. high school students. We sought to address this challenge by including the appropriate panel weights supplied by NCES in all of our descriptive and regression analyses.

Finally, although considerable effort has been devoted to standardizing how CTE courses are classified, the content of similarly labeled and classified courses likely varies by jurisdiction and location. And there is also variation in the way states define CTE concentration, with a few states requiring two courses rather than three courses (which is the definition we use in this report).

Unfortunately, most individual MSAs don't have enough sampled students in HSLS:2009 to make generating descriptive statistics a meaningful exercise. However, in some cases—mostly in larger urban MSAs—enough students were sampled to permit a rough portrait.

Consequently, descriptive profiles of the following ten MSAs are included in *Part 2, Local Profiles*:

1. Atlanta-Sandy Springs-Marietta, GA
2. Boston-Cambridge-Quincy, MA-NH
3. Chicago-Joliet-Naperville, IL-IN-WI
4. Detroit-Warren-Livonia, MI
5. Houston-Sugar Land-Baytown, TX
6. Indianapolis-Carmel, IN
7. Los Angeles-Long Beach-Santa Ana, CA
8. New York-Northern New Jersey-Long Island, NY-NJ-PA
9. Phoenix-Mesa-Scottsdale, AZ
10. Seattle-Tacoma-Bellevue, WA

Due to the small number of observations in each MSA, readers should interpret these profiles with caution. And local stakeholders should be sure to gather more detailed information about which courses students are taking before making programmatic changes.

Note also that we use "local" data in two very different ways: First, to examine the relationship between local labor market demand and CTE course-taking *across* all of the 215 MSAs in our sample (in Findings 2 and 3). And second, to descriptively profile a handful of *individual* MSAs (in *Part 2*). Because these are fundamentally different uses of "local" data, it does not make sense to compare these two sets of results to one another. (See the *Appendix* and report page on fordhaminstitute.org for more on the methodology.)[23]

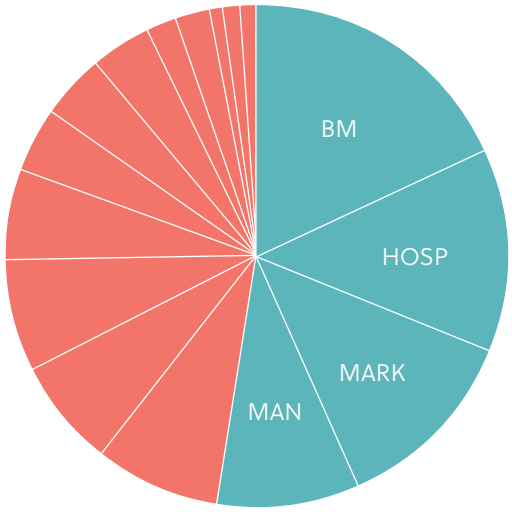
Findings

FINDING ONE: Many fields that support a significant number of U.S. jobs see little CTE course-taking.

Over half of the jobs in the U.S. are in four fields: Business Management & Administration (18.0 percent); Hospitality & Tourism (12.5 percent); Marketing (11.6 percent); and Manufacturing (8.9 percent). (See Figure 1.) Yet, collectively, these fields account for just one-quarter of CTE course-taking and one-fifth of concentrations.

In contrast, the four most popular fields in terms of the total number of CTE courses taken are IT (19.3 percent); Business Management & Administration (14.0 percent); Arts, A/V Technology & Communications (12.4 percent); and Agriculture, Food, & Natural Resources (8.7 percent). (See *The Curious Case of Information Technology*.) Collectively, these fields account for over half of CTE course-taking and two-fifths of concentrations (see Figures 2 and 3). Yet they account for just one-quarter of total U.S. employment.

FIGURE 1 **Half of the jobs in the U.S. are in one of four fields.***



BM	**18.0%**
HOSP	**12.5%**
MARK	**11.6%**
MAN	**8.9%**
TRAN	8.2%
HS	7.2%
ED	6.8%
AC	6.2%
FIN	3.9%
LAW	3.7%
HUM	3.4%
IT	2.0%
STEM	1.5%
AV	1.4%
AFNR	1.0%
GOV	0.8%

*Individual percentages may not sum to 100 percent due to inconsistent reporting for some BLS occupations.

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
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GOV	Government & Public Administration
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HOSP	Hospitality & Tourism
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IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
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MARK	Marketing
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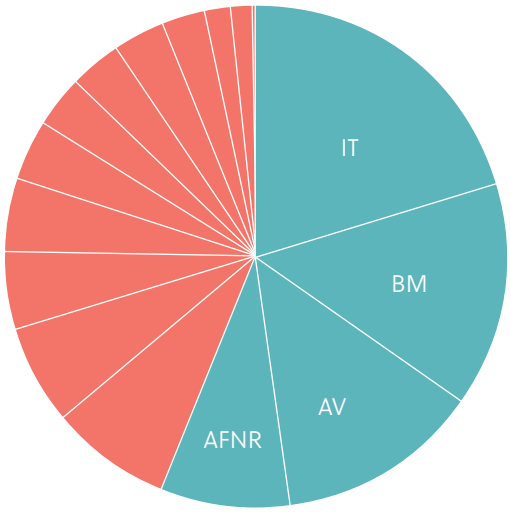
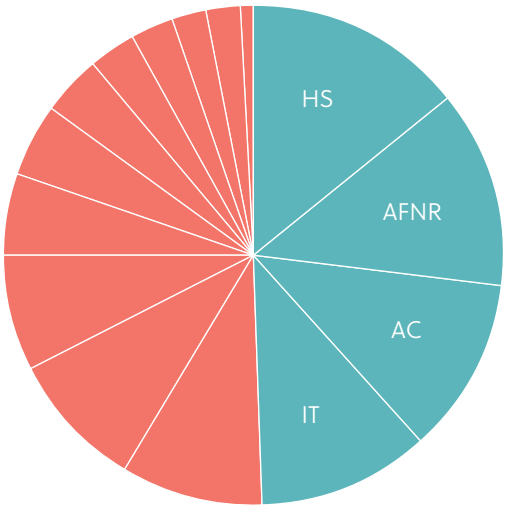
FIGURE 2 **Nationally, four fields account for over half of CTE course-taking.**



IT	19.3%
BM	14.0%
AV	12.4%
AFNR	8.7%
AC	7.9%
HS	7.0%
HOSP	5.1%
STEM	4.7%
LAW	3.7%
TRAN	3.4%
FIN	3.3%
MAN	3.3%
MARK	3.0%
HUM	2.7%
ED	1.5%
GOV	0.1%

FIGURE 3 **Four fields account for approximately half of CTE concentrations.**



HS	14.4%
AFNR	12.8%
AC	11.3%
IT	11.2%
AV	9.0%
BM	8.9%
TRAN	7.5%
HOSP	5.2%
STEM	4.8%
HUM	4.0%
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LAW	2.2%
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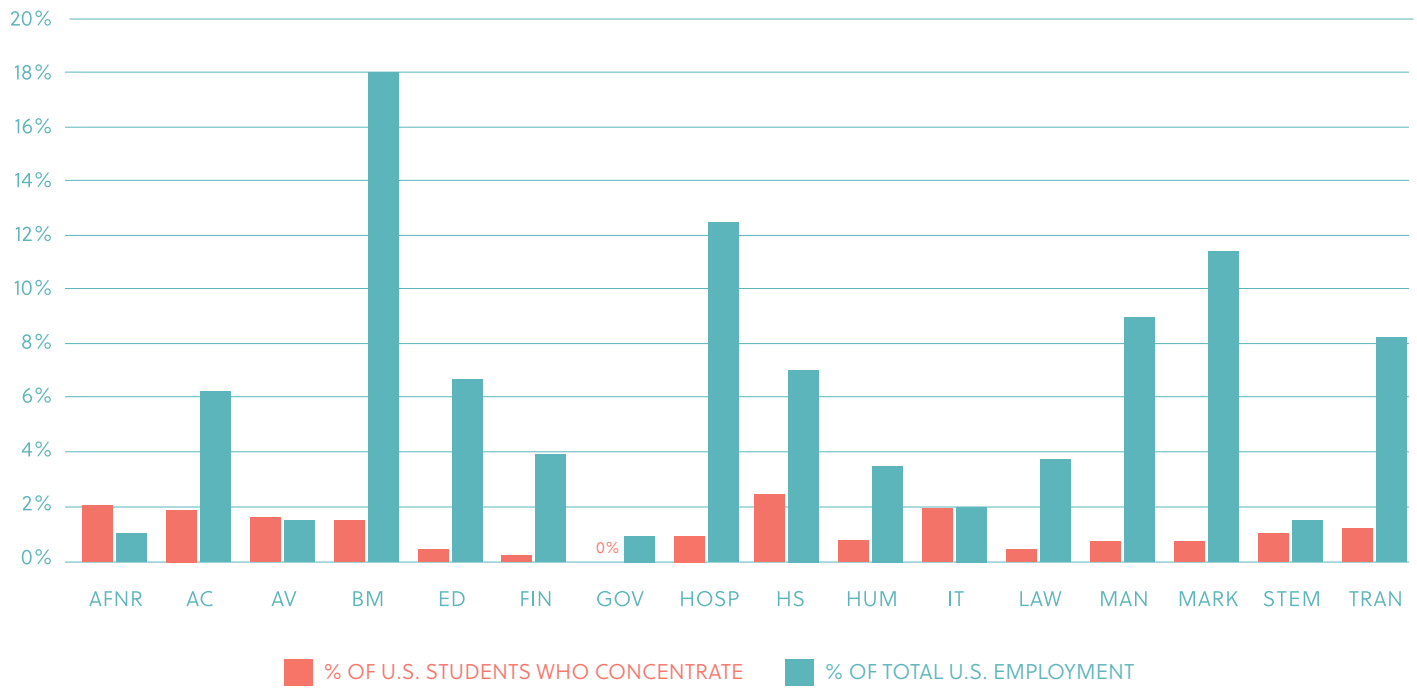
As these numbers suggest, there is no obvious relationship between the proportion of total CTE course-taking or concentrations a field accounts for and its national employment share. And because only 15.5 percent of U.S. students concentrate in *any* CTE cluster, most fields have concentration rates that are lower than their employment shares—even if they account for a significant share of total CTE concentrations. For example, only 2.4 percent of high school students concentrate in Health Science, which accounts for 7.2 percent of total U.S. employment. And almost no students concentrate in Marketing, which accounts for 11.6 percent. In fact, of the sixteen CTE fields, only two—Agriculture, Food & Natural Resources and Arts, A/V Technology & Communications—have concentration rates that exceed their employment shares (see Figure 4).

Obviously, many jobs in these fields require a bachelor's degree or higher—but plenty of jobs don't. So it's possible that a significant number of high school students are missing out on promising career opportunities by not concentrating in these fields.

FIGURE 4 **Only two fields have concentration rates that exceed their national employment shares.**



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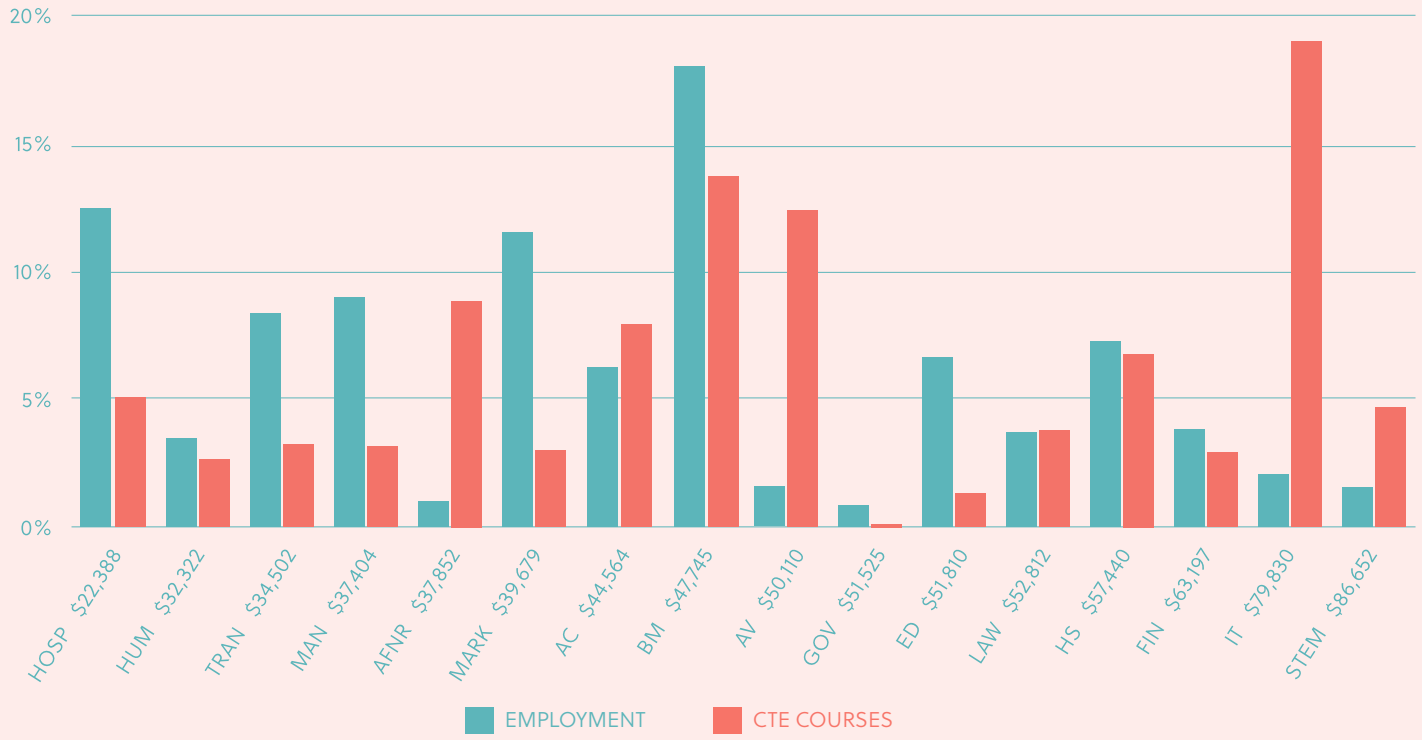
The Curious Case of Information Technology

As shown in Figure 5, despite accounting for just 2 percent of U.S. employment, the high-paying IT field accounts for almost a fifth of CTE course-taking. However, because of the unique characteristics of this field, it's not clear how seriously we should take this pattern: Are students who take IT courses really angling for a job at Google or Facebook? Or are the IT courses that are officially classified as "CTE" really just a part of general education?

Notably, the Education Commission of the States reports that twenty states allow students to apply specific computer science courses toward their math or science graduation requirements, meaning they view them as suitable replacements for traditional core courses. Furthermore, the titles of the most popular IT courses suggest their educational purposes are general. For example, "Computer and Information Technology" and "Computer Applications" account for 53 percent of IT course-taking. And when "Introduction to Computer Technology" and "Web Design" are included, that figure rises to 70 percent.

In short, because computers have transformed society so radically, it is probably a mistake to think of most IT course-taking as a form of industry-specific CTE. Thus, our IT estimates should be interpreted with caution.

FIGURE 5 **Nationally, students take a disproportionate number of CTE courses in IT.**



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FINDING TWO: In general, students take more CTE courses in fields that support more local jobs.

As indicated, there may be some mismatch between CTE course-taking and national labor market demand. Yet in many fields, there is nevertheless a significant and positive relationship between a specific industry's *local* employment share and the probability that a student takes related coursework.

For example, a 1 percentage point increase in the IT sector's local employment share is associated with a 10.2 percentage point increase in the probability that a student takes one or more IT courses *(see The Curious Case of Information Technology)*. Similarly, a 1 percentage point increase in the Arts, A/V Technology & Communications sector's share of employment is associated with a 14.8 percentage point increase in a student's probability of taking one or more Arts, A/V Technology & Communications courses. Among the seven fields we examined, the only exception to this rule is Architecture & Construction, where a 1 percentage point increase in local employment is associated with a 0.3 percentage point *decrease* in the probability of taking related coursework (see Figure 6).

Less encouragingly, local employment is significantly and positively associated with a student's probability of "concentrating" in just two of the fields that we examined: Specifically, a 1 percentage point increase in Agriculture, Food & Natural Resources employment is associated with a 0.3 percentage point increase in a student's probability of concentrating in that field, while a similar increase in local STEM employment is associated with an even smaller increase. However, there is a significant negative relationship between local IT employment and concentrations (despite the positive relationship we observe for course-taking). And there is no significant relationship between local employment and a student's probability of concentrating in the other four fields we examined (see Figure 7).

FIGURE 6 **In most fields, students are more likely to take related CTE coursework when there are more local jobs.**

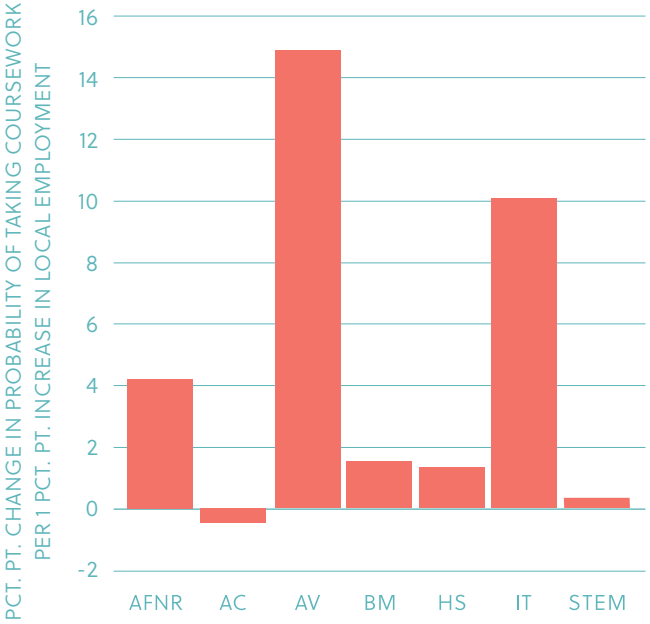
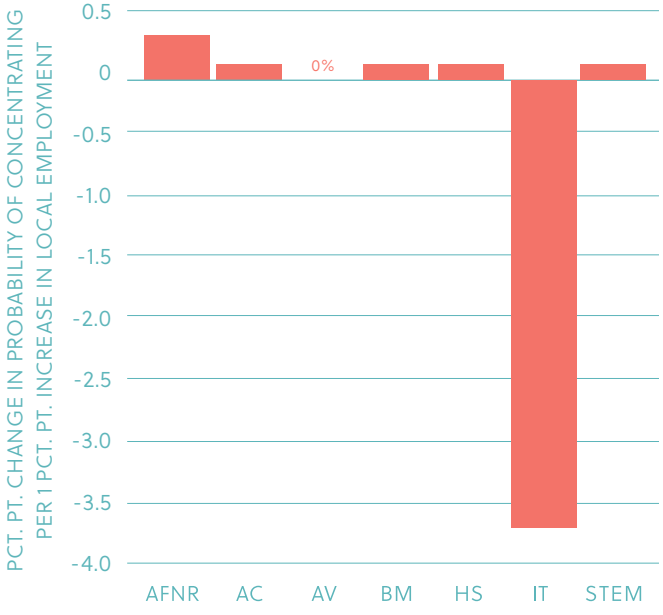


FIGURE 7 **In most fields, there is no clear link between local employment and a student's likelihood of concentrating.**



*Because some CTE clusters have very low participation rates, our exploration of local course-taking patterns is limited to the seven clusters with enough data to facilitate a meaningful analysis.

FINDING THREE: In most fields, students take *fewer* CTE courses when local wages are higher.

In most fields, CTE course-taking is negatively correlated with local wages. In other words, students are actually *less* likely to take CTE courses when local industry wages are higher.[25]

For example, a $1,000 increase in local Arts, A/V Technology & Communications wages is associated with a 14 percentage point *decrease* in the probability that a student will take one or more Arts, A/V Technology & Communications courses. Similarly, a $1,000 increase in local IT wages is associated with a 13.6 percentage point *decrease* in the probability that a student will take one or more courses in this field. The only exceptions to this rule are Architecture & Construction, where a $1,000 increase in local wages is associated with a 2.3 percentage point *increase* in the probability of taking related coursework, and Health Science, where a similar wage increase is associated with a 0.7 percentage point increase in the probability of course-taking (see Figure 8).

Once again, it is not clear that the pattern we observe for course-taking also holds for concentrations. For example, a $1,000 increase in local Health Science wages is associated with a 0.2 percentage point decrease in the local concentration rate for this field. And a similar increase in Agriculture, Food & Natural Resources wages is associated with a 0.1 percentage point decrease in that field's concentration rate. However, there is a significant positive relationship between IT wages and concentrations (despite the negative relationship we observe for course-taking). And there is no statistically significant relationship between local wages and concentration rates in the other four fields we examined (see Figure 9).

FIGURE 8 **In most fields, students are less likely to take related CTE coursework when local industry wages are higher.**

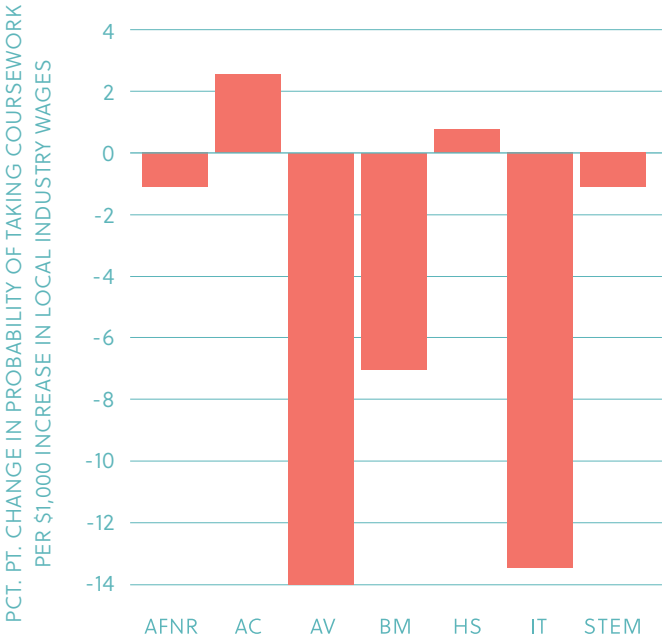
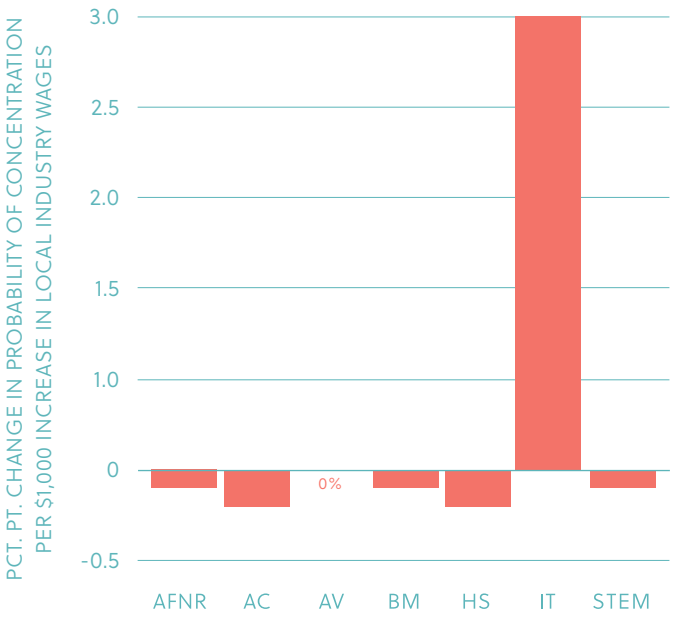


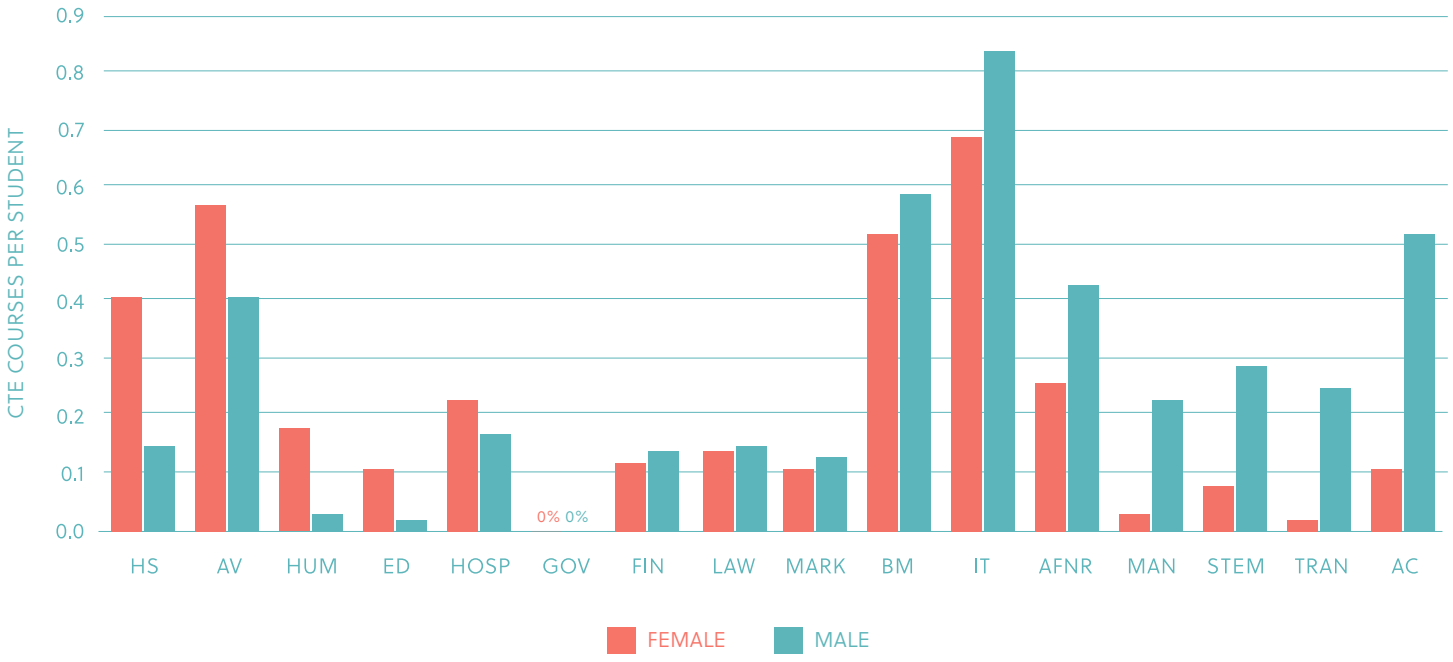
FIGURE 9 **In most fields, there is no clear link between local industry wages and a student's likelihood of concentrating.**



FINDING FOUR: Although national CTE course-taking patterns differ significantly by race and gender, all student groups exhibit similar responses to local labor market demand.

At a purely descriptive level, male and female students exhibit strikingly different patterns of CTE course-taking at the national level. For example, male students take *far* more courses in STEM; Manufacturing; Architecture & Construction; and Transportation, Distribution & Logistics (see Figure 10). And conversely, female students take significantly more courses in Health Science; Human Services; Education & Training; and Arts, A/V Technology & Communications.

FIGURE 10 **Female students take more courses in Health Science and Human Services, while male students take more courses in IT, STEM, and Architecture & Construction.**



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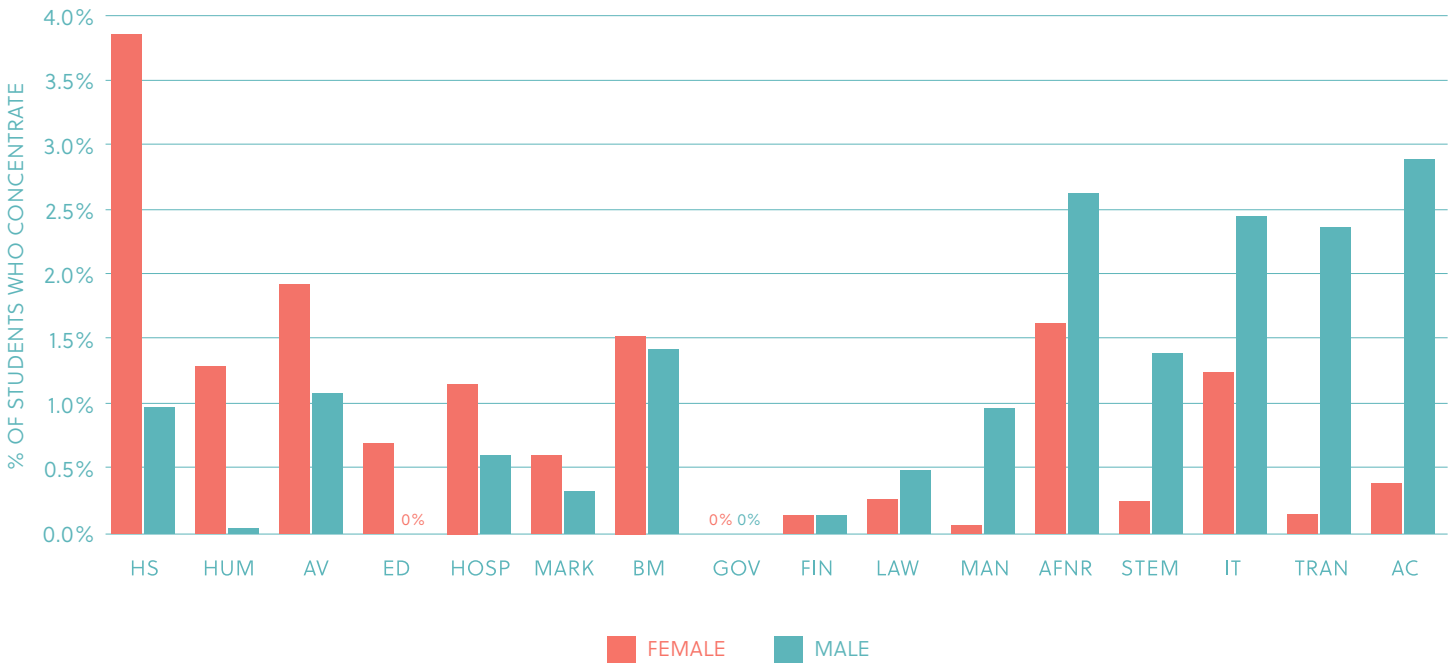
This pattern is, if anything, clearer for concentrations, where large (and depressingly familiar) gender gaps remain in several fields (see Figure 11). For example, male students are six times more likely to concentrate in STEM than female students and almost twice as likely to concentrate in IT.

FIGURE 11 **Female students are more likely to concentrate in Health Science and Human Services, while male students are more likely to concentrate in IT, STEM, and Architecture & Construction.**



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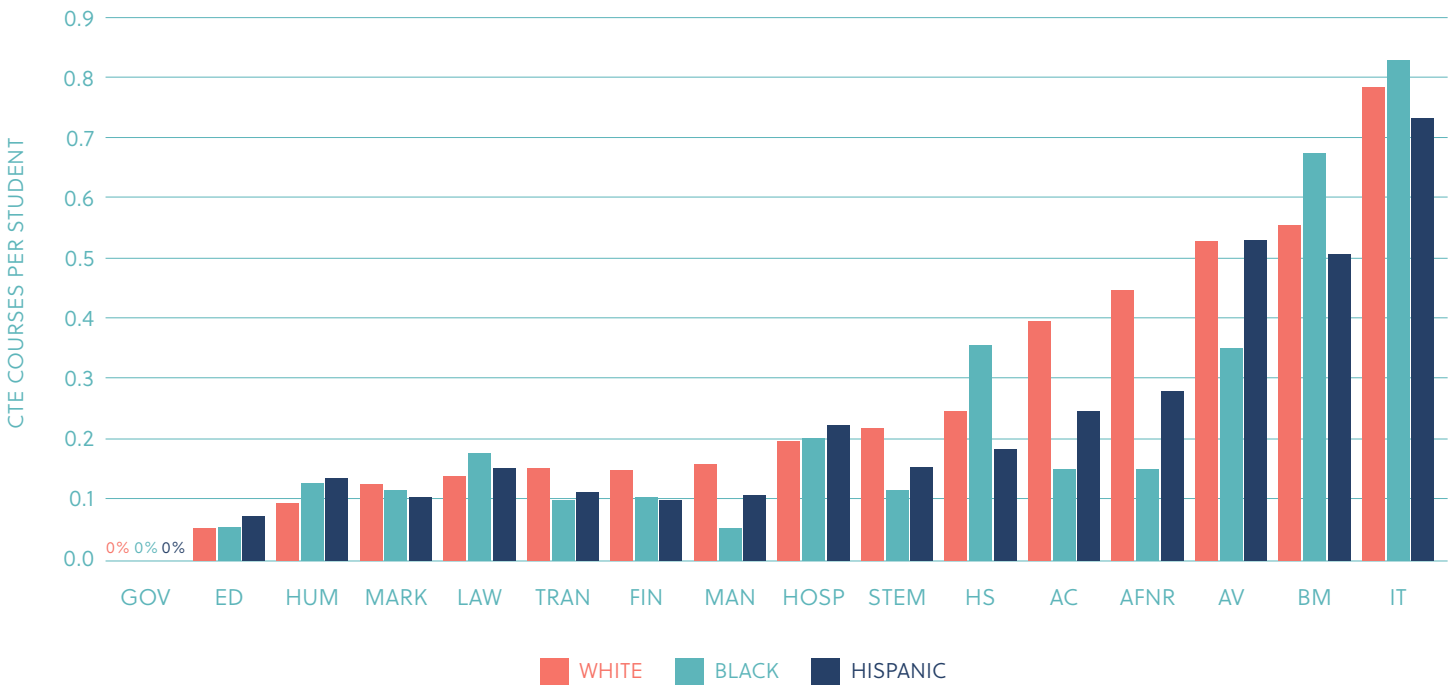
National CTE course-taking patterns also differ by race, though less dramatically than by gender (see Figure 12). For example, white and Hispanic students take more courses in STEM; Architecture & Construction; Agriculture, Food & Natural Resources; and Arts, A/V Technology & Communications, while black students take more courses in Health Science and Business Management & Administration.

FIGURE 12 **White, black, and Hispanic students exhibit different patterns of CTE course-taking.**



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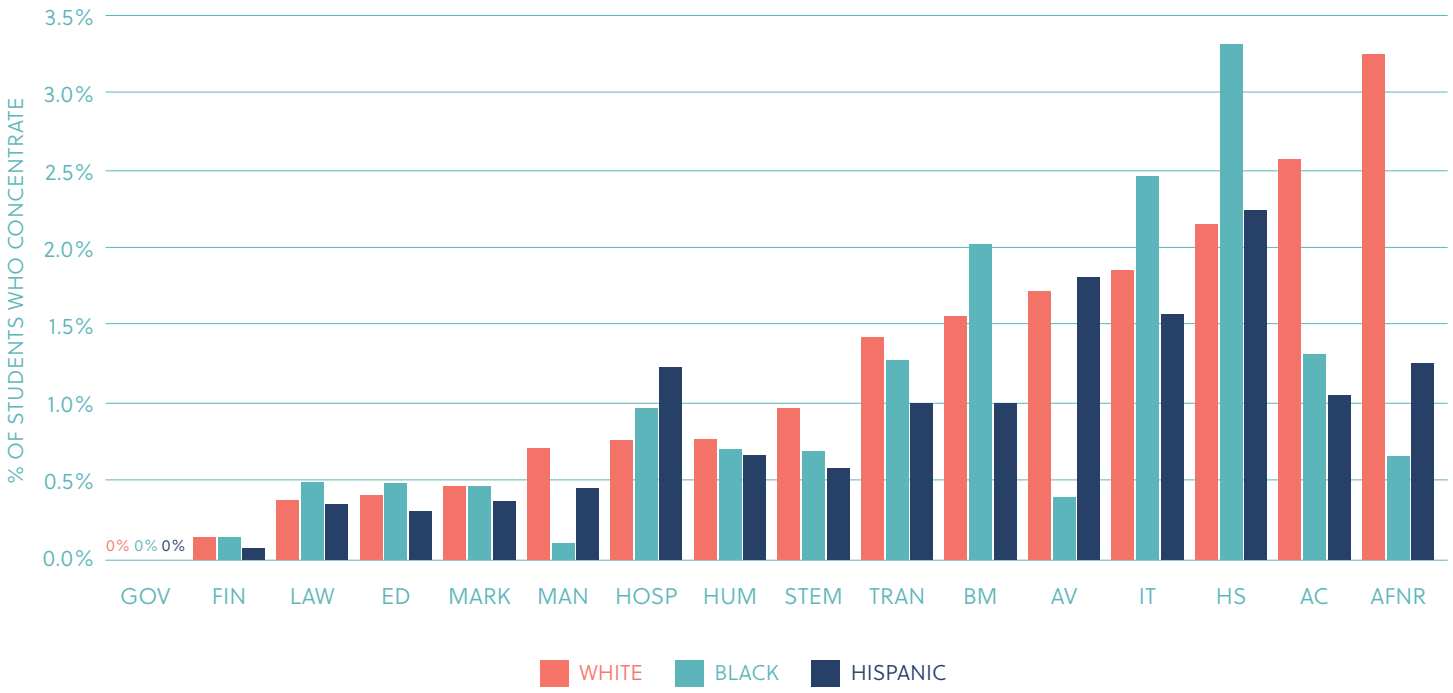
Once again, the differences between groups are clearer for concentrations than for course-taking (see Figure 13). For example, compared to other groups, white students are more likely to concentrate in Agriculture, Food & Natural Resources, as well as Architecture & Construction, while black students are more likely to concentrate in IT; Health Science; and Business Management & Administration (though some of these differences are not statistically significant at conventional levels).

FIGURE 13 **White, black, and Hispanic students exhibit different patterns of CTE concentration.**



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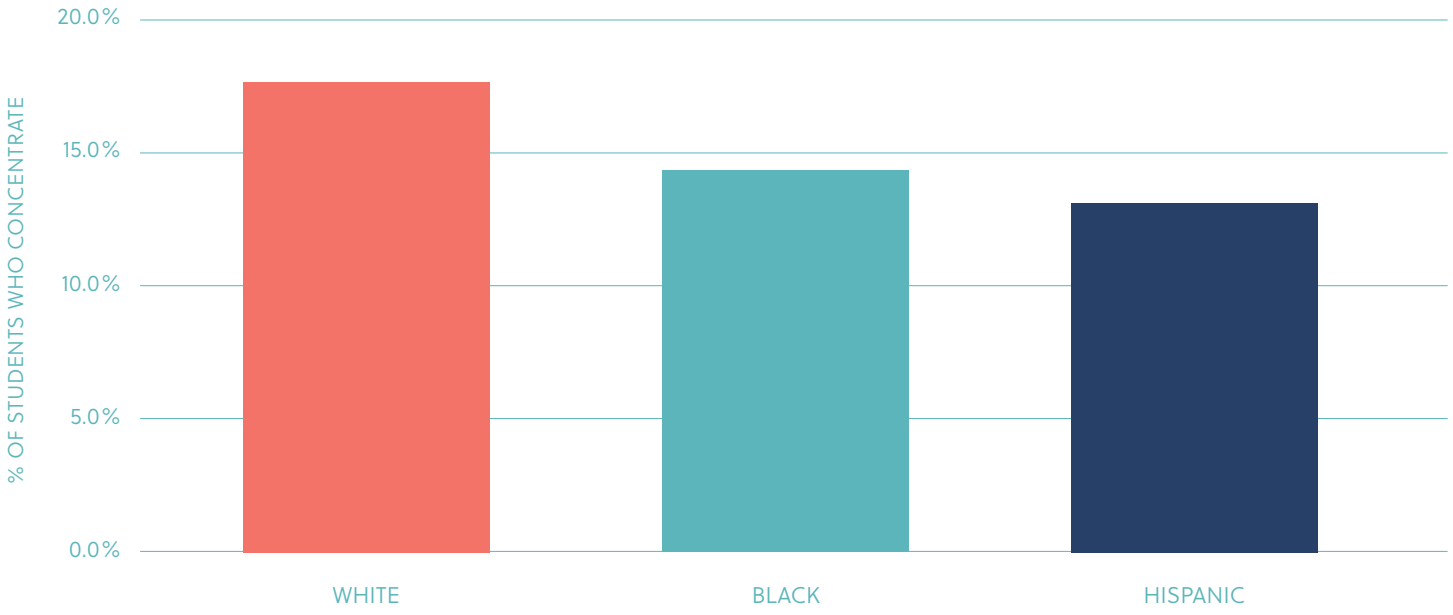
Notably, 17.7 percent of white students concentrate in any CTE field—versus 14.8 percent of black students and 13.1 percent of Hispanic students (see Figure 14). Yet black students are at least as likely to concentrate in high-paying paying fields like Health Science and IT. Meanwhile, substantially larger numbers of white students are now taking coursework in the low-paying Agriculture, Food & Natural Resources field, where it's not clear that there are enough jobs to go around.

FIGURE 14 **White students are somewhat more likely to concentrate in CTE than black and Hispanic students.**



Importantly, despite the descriptive differences highlighted in this section, there is no evidence that male and female students have systematically different responses to local labor market demand—that is, to local variation in employment or wages. Nor is there any consistent evidence that white students respond differently than black or Hispanic students, or that poor students respond differently than non-poor students. In other words, regardless of their race, gender, or poverty status, high school students are (in general) more likely to take CTE coursework in fields that support more local jobs but less likely to do so when those jobs pay a higher wage.

Takeaways

Our findings raise as many questions as answers.

But in our view, they suggest at least five takeaways...

1. There is significant potential for greater alignment in most fields.

Because only one in six high school students concentrates in *any* CTE field, there is significant potential for greater alignment in most fields, both nationally and in particular locations. For example, only 2.4 percent of high school students concentrate in Health Science, which accounts for 7.2 percent of employment. And less than one percent of students concentrate in Marketing, which accounts for 11.6 percent.

Obviously, those figures don't necessarily mean that twelve times as many high school students should concentrate in Marketing. Still, most high school graduates *don't* go on to earn a postsecondary degree.[26] And many young people struggle to find employment after graduating high school (especially in low-income communities). So it would be helpful if we could point more of them in the right direction—or at least, *a* right direction—before they enter the labor market.

---

2. At least some local labor market alignment is occurring, though it's not clear why.

On the one hand, the fact that students are more likely to take at least *one* course in fields where there are more local jobs suggests that *some* local labor market alignment is occurring. But on the other hand, this pattern seems to be weaker for concentrations, which are probably a better indicator of the kind of alignment that policymakers and other stakeholders have in mind.

Regardless, since it's impossible to identify the specific causal mechanisms that explain the relationships we observe, it's difficult to recommend that policymakers take a specific course of action to encourage greater alignment. In particular, we simply don't know if teenagers are responding to changes in the local labor market, or if state and local policymakers are making a conscious effort to promote CTE in the fields that support the most local jobs. And conversely, we don't know if misalignment (or if you prefer, less than optimal alignment) is driven by the decisions students are making, or by other factors, such as the kinds of courses that are or aren't offered at the schools they attend. We hope future work can help disentangle these factors, with the goal of understanding how adult behavior can promote greater alignment.

3. To truly move beyond the legacy of yesterday's vocational education, today's CTE needs to connect more students with higher-paying jobs.

Contrary to the aspirations of most CTE advocates, our analysis suggests that high school students are actually more likely to take related CTE coursework when local industry wages are lower (though again, this pattern doesn't hold as clearly for concentrations, which are a stronger indicator of deliberate course-taking behavior). In other words, it appears that CTE is connecting students with jobs that are locally plentiful (per the previous takeaway) but relatively low-paying by industry standards.

Regardless, a negative relationship between wages and CTE shouldn't be too surprising. After all, one of the primary purposes of high school CTE is to provide students who may not earn another degree with specialized training (preferably in a field that is in demand). And on average, jobs that require no more than a high school degree pay less than those that require some form of postsecondary education. So if nothing else, perhaps our results will help promote a broader dialogue about the trade-offs involved in CTE—and, hopefully, encourage further reforms that make it a more reliable pathway to postsecondary training.

4. Some historical inequities persist, but there is no evidence of "tracking."

Encouragingly, our results suggest that the practice of "tracking" students of color into lower-paying and often menial professions may be a thing of the past (though, to be clear, they don't *prove* this). Perhaps most notably, white students are now more likely to participate in CTE than black students. Yet black students are at least as likely to concentrate in IT, which is the second highest-paying field. Furthermore, despite the negative relationship between local industry wages and CTE course-taking, there is no evidence that this relationship is any *more* negative for black or Hispanic students.

Less encouragingly, however, the same national data that suggest rather modest racial differences also suggest that we have a long way to go when it comes to encouraging girls to enter fields like IT; STEM; and Business Management & Administration (and also, perhaps, when it comes to encouraging more boys to consider Human Services and Health Science). These strikingly large differences between male and female participation and concentration rates merit further discussion.

5. The CTE community needs a clearer definition of alignment.

As this study demonstrates, defining labor market alignment is more complicated than it seems. And, of course, if alignment is elusive, then so is "misalignment." For example, it seems obvious that the U.S. needs more healthcare workers moving forward. But without much more detailed information about the specific positions that need filling and the types of degrees or training those positions require, we can't say definitively that the measly 2.4 percent concentration rate for Health Science is evidence of misalignment.

Despite the attention it has attracted in recent years, critical questions remain about the fundamental purpose (or purposes) of high school CTE. For example, many states now recognize CTE courses in graduation requirements, suggesting that they serve some general educational purpose.[27] Yet other stakeholders still maintain that CTE is best viewed as specialized preparation for students who may not earn a four-year degree.

Even that dichotomy is an oversimplification, but the point is this: We won't achieve greater "alignment" between labor market demand and high school CTE until we've figured out which of its competing purposes to prioritize.

LET'S GET THE CONVERSATION STARTED.

Part 2

City Profiles*

*Data in the profiles are descriptive and do not reflect statistically significant differences or controls of any kind.

Atlanta

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
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Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the Atlanta metropolitan area.[1]

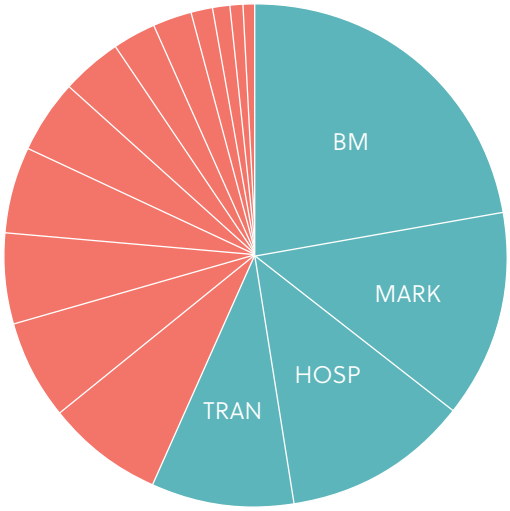
Given the number of local jobs they support, higher-paying career clusters account for a disproportionate share of Atlanta CTE. For example, three such clusters—IT; Business Management & Administration; and Arts, A/V Technology & Communications—account for almost half of CTE course-taking. And IT and Business Management & Administration also account for a large share of CTE concentrations. However, almost no Atlanta students take courses in low-wage clusters such as Human Services and Architecture & Construction.

Of the four clusters that support the majority of Atlanta jobs, only one—Business Management & Administration—sees a meaningful level of CTE course-taking. In contrast, few students concentrate in Marketing and Transportation, Distribution & Logistics, despite the number of jobs they support. And even fewer focus on higher wage opportunities in Architecture & Construction, which might offer a practical route to employment for many CTE students.

Leaders in education and workforce development in the Atlanta region should consider how more students might be encouraged to focus on underserved fields with strong current and future job prospects.

FIGURE 1 Employment in Atlanta

Currently, more than half of the jobs in the Atlanta metropolitan area are in four industries: Business Management & Administration; Marketing; Hospitality & Tourism; and Transportation, Distribution & Logistics. Compared to the rest of the U.S., Atlanta has an unusually large Business sector, but fewer jobs in Health Science and Human Services.



BM	21.2%
MARK	12.6%
HOSP	11.3%
TRAN	8.6%
MAN	7.1%
ED	6.1%
HS	5.4%
AC	5.3%
FIN	4.4%
LAW	3.6%
IT	2.8%
HUM	2.4%
AV	1.4%
STEM	1.1%
GOV	0.8%
AFNR	0.6%

FIGURE 2 Industry wages in Atlanta versus the United States

On average, STEM and IT are the highest-paid industries in Atlanta—and the rest of the United States—while Hospitality & Tourism and Human Services are the lowest paid. Although average STEM and IT wages are slightly lower in Atlanta than in the rest of the country, the average Atlanta STEM worker still makes about $85,000, or about 1.85 times as much as the average Atlanta worker. (See Table 1 for wages.)

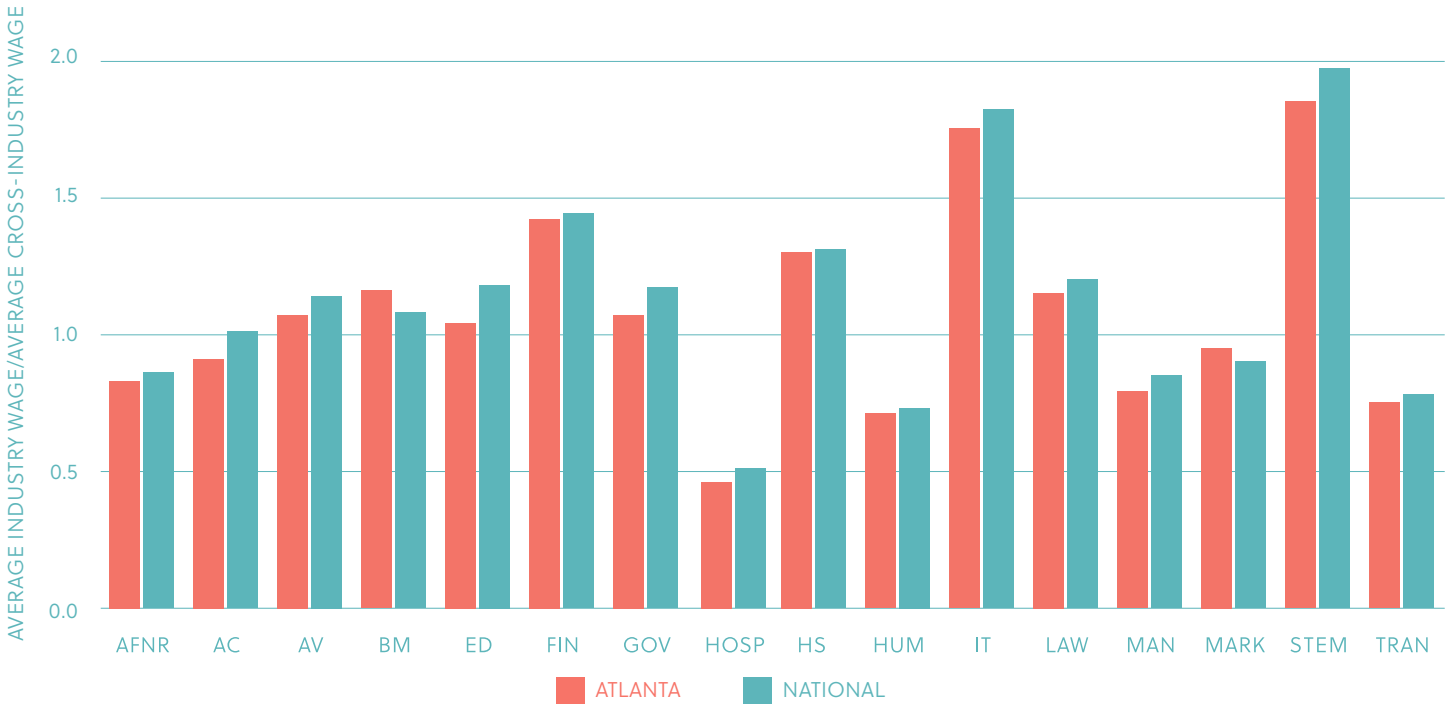
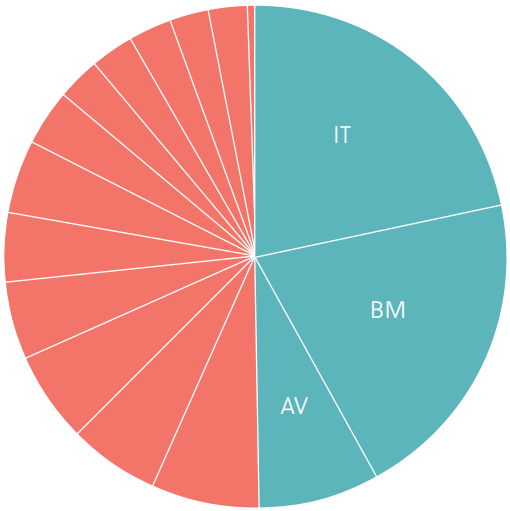


FIGURE 3 CTE course-taking in Atlanta

Roughly half of the CTE courses taken by Atlanta students are in three fields: IT; Business Management & Administration; and Arts, A/V Technology & Communications. However, almost no students take CTE courses in Government & Public Administration.



IT	21.8%
BM	20.2%
AV	8.0%
LAW	6.8%
HOSP	6.0%
HS	5.6%
AFNR	5.0%
MARK	4.6%
ED	4.5%
TRAN	3.6%
AC	3.0%
MAN	2.8%
STEM	2.6%
FIN	2.6%
HUM	2.6%
GOV	0.4%

FIGURE 4 CTE course-taking in Atlanta versus the United States

On average, Atlanta students take more courses in Business Management & Administration and IT than students in the rest of the United States—and about three times as many courses in Education & Training. However, they take fewer courses in Agriculture, Food & Natural Resources; Architecture & Construction; and Arts, A/V Technology & Communications.

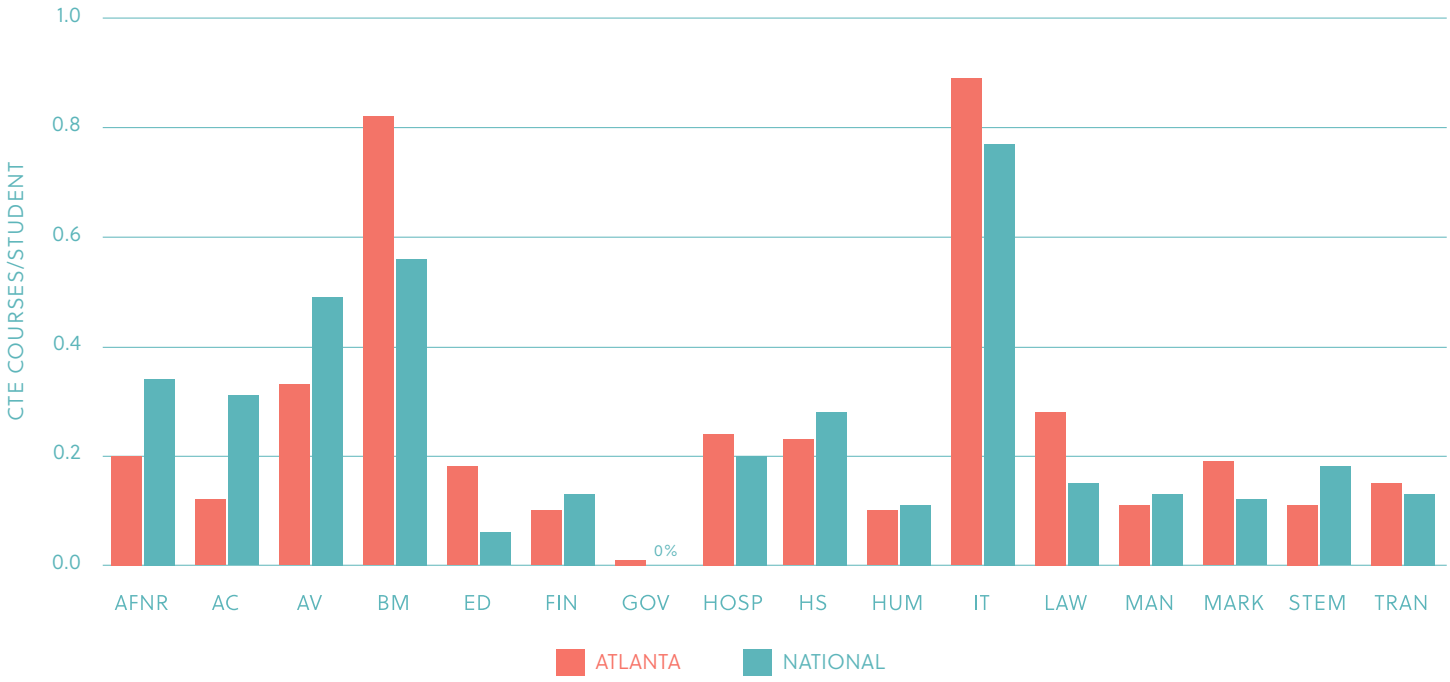
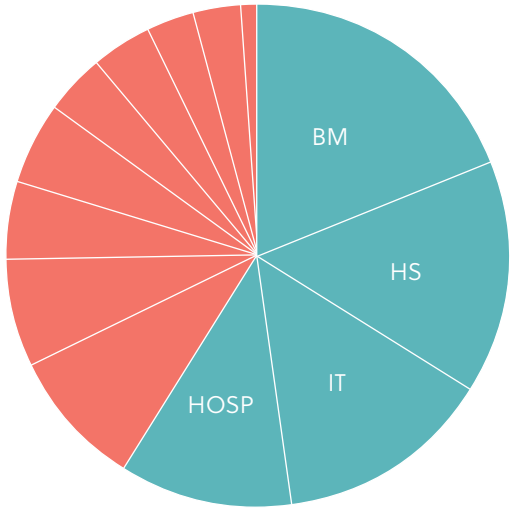


FIGURE 5 CTE concentrations in Atlanta

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

More than half of CTE concentrations in Atlanta are in four fields: Business Management & Administration; Health Science; IT; and Hospitality & Tourism.



BM	18.2%
HS	14.5%
IT	13.4%
HOSP	11.1%
TRAN	9.1%
AFNR	7.0%
AV	5.1%
MARK	4.8%
LAW	4.3%
ED	4.2%
STEM	3.5%
MAN	3.4%
AC	1.3%
FIN	0.0%
GOV	0.0%
HUM	0.0%

FIGURE 6 CTE concentrations in Atlanta versus the United States

Compared to their peers in the rest of the U.S., high school students in Atlanta are more likely to concentrate in Business Management & Administration and Hospitality & Tourism. However, they are less likely to concentrate in Architecture & Construction and Agriculture, Food & Natural Resources.

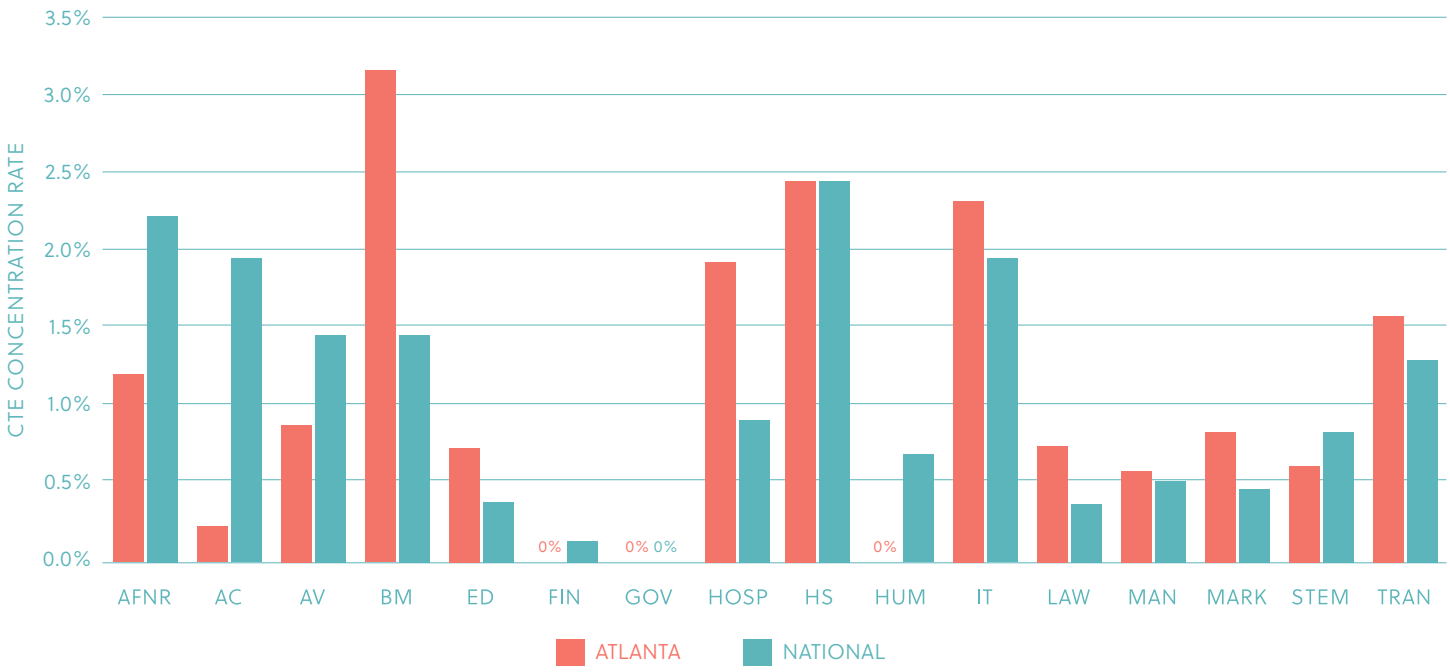
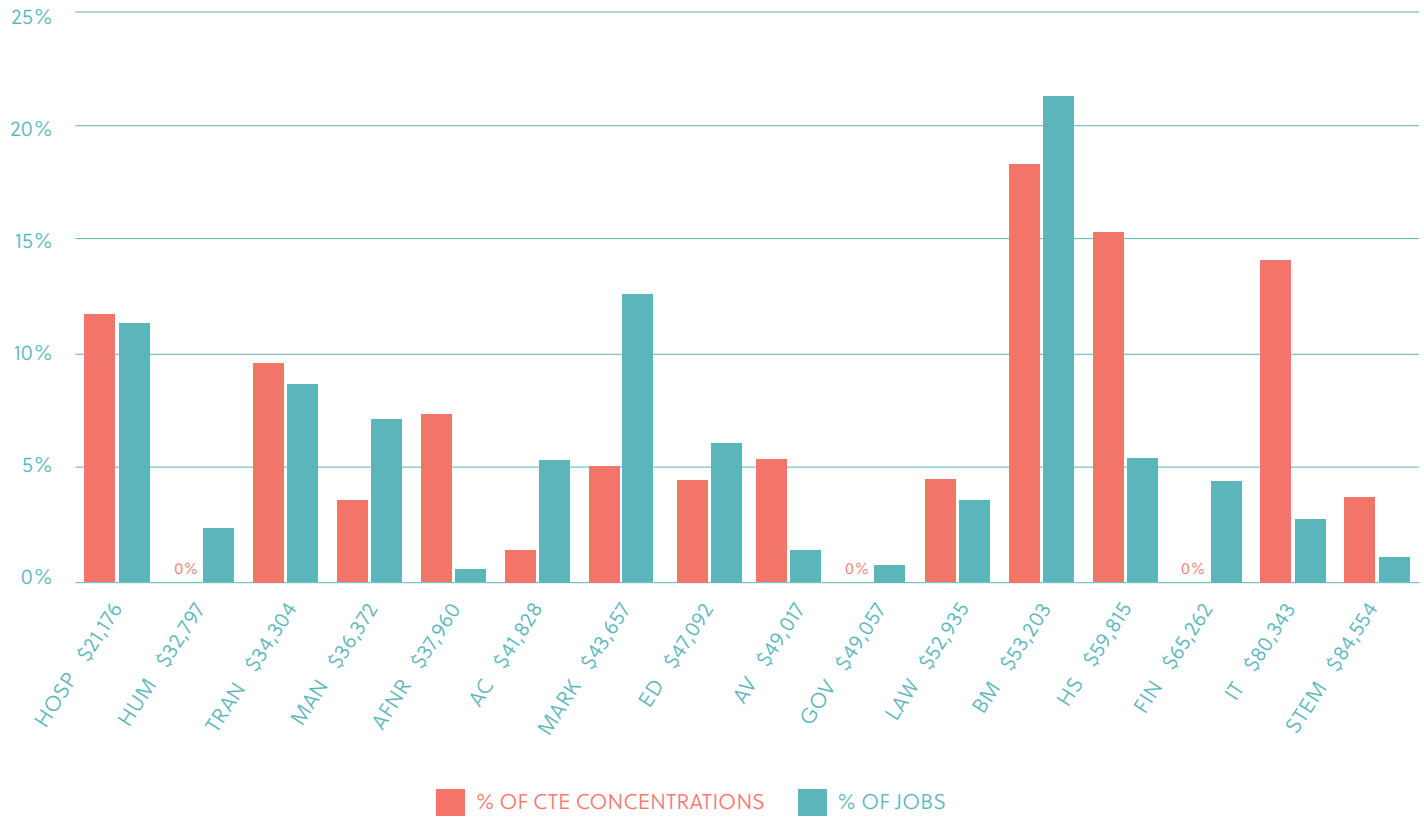


FIGURE 7 Employment and CTE concentrations in Atlanta

High school students in Atlanta are disproportionately likely to concentrate in certain fields, given the number of local jobs they support. For example, the IT and Health Science fields account for nearly one third of concentrations, but just 8 percent of local employment. And conversely, the lower-paying Marketing and Manufacturing fields account for nearly one-fifth of employment—but just 8 percent of concentrations.



1 Technically, this area comprises the metropolitan statistical area known as Atlanta-Sandy Springs-Marietta, GA. Because only 510 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Atlanta

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	ATLANTA	ATLANTA	U.S.	ATLANTA	U.S.	ATLANTA	U.S.
AFNR	12,713	0.6	1.0	37,961	37,852	0.8	0.9
AC	122,120	5.3	6.2	41,828	44,564	0.9	1.0
AV	31,688	1.4	1.4	49,017	50,110	1.1	1.1
BM	484,428	21.2	18.0	53,204	47,745	1.2	1.1
ED	138,908	6.1	6.8	47,805	51,810	1.0	1.2
FIN	101,043	4.4	3.9	65,262	63,197	1.4	1.4
GOV	17,363	0.8	0.8	49,057	51,525	1.1	1.2
HOSP	258,033	11.3	12.5	21,176	22,388	0.5	0.5
HS	123,665	5.4	7.2	59,816	57,440	1.3	1.3
HUM	53,818	2.4	3.4	32,797	32,322	0.7	0.7
IT	63,163	2.8	2.0	80,344	79,830	1.8	1.8
LAW	81,148	3.6	3.7	52,936	52,812	1.2	1.2
MAN	162,715	7.1	8.9	36,372	37,404	0.8	0.9
MARK	286,983	12.6	11.6	43,658	39,679	1.0	0.9
STEM	24,463	1.1	1.5	84,555	86,651	1.9	2.0
TRAN	197,438	8.6	8.2	34,305	34,502	0.8	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Atlanta

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	ATLANTA	U.S.	ATLANTA	U.S.	ATLANTA	U.S.	ATLANTA	U.S.
AFNR	0.2	0.3	5.0	8.7	1.2	2.1	7.0	12.8
AC	0.1	0.3	3.0	7.9	0.2	1.9	1.3	11.3
AV	0.3	0.5	8.0	12.4	0.8	1.5	5.1	9.0
BM	0.8	0.6	20.2	14.0	3.0	1.5	18.2	8.9
ED	0.2	0.1	4.5	1.5	0.7	0.4	4.2	2.2
FIN	0.1	0.1	2.6	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0
HOSP	0.2	0.2	6.0	5.1	1.8	0.9	11.1	5.2
HS	0.2	0.3	5.6	7.0	2.4	2.4	14.5	14.4
HUM	0.1	0.1	2.6	2.7	0.0	0.7	0.0	4.0
IT	0.9	0.8	21.8	19.3	2.2	1.9	13.4	11.2
LAW	0.3	0.1	6.8	3.7	0.7	0.4	4.3	2.2
MAN	0.1	0.1	2.8	3.3	0.6	0.5	3.4	3.0
MARK	0.2	0.1	4.6	3.0	0.8	0.4	4.8	2.7
STEM	0.1	0.2	2.6	4.7	0.6	0.8	3.5	4.8
TRAN	0.1	0.1	3.6	3.4	1.5	1.2	9.1	7.5
TOTAL	**4.1**	**4.0**	**100**	**100**	**15.7****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Boston

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the Boston metropolitan area.[1]

In general, the distribution of CTE course-taking and concentrations in Boston bears little relation to the distribution of local jobs. For example, of the four large clusters that support the majority of Boston jobs—Marketing; Health Science; Hospitality & Tourism; and Business Management & Administration—only one (Business Management & Administration) sees meaningful levels of CTE course-taking at the high school level.

Conversely, the IT; Architecture & Construction; and Arts, A/V Technology & Communication clusters account for about half of CTE course-taking and concentrations in the greater Boston area. Yet collectively, they account for just one-tenth of local employment.

Leaders involved in education and workforce development in the Boston metropolitan region should consider how more students might be encouraged to focus on underserved clusters with strong current and future job prospects.

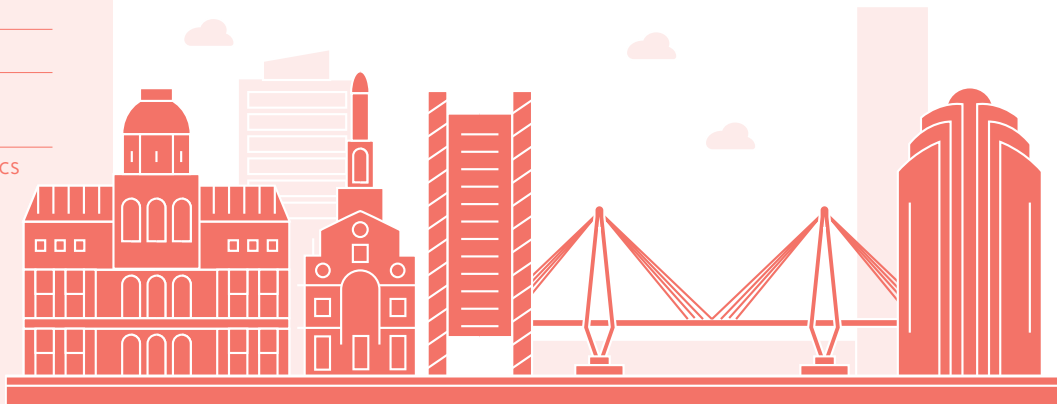
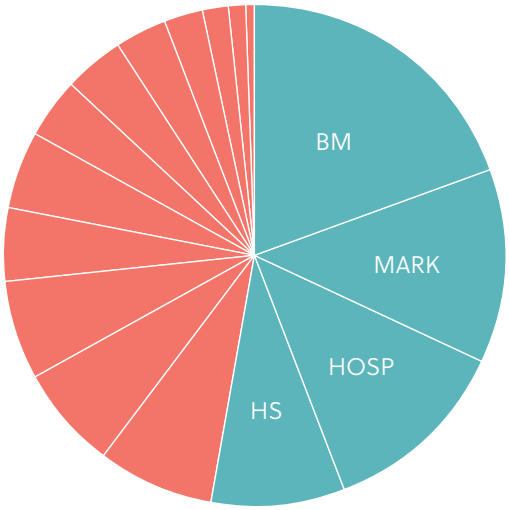


FIGURE 1 **Employment in Boston**

Currently, around half of the jobs in the Boston metropolitan area are in four fields: Business Management & Administration; Marketing; Hospitality & Tourism; and Health Services. Compared to the rest of the U.S., Boston has somewhat fewer jobs in Manufacturing and Transportation, Distribution & Logistics.



BM	18.1%
MARK	11.7%
HOSP	11.3%
HS	8.2%
ED	6.9%
MAN	6.3%
TRAN	5.7%
FIN	4.6%
AC	4.6%
IT	3.6%
HUM	3.6%
LAW	3.1%
STEM	2.3%
AV	1.7%
AFNR	0.8%
GOV	0.5%

FIGURE 2 **Industry wages in Boston versus the United States**

On average, the STEM and IT industries pay the highest wages in Boston—and the rest of the U.S.—while the Hospitality & Tourism and Transportation, Distribution & Logistics sectors pay the lowest wages. In general, industry wage ratios in Boston are similar to those in the rest of the United States, with the possible exception of Agriculture, Food & Natural Resources where Boston workers make an average of $58,000 per year. (See Table 1 for wages.)

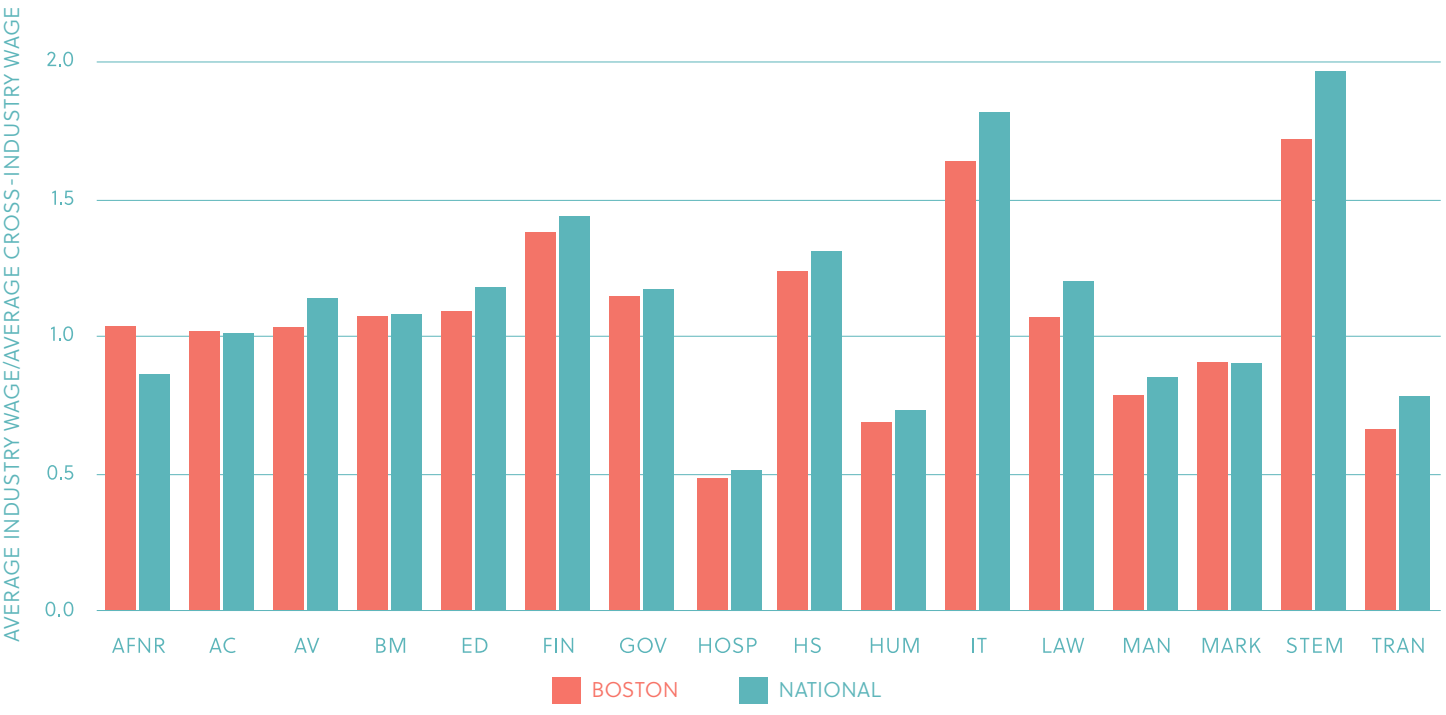
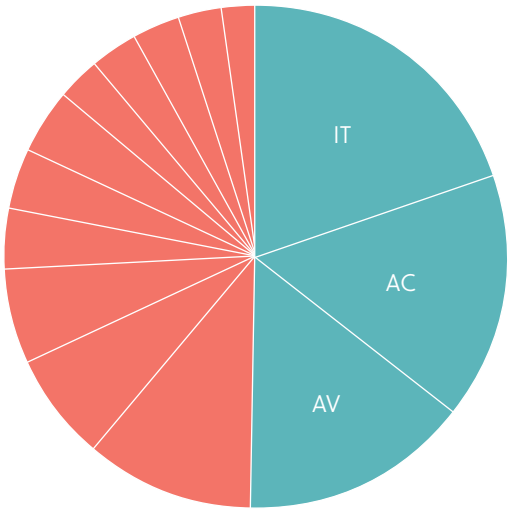


FIGURE 3 CTE course-taking in Boston

Half of the CTE courses taken by Boston students are in three fields: IT; Architecture & Construction; and Arts, A/V Technology & Communications. Almost no students take CTE courses in Government & Public Administration; Education & Training; or Agriculture, Food & Natural Resources.



IT	19.9%
AC	15.8%
AV	14.8%
BM	11.3%
HOSP	7.0%
LAW	5.9%
MARK	4.1%
FIN	3.7%
STEM	3.5%
TRAN	3.4%
HUM	2.9%
HS	2.8%
MAN	2.6%
ED	1.9%
AFNR	0.4%
GOV	0.0%

FIGURE 4 CTE course-taking in Boston versus the United States

The average Boston high school student takes about twice as many Architecture & Construction courses as the average U.S. high school student—and significantly more courses in Arts, A/V Technology & Communications. In contrast, Boston students take almost no classes in Agriculture, Food & Natural Resources.

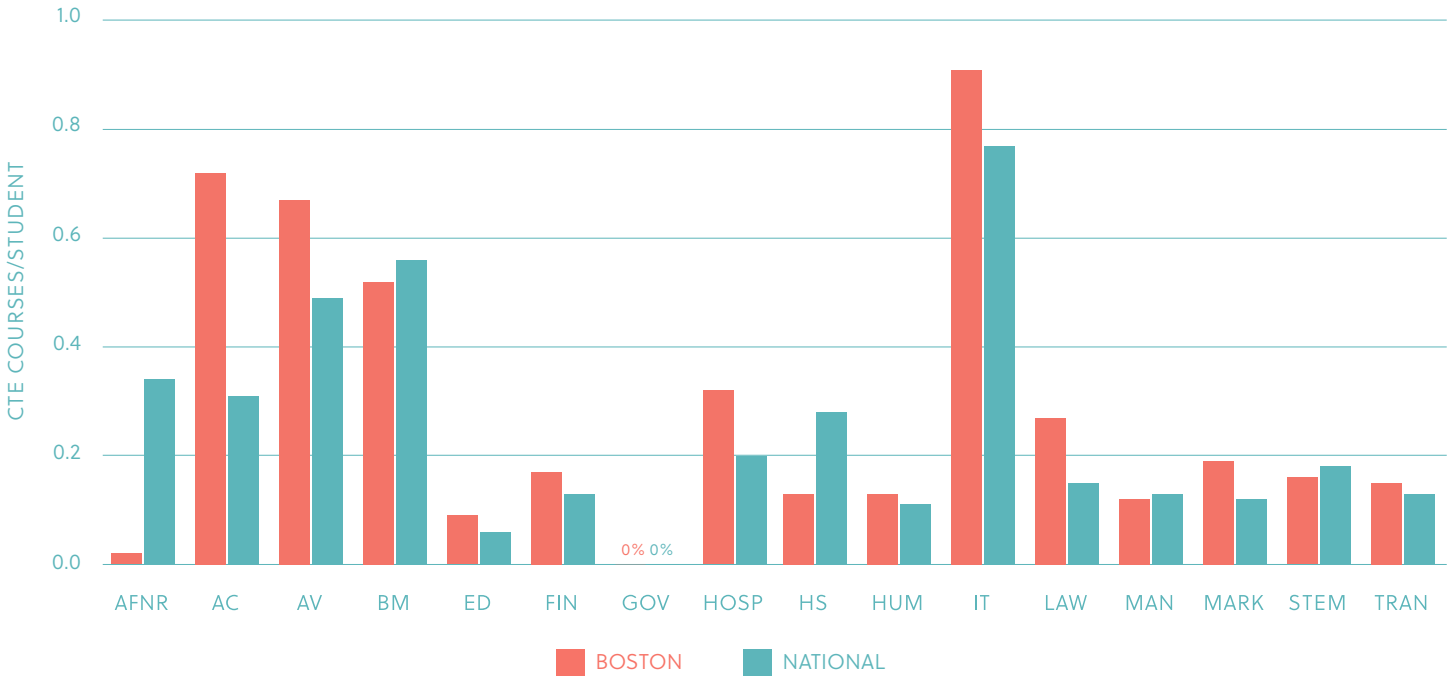
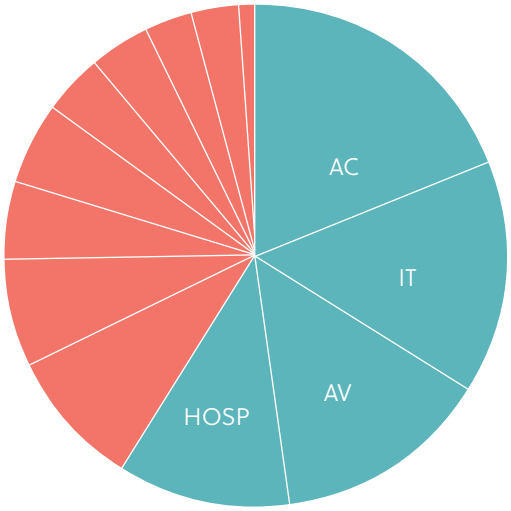


FIGURE 5 CTE concentrations in Boston

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

Collectively, Architecture & Construction; IT; Arts, A/V Technology & Communications; and Hospitality & Tourism clusters account for half of the CTE concentrations in the Boston area.



AC	24.8%
IT	14.7%
AV	12.1%
HOSP	10.9%
BM	10.9%
MARK	9.0%
TRAN	6.7%
HUM	5.7%
HS	4.0%
ED	1.5%
AFNR	0.0%
FIN	0.0%
GOV	0.0%
LAW	0.0%
MAN	0.0%
STEM	0.0%

FIGURE 6 CTE concentrations in Boston versus the United States

Compared to their peers in the rest of the U.S., Boston high school students are more likely to concentrate in Architecture & Construction; Hospitality & Tourism; and Marketing. However, they are less likely to concentrate in STEM; Health Science; and Agriculture, Food & Natural Resources.

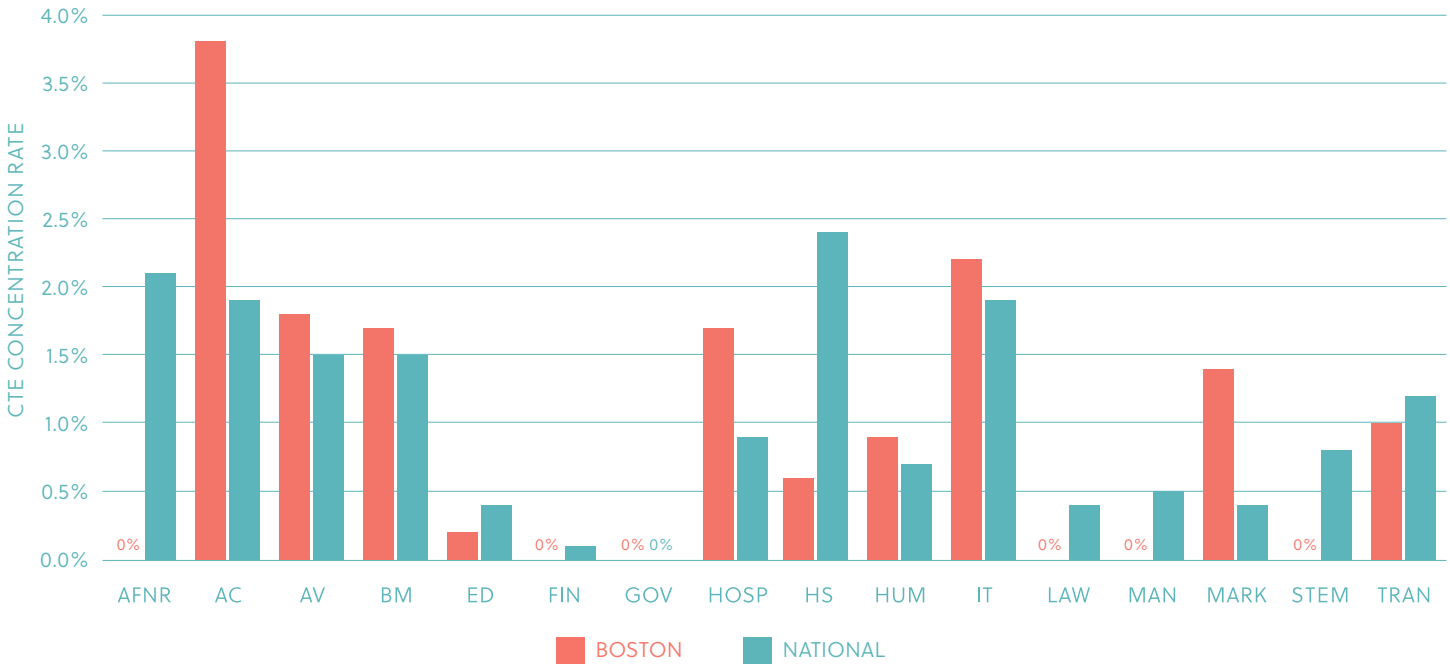
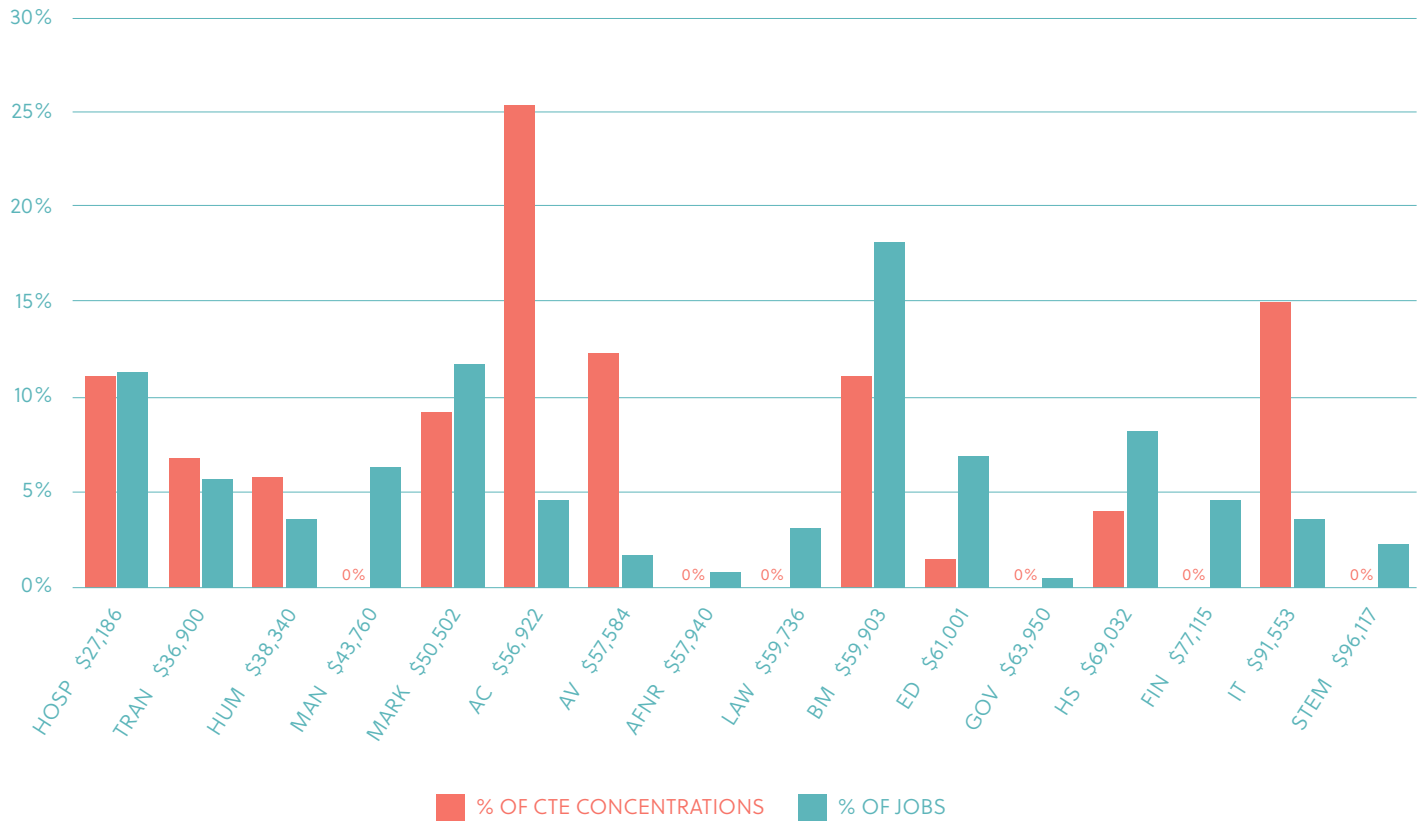


FIGURE 7 Employment and CTE concentrations in Boston

In general, the distribution of CTE concentrations in the Boston area bears little relation to the distribution of local jobs. For example, Architecture & Construction accounts for a quarter of CTE concentrations, but less than 5 percent of employment. Conversely, Health Science and Business Management & Administration account for a quarter of local jobs, but just 15 percent of concentrations.



1 Technically, this area comprises the metropolitan statistical area known as Boston-Cambridge-Quincy, MA-NH. Because only 260 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Boston

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	BOSTON	BOSTON	U.S.	BOSTON	U.S.	BOSTON	U.S.
AFNR	18,500	0.8	1.0	57,940	37,852	1.0	0.9
AC	112,155	4.6	6.2	56,922	44,564	1.0	1.0
AV	41,003	1.7	1.4	57,584	50,110	1.0	1.1
BM	444,013	18.1	18.0	59,903	47,745	1.1	1.1
ED	168,923	6.9	6.8	61,001	51,810	1.1	1.2
FIN	112,548	4.6	3.9	77,115	63,197	1.4	1.4
GOV	12,713	0.5	0.8	63,950	51,525	1.1	1.2
HOSP	276,750	11.3	12.5	27,186	22,388	0.5	0.5
HS	200,870	8.2	7.2	69,032	57,440	1.2	1.3
HUM	87,773	3.6	3.4	38,340	32,322	0.7	0.7
IT	88,468	3.6	2.0	91,553	79,830	1.6	1.8
LAW	76,310	3.1	3.7	59,736	52,812	1.1	1.2
MAN	153,920	6.3	8.9	43,760	37,404	0.8	0.9
MARK	285,930	11.7	11.6	50,502	39,679	0.9	0.9
STEM	55,868	2.3	1.5	96,117	86,651	1.7	2.0
TRAN	139,748	5.7	8.2	36,900	34,502	0.7	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Boston

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	BOSTON	U.S.	BOSTON	U.S.	BOSTON	U.S.	BOSTON	U.S.
AFNR	0.0	0.3	0.4	8.7	0.0	2.1	0.0	12.8
AC	0.7	0.3	15.8	7.9	3.8	1.9	24.8	11.3
AV	0.7	0.5	14.8	12.4	1.8	1.5	12.1	9.0
BM	0.5	0.6	11.3	14.0	1.7	1.5	10.9	8.9
ED	0.1	0.1	1.9	1.5	0.2	0.4	1.5	2.2
FIN	0.2	0.1	3.7	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
HOSP	0.3	0.2	7.0	5.1	1.7	0.9	10.9	5.2
HS	0.1	0.3	2.8	7.0	0.6	2.4	4.0	14.4
HUM	0.1	0.1	2.9	2.7	0.9	0.7	5.7	4.0
IT	0.9	0.8	19.9	19.3	2.2	1.9	14.7	11.2
LAW	0.3	0.1	5.9	3.7	0.0	0.4	0.0	2.2
MAN	0.1	0.1	2.6	3.3	0.0	0.5	0.0	3.0
MARK	0.2	0.1	4.1	3.0	1.4	0.4	9.0	2.7
STEM	0.2	0.2	3.5	4.7	0.0	0.8	0.0	4.8
TRAN	0.2	0.1	3.4	3.4	1.0	1.2	6.7	7.5
TOTAL	**4.6**	**4.0**	**100**	**100**	**15.0****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Chicago

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the Chicago metropolitan area.[1]

Given the number of jobs they support, higher-paying career clusters account for a disproportionate share of Chicago CTE. In fact, two such clusters—IT and STEM—account for almost one-third of CTE concentrations, but just 3 percent of jobs. Conversely, fewer Chicago students take courses in large but low-paying fields such as Marketing and Hospitality & Tourism.

Of the four large clusters that support the majority of Chicago jobs—Business Management & Administration; Hospitality & Tourism; Marketing; and Manufacturing—only Business Management & Administration sees meaningful levels of CTE course-taking at the high school level.

Leaders involved in education and workforce development in the Chicago area should consider how more students might be encouraged to focus on underserved industries with strong current and future job prospects.

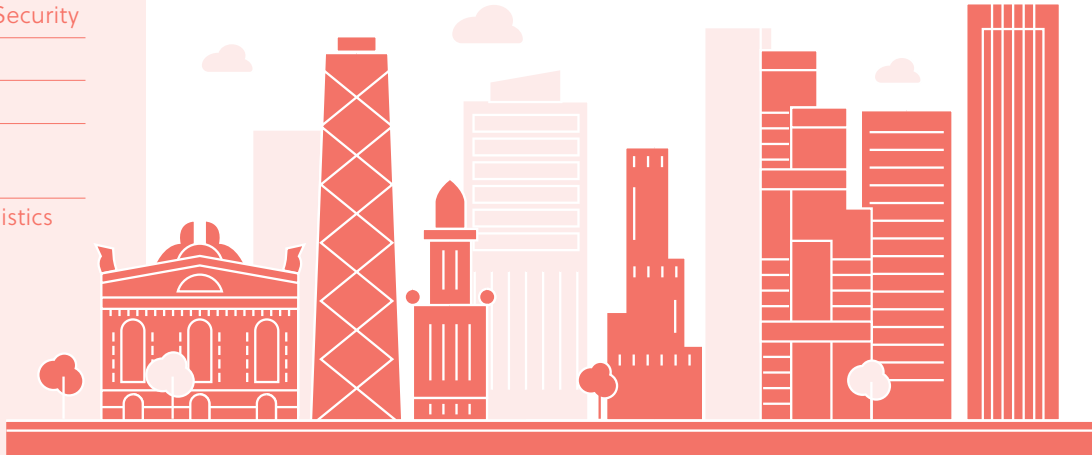
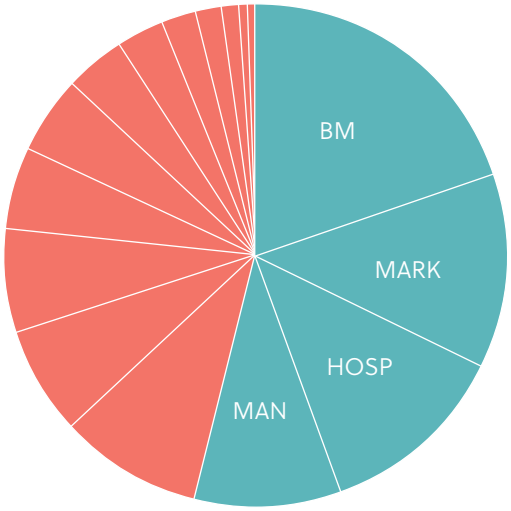


FIGURE 1 Employment in Chicago

Currently, over half of the jobs in the Chicago metropolitan area are in four fields: Business Management & Administration; Marketing; Hospitality & Tourism; and Manufacturing. Compared to the rest of the U.S., Chicago has somewhat fewer jobs in Architecture & Construction.



BM	18.9%
MARK	12.0%
HOSP	11.5%
MAN	8.9%
TRAN	8.8%
ED	6.6%
HS	6.4%
AC	5.1%
FIN	4.5%
LAW	3.8%
HUM	2.9%
IT	2.2%
AV	1.5%
STEM	1.1%
AFNR	0.5%
GOV	0.4%

FIGURE 2 Industry wages in Chicago versus the United States

On average, the STEM and IT clusters pay the highest wages in Chicago—and the rest of the United States—while the Hospitality & Tourism and Human Services sectors pay the lowest wages. Although average STEM and IT wages are slightly lower in Chicago than in the rest of the country, the average Chicago STEM worker still makes $85,000, or about 1.8 times as much as the average Chicago worker. (See Table 1 for wages.)

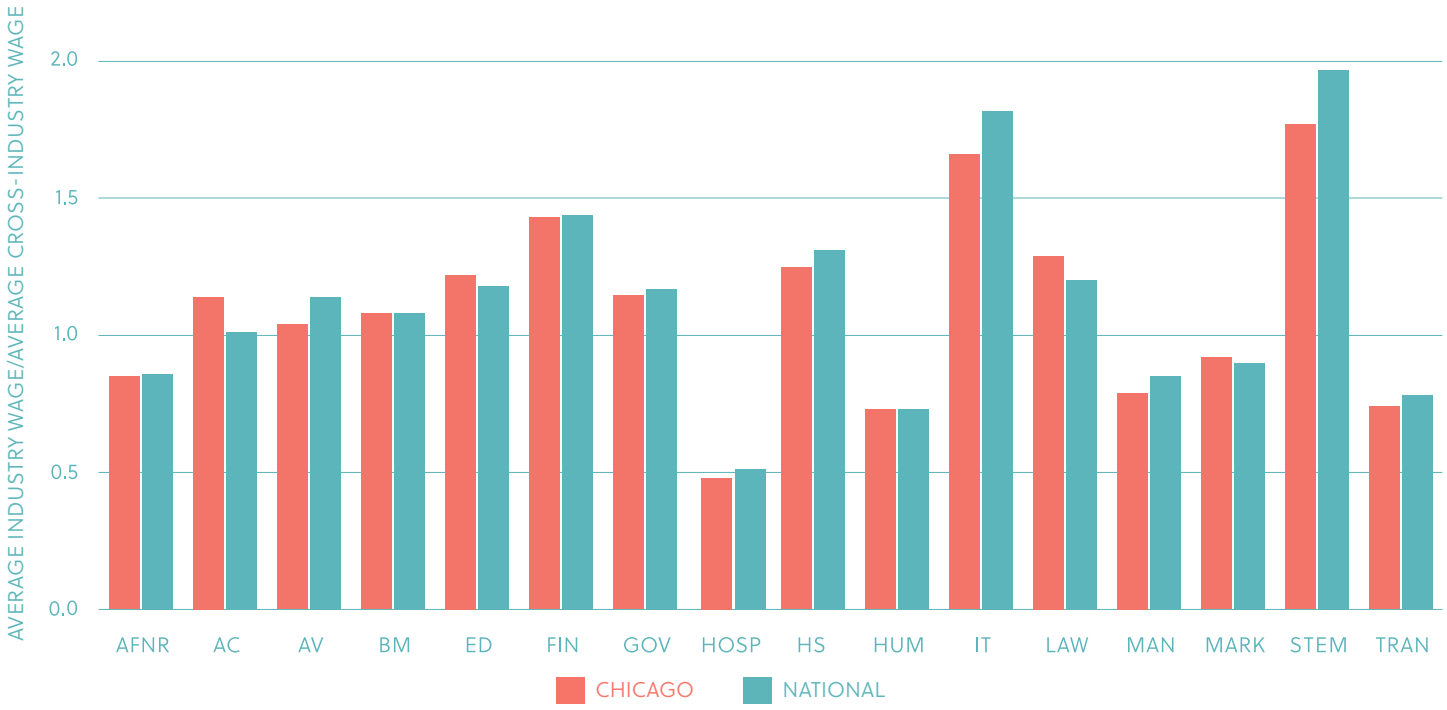
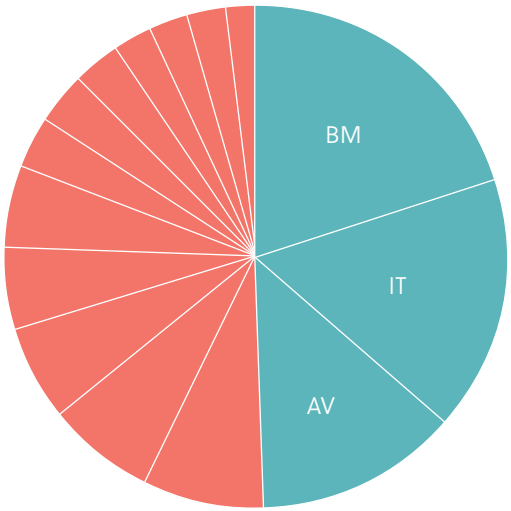


FIGURE 3 CTE course-taking in Chicago

Half of the CTE courses taken by Chicago students are in three fields: Business Management & Administration; IT; and Arts, A/V Technology & Communications. Almost no students take CTE courses in Government & Public Administration; Manufacturing; or Agriculture, Food & Natural Resources.



BM	20.1%
IT	16.6%
AV	12.9%
AC	7.9%
HOSP	6.9%
TRAN	6.1%
LAW	5.3%
STEM	5.2%
FIN	3.5%
MARK	3.2%
ED	3.0%
HS	3.0%
HUM	2.7%
MAN	2.4%
AFNR	1.8%
GOV	0.0%

FIGURE 4 CTE course-taking in Chicago versus the United States

In general, high school students in Chicago take fewer CTE courses than their peers in the rest of the United States—especially in IT and Agriculture, Food & Natural Resources.

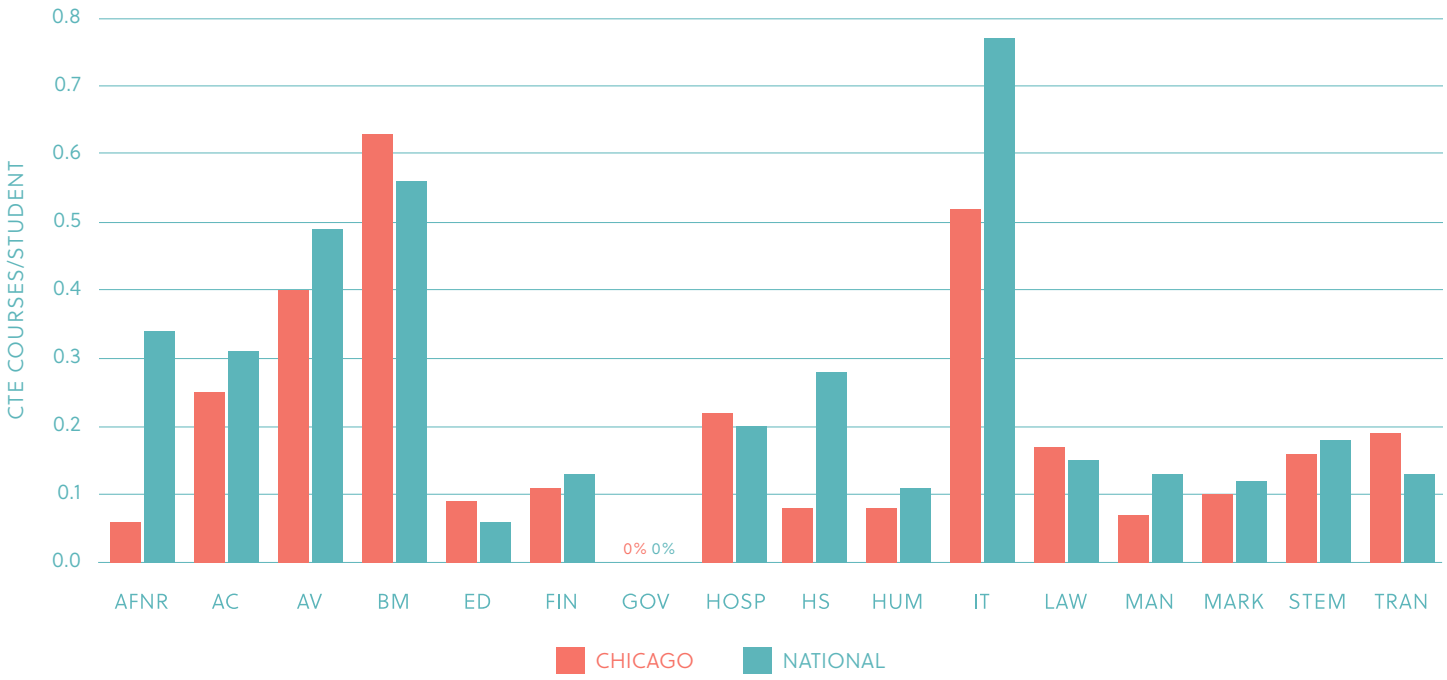
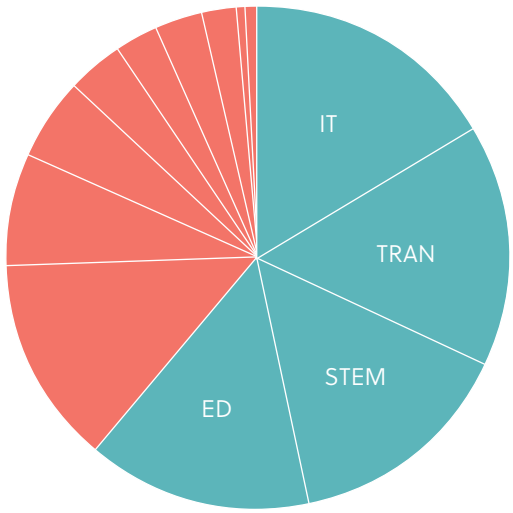


FIGURE 5 CTE concentrations in Chicago

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

Collectively, the IT; Transportation, Distribution & Logistics; STEM; and Education & Training clusters account for more than half of the CTE concentrations in the Chicago area.



IT	16.5%
TRAN	15.6%
STEM	14.6%
ED	14.3%
AV	13.3%
AC	7.3%
HOSP	5.2%
BM	3.7%
LAW	2.9%
HS	2.9%
MARK	2.3%
HUM	0.6%
MAN	0.6%
AFNR	0.0%
FIN	0.0%
GOV	0.0%

FIGURE 6 CTE concentrations in Chicago versus the United States

High school students in Chicago are more likely to concentrate in Education & Training than high school students in the rest of the United States. However, they are less likely to concentrate in most other fields—or in any field whatsoever.

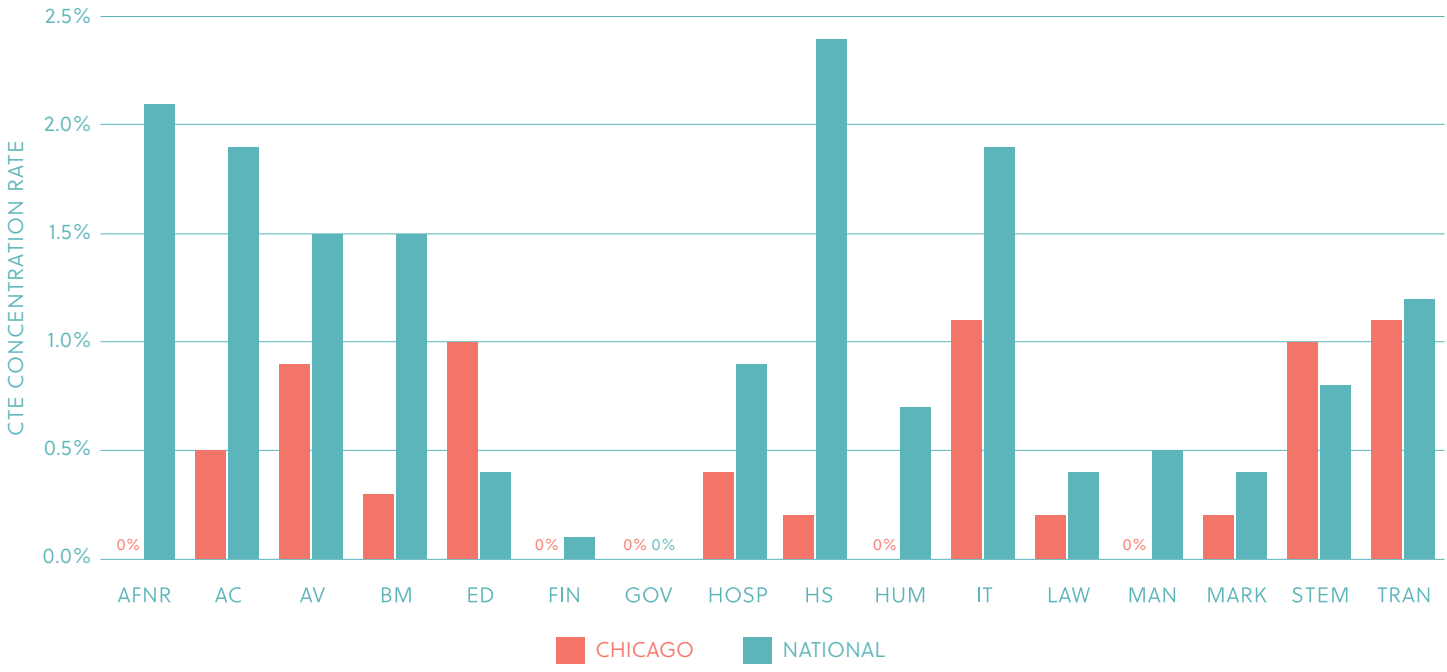
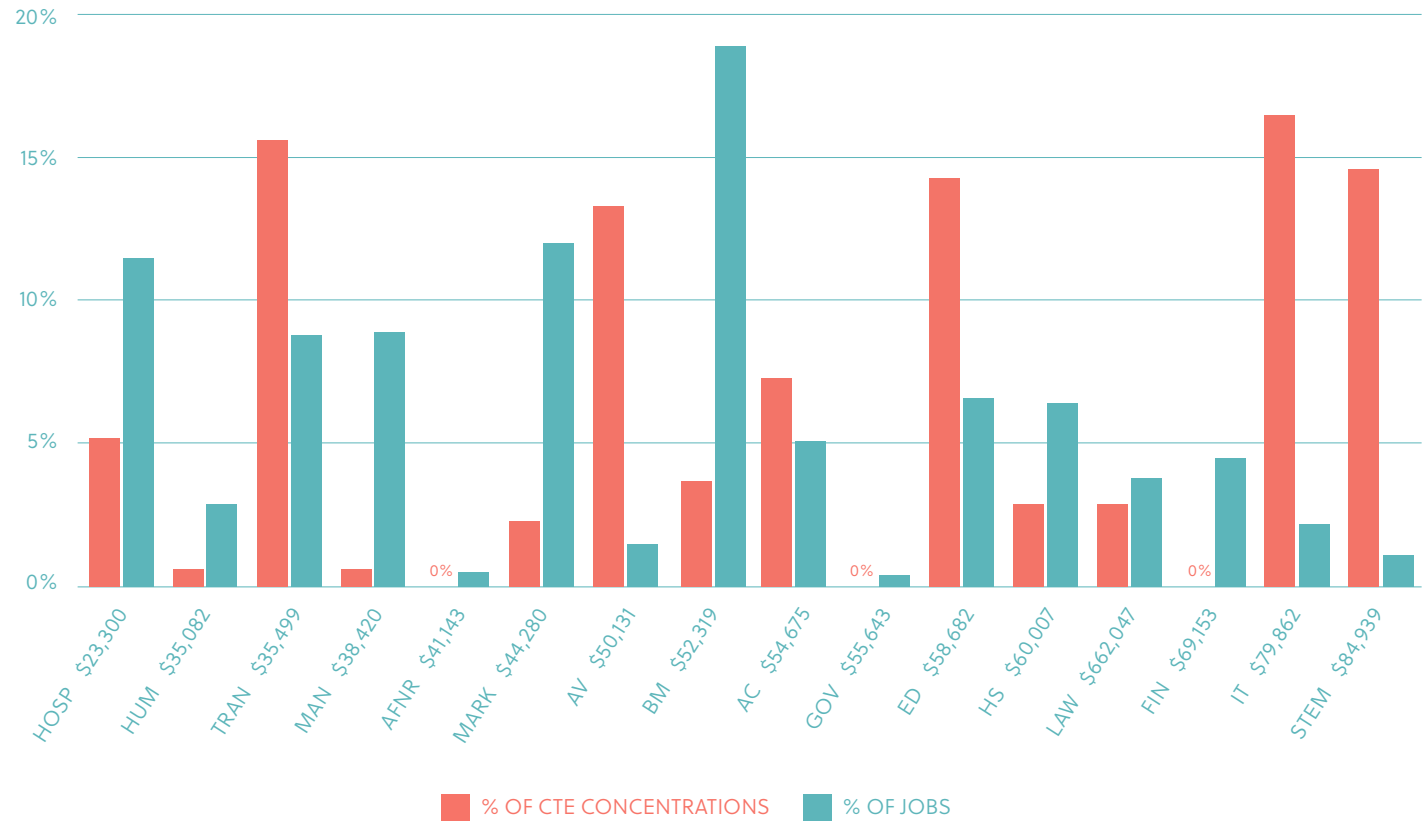


FIGURE 7 Employment and CTE concentrations in Chicago

The distribution of CTE concentrations in Chicago is skewed towards higher-paying fields. For example, the IT and STEM clusters account for one-third of concentrations, but just 3.3 percent of local employment. And conversely, almost no Chicago students concentrate in Human Services; Manufacturing; or Marketing, which collectively account for a quarter of local employment.



1 Technically, this area comprises the metropolitan statistical area known as Chicago-Joliet-Naperville, IL-IN-WI. Because only 640 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Chicago

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	CHICAGO	CHICAGO	U.S.	CHICAGO	U.S.	CHICAGO	U.S.
AFNR	21,683	0.5	1.0	41,144	37,852	0.9	0.9
AC	220,608	5.1	6.2	54,675	44,564	1.1	1.0
AV	62,835	1.5	1.4	50,131	50,110	1.0	1.1
BM	812,985	18.9	18.0	52,319	47,745	1.1	1.1
ED	282,680	6.6	6.8	58,683	51,810	1.2	1.2
FIN	194,018	4.5	3.9	69,153	63,197	1.4	1.4
GOV	19,060	0.4	0.8	55,644	51,525	1.2	1.2
HOSP	492,250	11.5	12.5	23,300	22,388	0.5	0.5
HS	274,643	6.4	7.2	60,008	57,440	1.2	1.3
HUM	125,338	2.9	3.4	35,082	32,322	0.7	0.7
IT	92,858	2.2	2.0	79,867	79,830	1.7	1.8
LAW	164,985	3.8	3.7	62,048	52,812	1.3	1.2
MAN	384,108	8.9	8.9	38,420	37,404	0.8	0.9
MARK	515,025	12.0	11.6	44,280	39,679	0.9	0.9
STEM	47,898	1.1	1.5	84,940	86,651	1.8	2.0
TRAN	377,270	8.8	8.2	35,500	34,502	0.7	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Chicago

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	CHICAGO	U.S.	CHICAGO	U.S.	CHICAGO	U.S.	CHICAGO	U.S.
AFNR	0.1	0.3	1.8	8.7	0.0	2.1	0.0	12.8
AC	0.2	0.3	7.9	7.9	0.5	1.9	7.3	11.3
AV	0.4	0.5	12.9	12.4	0.9	1.5	13.3	9.0
BM	0.6	0.6	20.1	14.0	0.3	1.5	3.7	8.9
ED	0.1	0.1	3.0	1.5	1.0	0.4	14.3	2.2
FIN	0.1	0.1	3.5	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
HOSP	0.2	0.2	6.9	5.1	0.4	0.9	5.2	5.2
HS	0.1	0.3	2.7	7.0	0.2	2.4	2.9	14.4
HUM	0.1	0.1	2.5	2.7	0.0	0.7	0.6	4.0
IT	0.5	0.8	16.6	19.3	1.1	1.9	16.5	11.2
LAW	0.2	0.1	5.3	3.7	0.2	0.4	2.9	2.2
MAN	0.1	0.1	2.4	3.3	0.0	0.5	0.6	3.0
MARK	0.1	0.1	3.2	3.0	0.2	0.4	2.3	2.7
STEM	0.2	0.2	5.2	4.7	1.0	0.8	14.6	4.8
TRAN	0.2	0.1	6.1	3.4	1.1	1.2	15.6	7.5
TOTAL	**3.1**	**4.0**	**100**	**100**	**6.9****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Detroit

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the Detroit metropolitan area.[1]

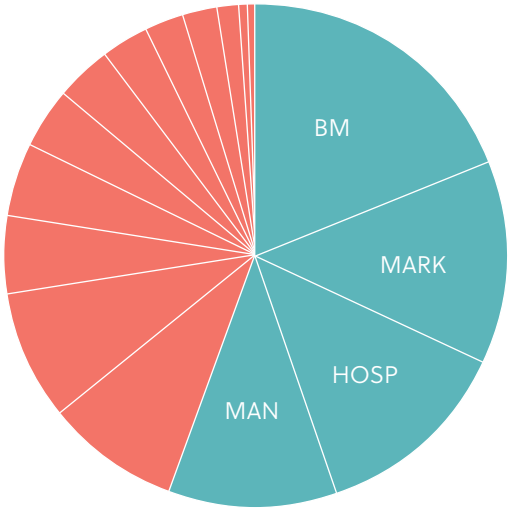
In general, the distribution of CTE course-taking and concentrations in Detroit bears little relation to the distribution on local jobs. For example, three clusters—IT; Business Management & Administration; and Architecture & Construction—account for two-fifths of CTE course-taking, despite accounting for just a quarter of employment. In contrast, few Detroit students concentrate in manufacturing, despite the fact that it supports one in ten Detroit jobs.

Unusually high percentages of Detroit students are taking courses and concentrating in Transportation, Distribution & Logistics—a field with obvious importance to the region. However, of the four large clusters that support the majority of local jobs—Business Management & Administration; Hospitality & Tourism; Marketing; and Manufacturing—only two see meaningful levels of CTE course-taking at the high school level.

Leaders involved in education and workforce development in Detroit should consider how more students might be encouraged to focus on underserved clusters with strong current and future job prospects.

FIGURE 1 Employment in Detroit

Currently, half of the jobs in the Detroit metropolitan area are in four fields: Business Management & Administration; Marketing; Hospitality & Tourism; and Manufacturing. Compared to the rest of the U.S., Detroit has an unusually large Transportation, Distribution & Logistics sector, but somewhat fewer jobs in Education & Training and Architecture & Construction.



BM	17.4%
MARK	12.0%
HOSP	11.7%
MAN	10.1%
HS	7.8%
TRAN	7.6%
ED	4.7%
AC	4.2%
FIN	3.6%
HUM	3.3%
LAW	3.0%
IT	2.3%
STEM	1.9%
AV	1.2%
GOV	0.6%
AFNR	0.4%

FIGURE 2 Industry wages in Detroit versus the United States

On average, the STEM and IT clusters have the highest mean wages in Detroit—and the rest of the United States—while the Hospitality & Tourism and Human Services sectors have the lowest wages. Although average STEM and IT wages are slightly lower in Detroit than in the rest of the country, the average Detroit IT worker still makes approximately $76,000, or about 1.6 times the average Detroit worker. (See Table 1 for wages.)

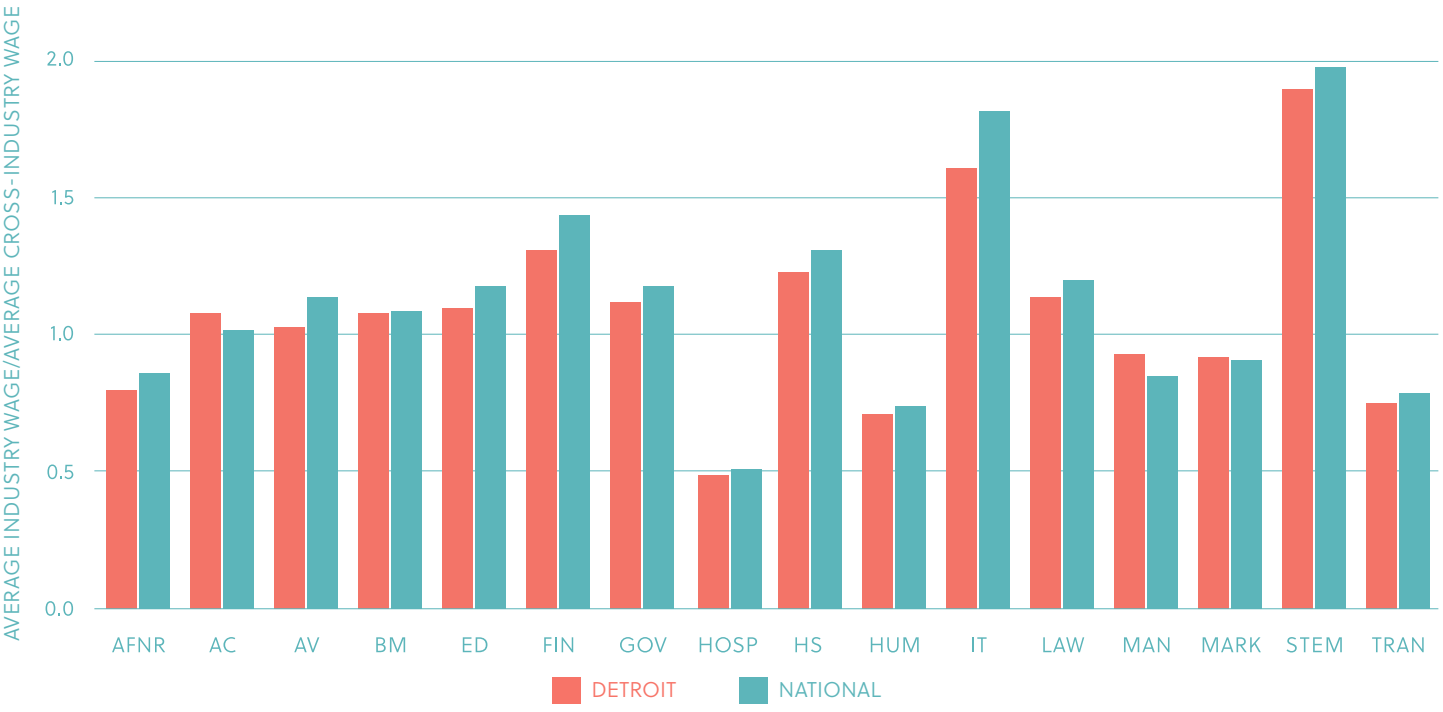
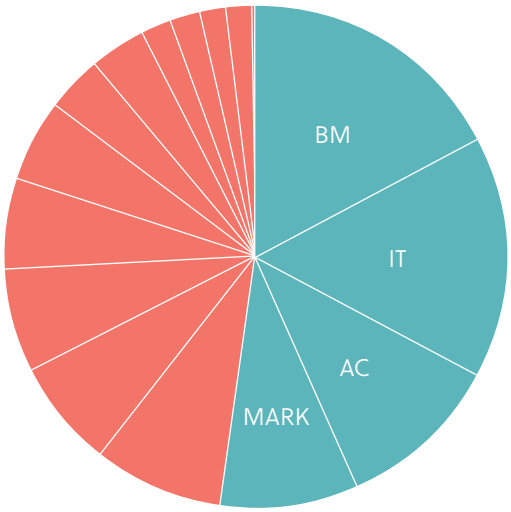


FIGURE 3 CTE course-taking in Detroit

Roughly half of the CTE courses taken by students in Detroit are in four fields: Business Management & Administration; IT; Architecture & Construction; and Marketing. Almost no students take CTE courses in Government & Public Administration; Education & Training; or Agriculture, Food & Natural Resources.



BM	17.3%
IT	15.7%
AC	10.5%
MARK	9.1%
AV	8.2%
LAW	7.0%
FIN	6.6%
TRAN	5.9%
HS	5.5%
MAN	3.6%
STEM	3.4%
HOSP	2.1%
HUM	1.9%
ED	1.8%
AFNR	1.6%
GOV	0.1%

FIGURE 4 CTE course-taking in Detroit versus the United States

The average Detroit high school student takes more CTE courses than the average U.S. high school student (5.7 courses versus 4.0 courses per student) and significantly more courses in Business Management & Administration. However, Detroit students take fewer courses in areas such as Hospitality & Tourism; Agriculture, Food & Natural Resources; and Arts, A/V Technology & Communications.

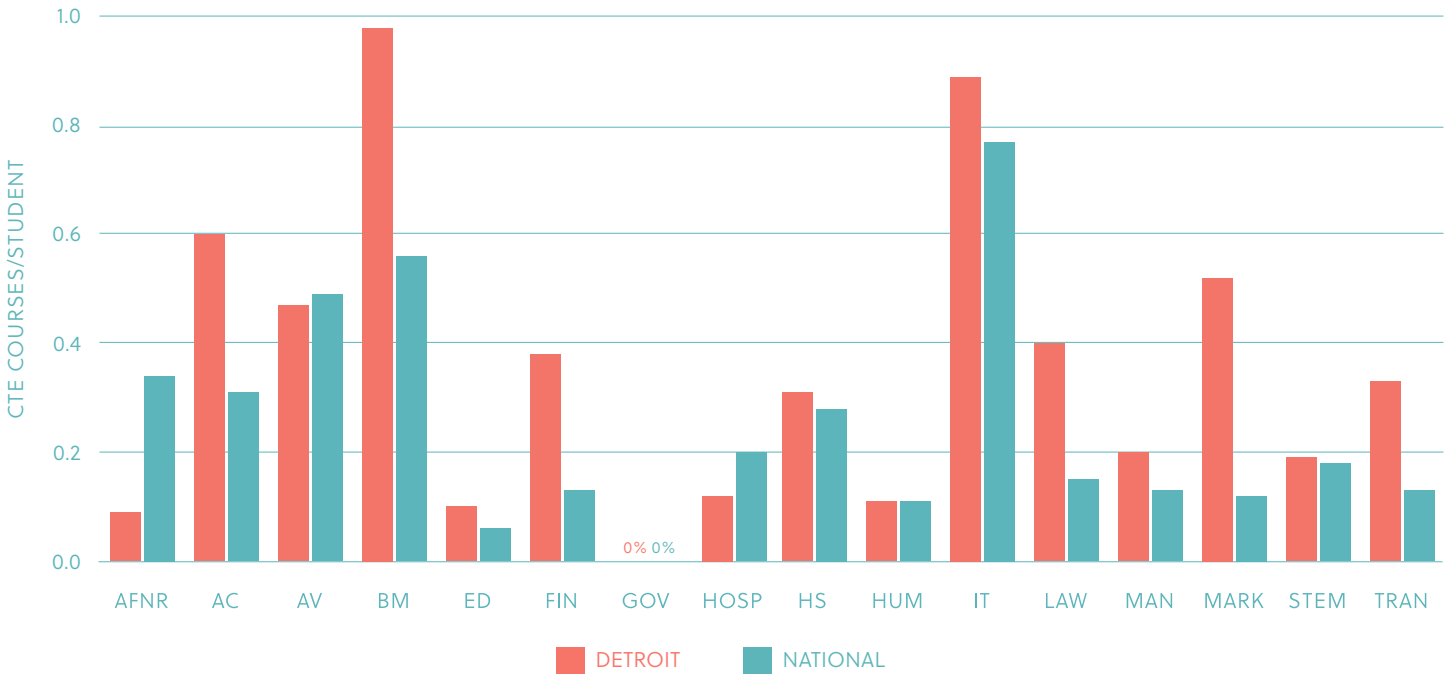
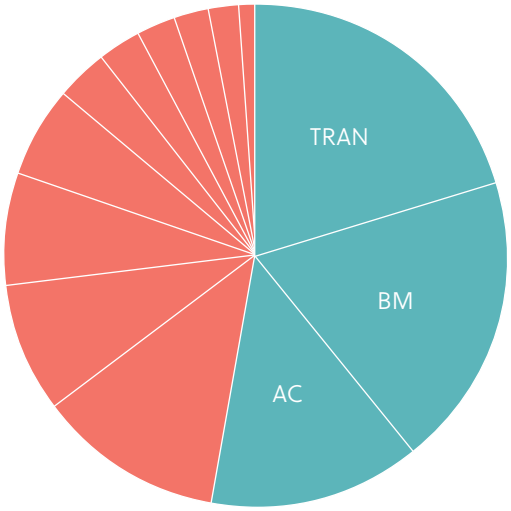


FIGURE 5 CTE concentrations in Detroit

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

Collectively, the Transportation, Distribution & Logistics; Business Management & Administration; and Architecture & Construction fields account for over half of CTE concentrations in Detroit.



TRAN	20.4%
BM	19.0%
AC	13.5%
HS	11.8%
IT	8.4%
LAW	7.2%
MARK	6.0%
AV	3.2%
HOSP	2.8%
MAN	2.4%
AFNR	2.4%
HUM	1.7%
ED	1.1%
FIN	0.0%
GOV	0.0%
STEM	0.0%

FIGURE 6 CTE concentrations in Detroit versus the United States

Compared to students in the rest of the U.S., students in Detroit are more likely to concentrate in Business Management & Administration; Architecture & Construction; and Transportation, Distribution & Logistics. However, they are less likely to concentrate in IT; Agriculture, Food & Natural Resources; and Arts, A/V Technology & Communications.

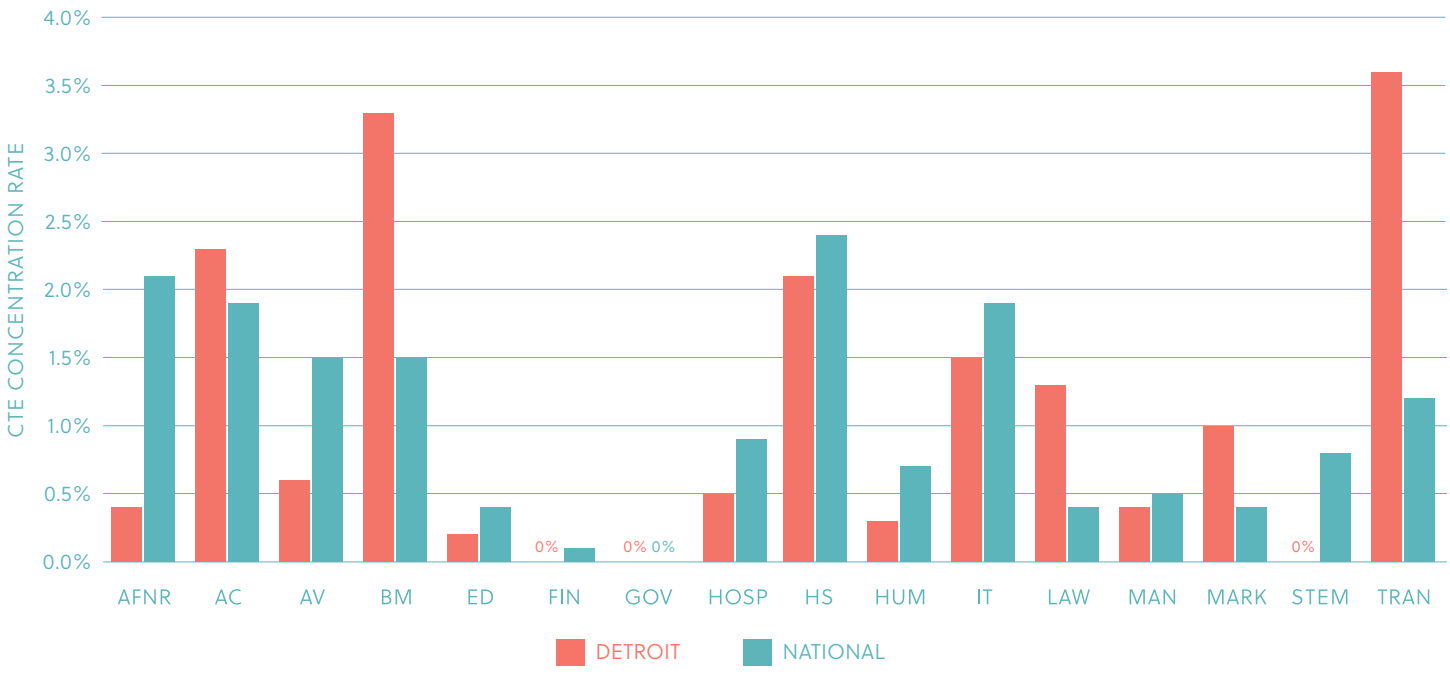
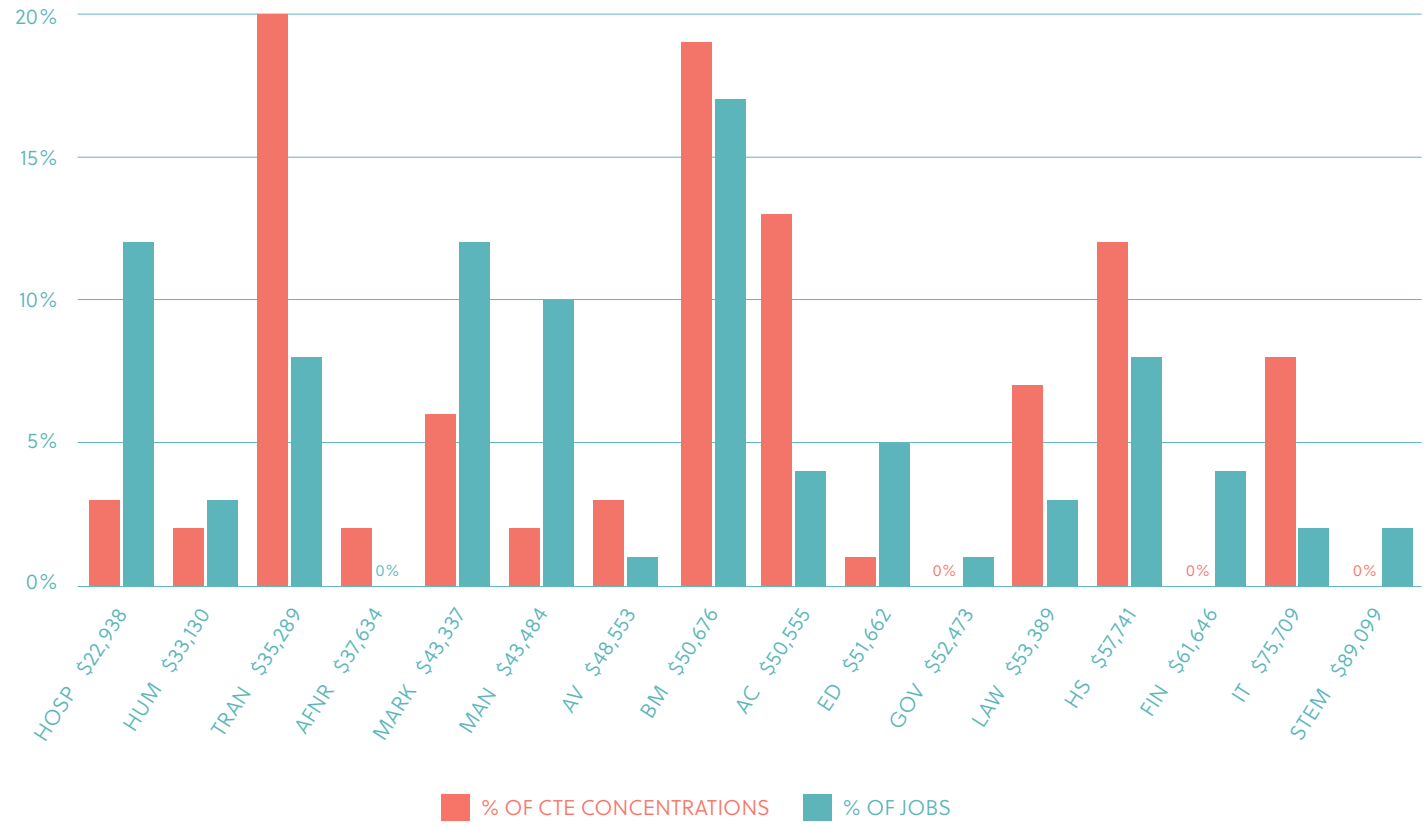


FIGURE 7 Employment and CTE concentrations in Detroit

In general, the distribution of CTE concentrations in Detroit bears little relation to the distribution of local jobs. For example, the Transportation, Distribution & Logistics field accounts for 20 percent of concentrations, but just 8 percent of local employment. Similarly, the IT field accounts for 8 percent of concentrations, but just 2 percent of local jobs. In contrast, the Manufacturing field accounts for 10 percent of local employment, but just 2 percent of concentrations.



1 Technically, this area comprises the metropolitan statistical area known as Detroit-Warren-Livonia, MI. Because only 520 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Detroit

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	DETROIT	DETROIT	U.S.	DETROIT	U.S.	DETROIT	U.S.
AFNR	7,180	0.4	1.0	37,634	37,852	0.8	0.9
AC	74,680	4.2	6.2	50,676	44,564	1.1	1.0
AV	21,833	1.2	1.4	48,553	50,110	1.0	1.1
BM	308,928	17.4	18.0	50,555	47,745	1.1	1.1
ED	83,633	4.7	6.8	51,662	51,810	1.1	1.2
FIN	63,930	3.6	3.9	61,646	63,197	1.3	1.4
GOV	10,600	0.6	0.8	52,473	51,525	1.1	1.2
HOSP	207,250	11.7	12.5	22,938	22,388	0.5	0.5
HS	137,300	7.7	7.2	57,741	57,440	1.2	1.3
HUM	58,598	3.3	3.4	33,130	32,322	0.7	0.7
IT	40,938	2.3	2.0	75,709	79,830	1.6	1.8
LAW	53,980	3.0	3.7	53,389	52,812	1.1	1.2
MAN	178,360	10.1	8.9	43,484	37,404	0.9	0.9
MARK	213,270	12.0	11.6	43,337	39,679	0.9	0.9
STEM	33,073	1.9	1.5	89,099	86,651	1.9	2.0
TRAN	134,020	7.6	8.2	35,289	34,502	0.8	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Detroit

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	DETROIT	U.S.	DETROIT	U.S.	DETROIT	U.S.	DETROIT	U.S.
AFNR	0.1	0.3	1.6	8.7	0.4	2.1	2.4	12.8
AC	0.6	0.3	10.5	7.9	2.3	1.9	13.5	11.3
AV	0.5	0.5	8.2	12.4	0.6	1.5	3.2	9.0
BM	1.0	0.6	17.3	14.0	3.3	1.5	19.0	8.9
ED	0.1	0.1	1.8	1.5	0.2	0.4	1.1	2.2
FIN	0.4	0.1	6.6	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
HOSP	0.1	0.2	2.1	5.1	0.5	0.9	2.8	5.2
HS	0.3	0.3	5.5	7.0	2.1	2.4	11.8	14.4
HUM	0.1	0.1	1.9	2.7	0.3	0.7	1.7	4.0
IT	0.9	0.8	15.7	19.3	1.5	1.9	8.4	11.2
LAW	0.4	0.1	7.0	3.7	1.3	0.4	7.2	2.2
MAN	0.2	0.1	3.6	3.3	0.4	0.5	2.4	3.0
MARK	0.5	0.1	9.1	3.0	1.0	0.4	6.0	2.7
STEM	0.2	0.2	3.4	4.7	0.0	0.8	0.0	4.8
TRAN	0.3	0.1	5.9	3.4	3.6	1.2	20.4	7.5
TOTAL	**5.7**	**4.0**	**100**	**100**	**16.1****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Houston

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the Houston metropolitan area.[1]

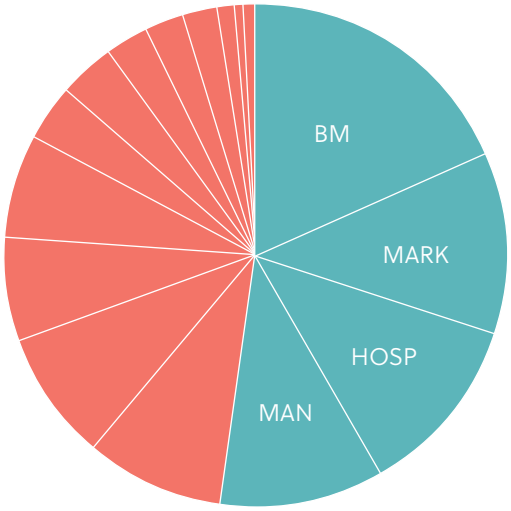
Given the number of jobs they support, higher-paying career clusters account for a disproportionate share of Houston CTE. In fact, three such clusters—IT; Health Science; and Arts, A/V Technology & Communications—account for over half of CTE course-taking.

In contrast, there is no obvious relationship between local employment and CTE. For example, of the four large clusters that support the majority of Houston jobs—Marketing; Hospitality & Tourism; Manufacturing; and Business Management & Administration—only one (Business Management & Administration) sees meaningful levels of CTE course-taking at the high school level.

Leaders who are involved in education and workforce development in Houston should consider how more students might be encouraged to focus on underserved clusters with strong current and future job prospects.

FIGURE 1 Employment in Houston

Currently, more than half of the jobs in the Houston metropolitan area are in four industry clusters: Business Management & Administration; Marketing; Hospitality & Tourism; and Manufacturing. Compared to the rest of the U.S., Houston has an unusually large construction sector, but fewer jobs in Health Science and Human Services.



BM	17.6%
MARK	11.3%
HOSP	11.1%
MAN	10.0%
AC	8.6%
TRAN	8.1%
ED	6.4%
HS	6.2%
FIN	3.6%
LAW	3.4%
HUM	2.6%
STEM	2.5%
IT	2.0%
AV	1.0%
AFNR	0.7%
GOV	0.6%

FIGURE 2 Industry wages in Houston versus the United States

The STEM and IT clusters have the highest mean wages in Houston—and the rest of the United States—while the Hospitality & Tourism and Human Services sectors have the lowest wages. Although average IT wages are slightly lower in Houston than in the rest of the country, STEM wages are notably higher at about $108,000 per year, or 2.4 times the wages of the average Houston worker. (See Table 1 for wages.)

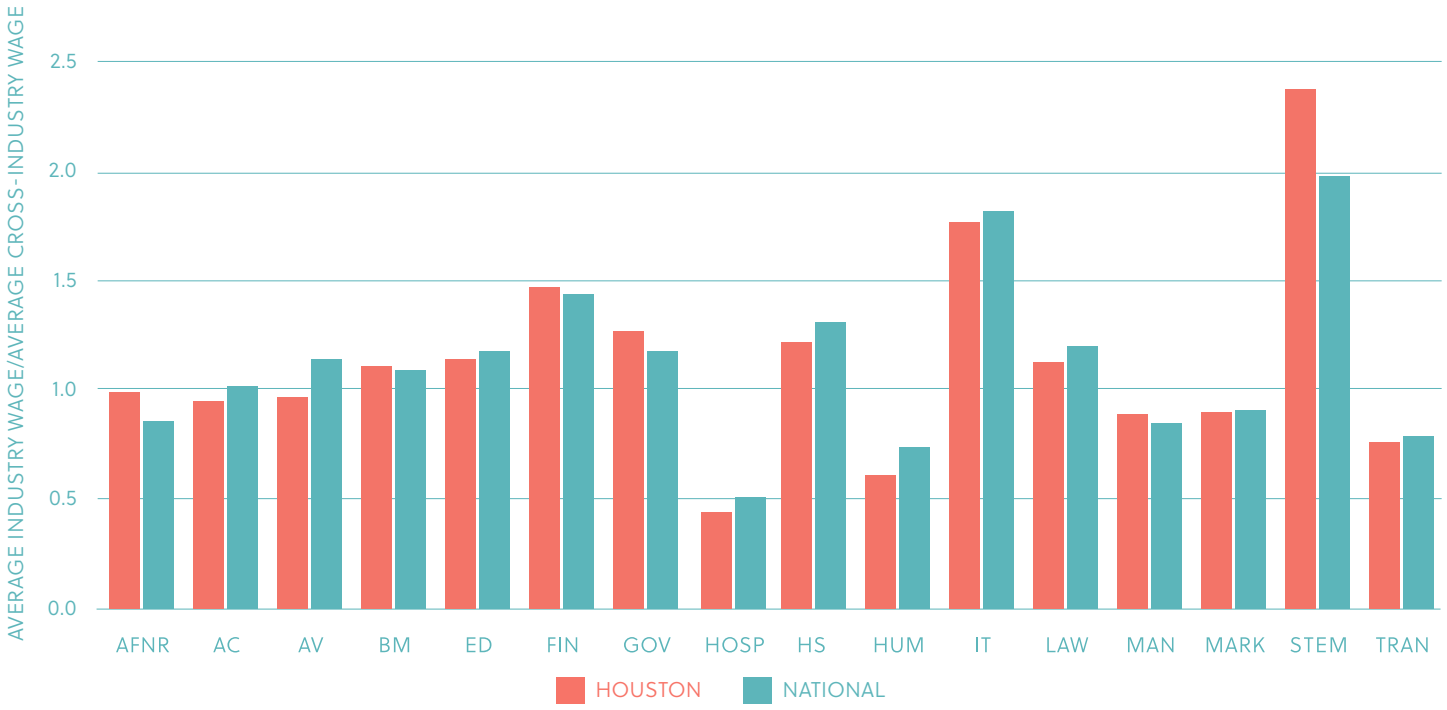
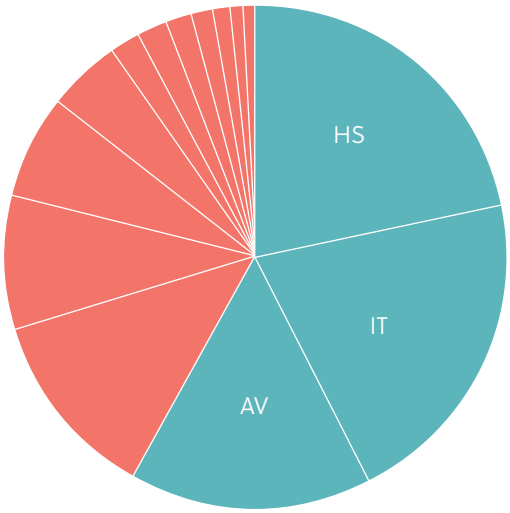


FIGURE 3 CTE course-taking in Houston

Over half of the CTE courses taken by students in the Houston metropolitan area are in Health Science; IT; and Arts, A/V Technology & Communications. Almost no students take CTE courses in Government & Public Administration; Manufacturing; Education & Training; or Architecture & Construction.



HS	21.8%
IT	20.7%
AV	15.8%
BM	12.1%
AFNR	8.6%
HUM	6.8%
HOSP	4.5%
STEM	2.1%
MARK	1.9%
TRAN	1.8%
FIN	1.3%
LAW	1.1%
AC	0.8%
MAN	0.7%
ED	0.0%
GOV	0.0%

FIGURE 4 CTE course-taking in Houston versus the United States

Compared to their peers in the rest of the U.S., high school students in Houston take more than twice as many Health Science courses—and slightly more courses in Human Services and Arts, A/V Technology & Communications. However, they take significantly fewer courses in areas such as STEM; Business Management & Administration; and Architecture & Construction.

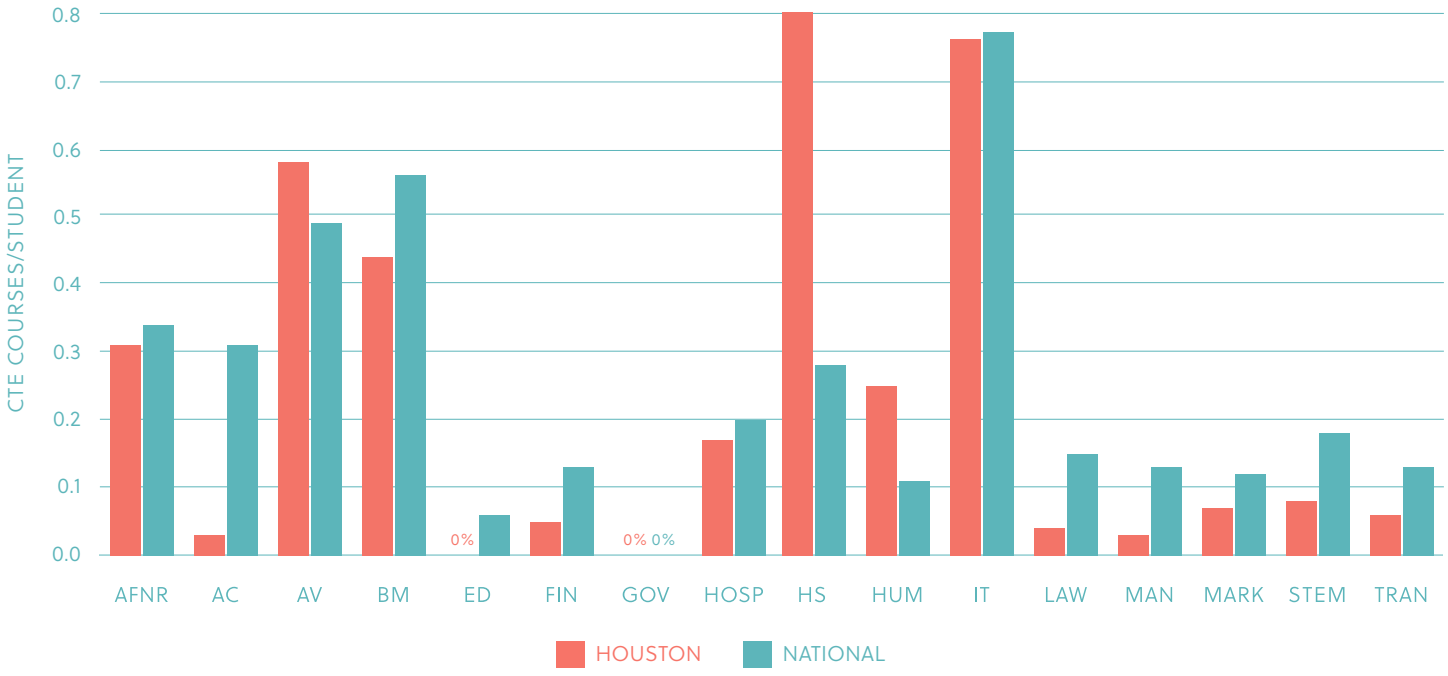
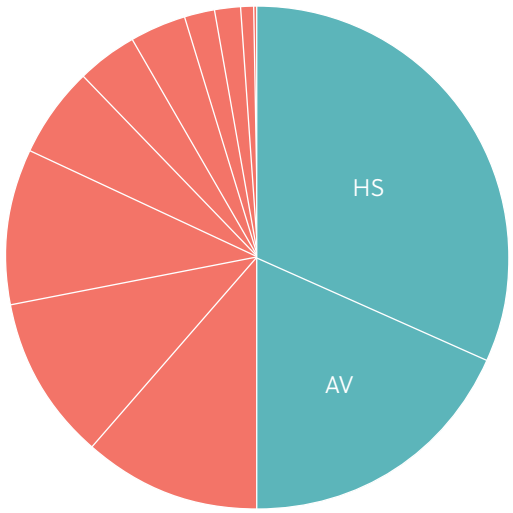


FIGURE 5 CTE concentrations in Houston

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

Collectively, the Health Science and Arts, A/V Technology & Communications sectors account for half of CTE concentrations in Houston.



HS	31.8%
AV	18.3%
TRAN	11.5%
HUM	10.5%
AFNR	10.0%
HOSP	5.6%
IT	4.1%
MARK	3.5%
LAW	2.1%
STEM	1.6%
BM	0.7%
ED	0.2%
AC	0.0%
FIN	0.0%
GOV	0.0%
MAN	0.0%

FIGURE 6 CTE concentrations in Houston versus the United States

High school students in Houston are far more likely to concentrate in Health Science and Arts, A/V Technology & Communications than students in the rest of the United States.

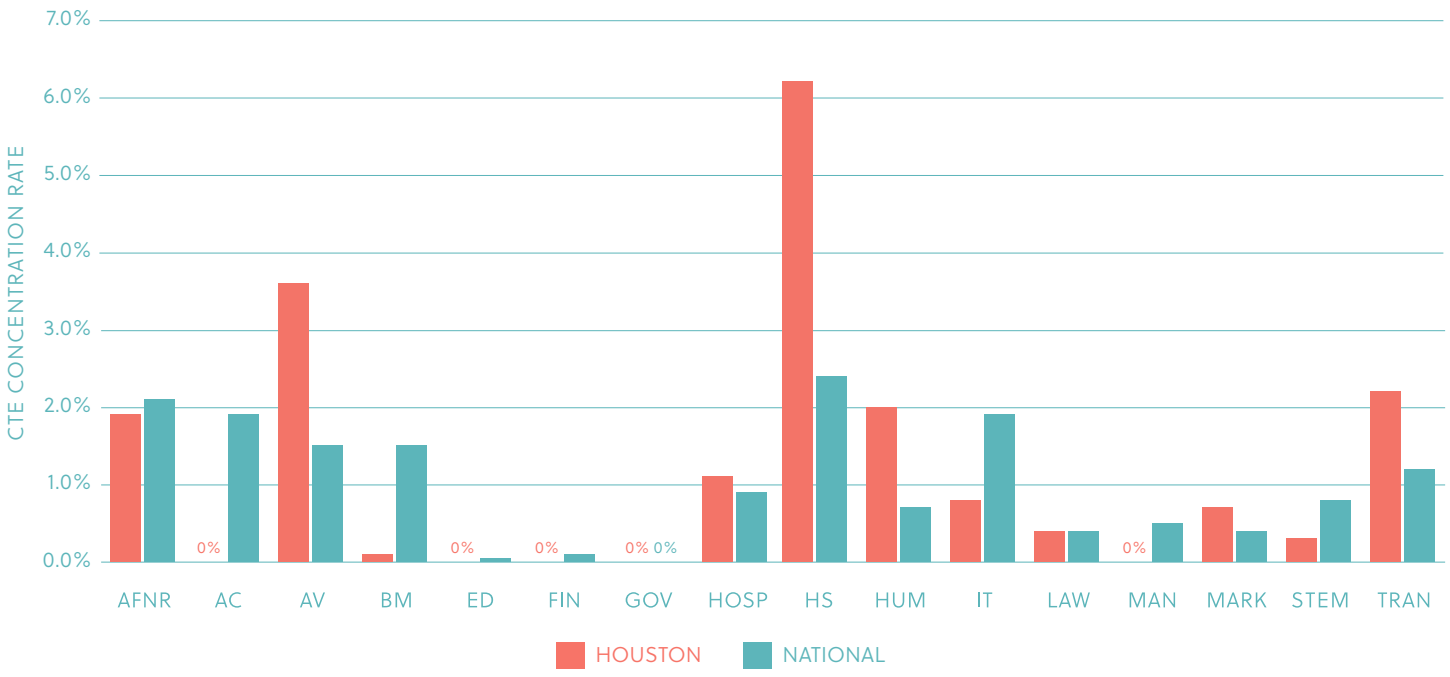
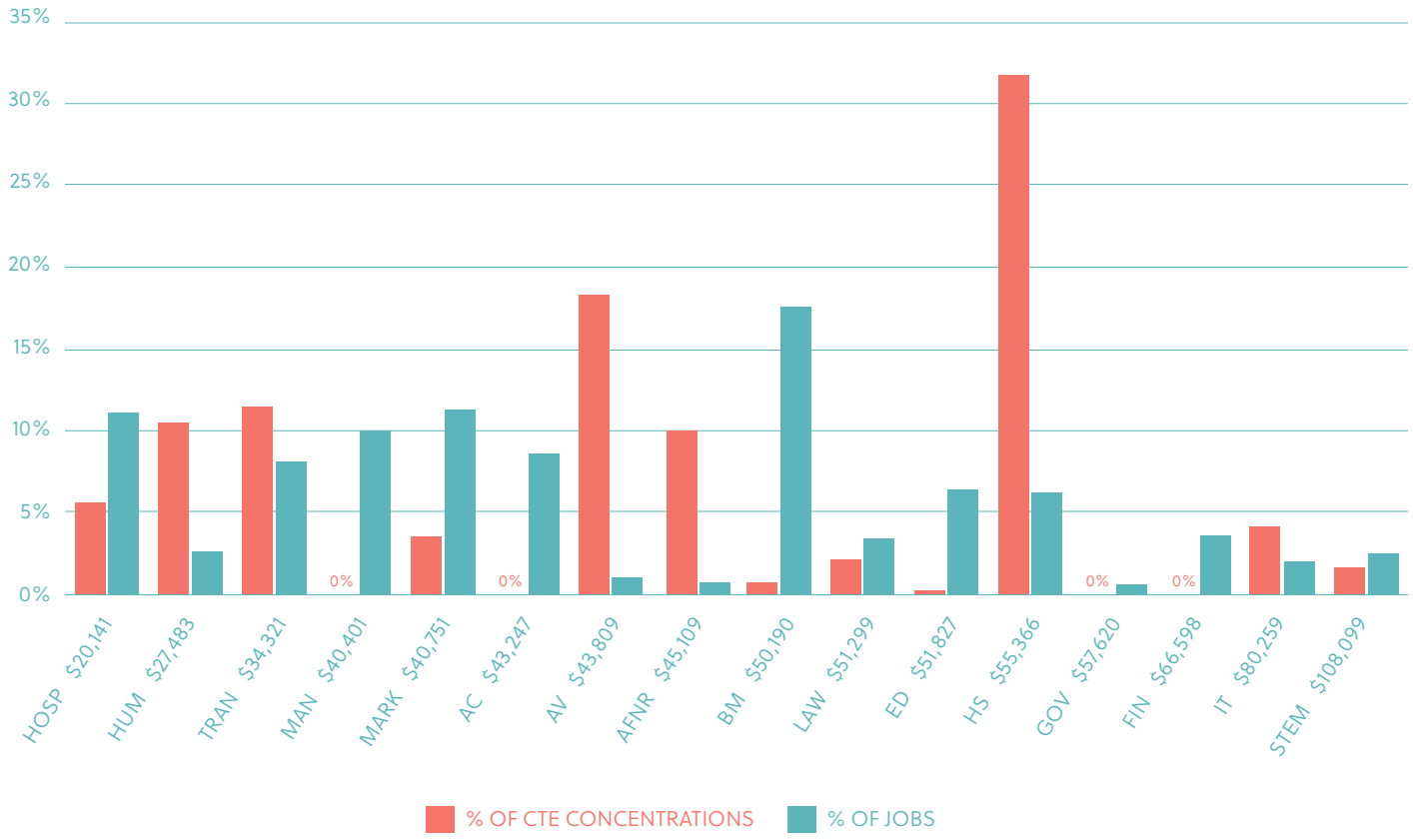


FIGURE 7 Employment and CTE concentrations in Houston

There is no obvious relationship between industry employment shares in Houston and the distribution of CTE concentrations. For example, the Health Science and Arts, A/V Technology & Communications sectors account for half of CTE concentrations, but just 7 percent of local jobs. And conversely, almost no Houston students concentrate in Marketing; Manufacturing; or Business Management & Administration, which support two out of five local jobs.



1 Technically, this area comprises the metropolitan statistical area known as Houston-Sugar Land-Baytown, TX. Because only 260 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Houston

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	HOUSTON	HOUSTON	U.S.	HOUSTON	U.S.	HOUSTON	U.S.
AFNR	17,133	0.7	1.0	45,109	37,852	1.0	0.9
AC	219,348	8.6	6.2	43,247	44,564	1.0	1.0
AV	24,383	1.0	1.4	43,809	50,110	1.0	1.1
BM	447,513	17.6	18.0	50,190	47,745	1.1	1.1
ED	161,885	6.4	6.8	51,827	51,810	1.1	1.2
FIN	92,540	3.6	3.9	66,598	63,197	1.5	1.4
GOV	14,450	0.6	0.8	57,620	51,525	1.3	1.2
HOSP	282,118	11.1	12.5	20,141	22,388	0.4	0.5
HS	159,078	6.2	7.2	55,366	57,440	1.2	1.3
HUM	66,525	2.6	3.4	27,483	32,322	0.6	0.7
IT	51,458	2.0	2.0	80,259	79,830	1.8	1.8
LAW	85,763	3.4	3.7	51,299	52,812	1.1	1.2
MAN	255,423	10.0	8.9	40,401	37,404	0.9	0.9
MARK	287,798	11.3	11.6	40,751	39,679	0.9	0.9
STEM	63,250	2.5	1.5	108,099	86,651	2.4	2.0
TRAN	205,910	8.1	8.2	34,321	34,502	0.8	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Houston

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	HOUSTON	U.S.	HOUSTON	U.S.	HOUSTON	U.S.	HOUSTON	U.S.
AFNR	0.3	0.3	8.6	8.7	1.9	2.1	10.0	12.8
AC	0.0	0.3	0.8	7.9	0.0	1.9	0.0	11.3
AV	0.6	0.5	15.8	12.4	3.6	1.5	18.3	9.0
BM	0.4	0.6	12.1	14.0	0.1	1.5	0.7	8.9
ED	0.0	0.1	0.0	1.5	0.0	0.4	0.2	2.2
FIN	0.0	0.1	1.3	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
HOSP	0.2	0.2	4.5	5.1	1.1	0.9	5.6	5.2
HS	0.8	0.3	21.8	7.0	6.2	2.4	31.8	14.4
HUM	0.3	0.1	6.8	2.7	2.0	0.7	10.5	4.0
IT	0.8	0.8	20.7	19.3	0.8	1.9	4.1	11.2
LAW	0.0	0.1	1.1	3.7	0.4	0.4	2.1	2.2
MAN	0.0	0.1	0.7	3.3	0.0	0.5	0.0	3.0
MARK	0.1	0.1	1.9	3.0	0.7	0.4	3.5	2.7
STEM	0.1	0.2	2.1	4.7	0.3	0.8	1.6	4.8
TRAN	0.1	0.1	1.8	3.4	2.2	1.2	11.5	7.5
TOTAL	**3.7**	**4.0**	**100**	**100**	**19.0****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Indianapolis

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in Indianapolis.[1]

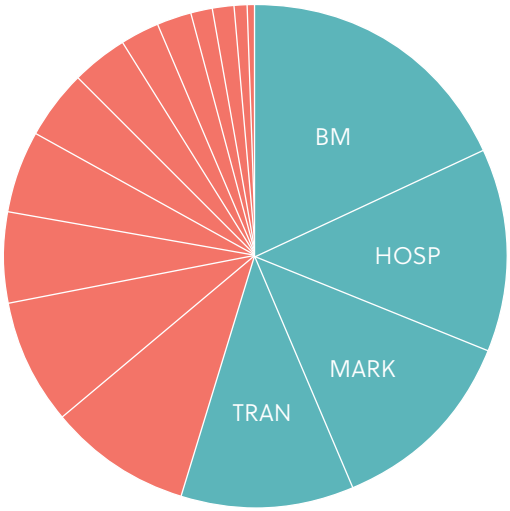
In general, higher-paying career clusters account for a disproportionate share of Indianapolis CTE—given the number of jobs they support. In fact, three such clusters—IT; STEM; and Business Management & Administration—account for almost two-thirds of CTE course-taking, as well as the bulk of concentrations. In contrast, almost no Indianapolis students take courses in low-wage clusters such as Human Services and Agriculture, Food & Natural Resources.

Of the clusters that account for a significant share of local employment, only one—Business Management & Administration—sees meaningful levels of CTE course-taking at the high school level, suggesting the potential for greater alignment in areas such as Marketing; Architecture & Construction; and Transportation, Distribution & Logistics.

Leaders involved in education and workforce development in the Indianapolis metropolitan region should consider how more students might be encouraged to focus on underserved clusters with strong current and future job prospects.

FIGURE 1 Employment in Indianapolis

More than half of the jobs in Indianapolis are in four fields: Business Management & Administration; Hospitality & Tourism; Marketing; and Transportation, Distribution & Logistics. Compared to the rest of U.S., Indianapolis has an unusually large transportation sector, but fewer jobs in Education & Training and Human Services.



BM	17.2%
HOSP	12.1%
MARK	11.9%
TRAN	10.4%
MAN	8.5%
HS	7.6%
AC	5.7%
ED	4.9%
FIN	4.0%
LAW	3.4%
HUM	2.5%
IT	2.1%
AV	1.4%
STEM	1.3%
GOV	0.6%
AFNR	0.5%

FIGURE 2 Industry wages in Indianapolis versus the United States

On average, the STEM and IT clusters pay the highest wages in Indianapolis—and the rest of the United States—while the Hospitality & Tourism and Human Services sectors pay the lowest wages. Although STEM and IT wages are slightly lower in Indianapolis than in the rest of the country, the average Indianapolis STEM worker still makes approximately $69,000, or about 1.6 times as much as the average Indianapolis worker. (See Table 1 for wages.)

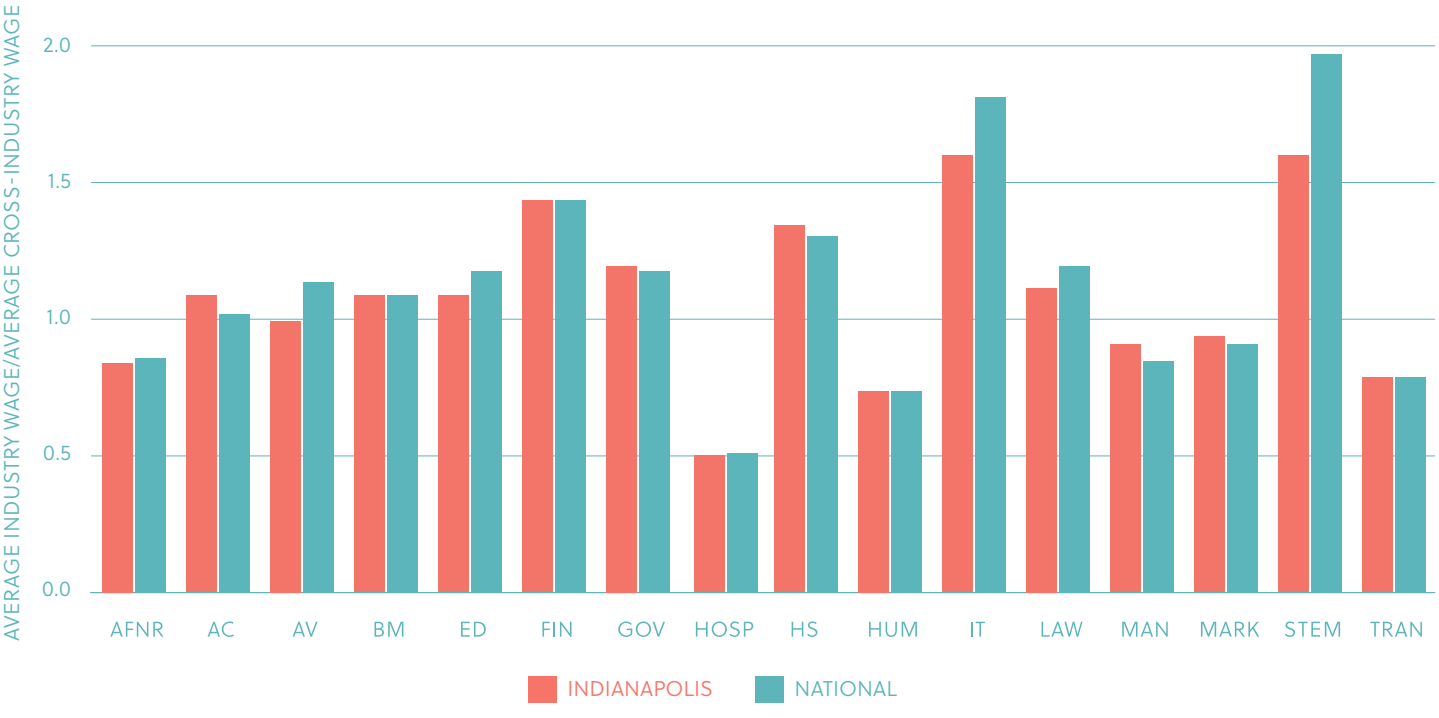
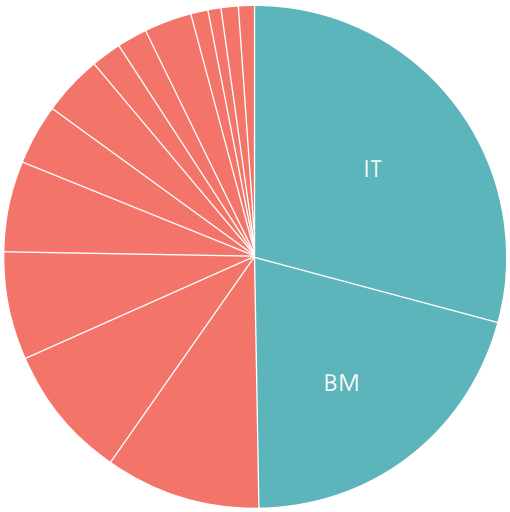


FIGURE 3 CTE course-taking in Indianapolis

Half of the CTE courses taken by Indianapolis high school students are in two fields: IT and Business Management & Administration. Almost no students take CTE courses in Government & Public Administration; Manufacturing; or Agriculture, Food & Natural Resources.



IT	29.7%
BM	21.3%
STEM	10.3%
AV	8.6%
HOSP	7.0%
HS	6.4%
FIN	4.0%
MARK	3.9%
TRAN	2.1%
ED	1.5%
LAW	1.5%
AC	1.4%
HUM	1.1%
MAN	0.9%
AFNR	0.3%
GOV	0.0%

FIGURE 4 CTE course-taking in Indianapolis versus the United States

The average Indianapolis high school student takes twice as many IT courses as the average U.S. high school student—and significantly more courses in Business Management & Administration. However, compared to students in the rest of the country, Indianapolis students take fewer courses in fields such as Agriculture, Food & Natural Resources; Architecture & Construction; and Manufacturing.

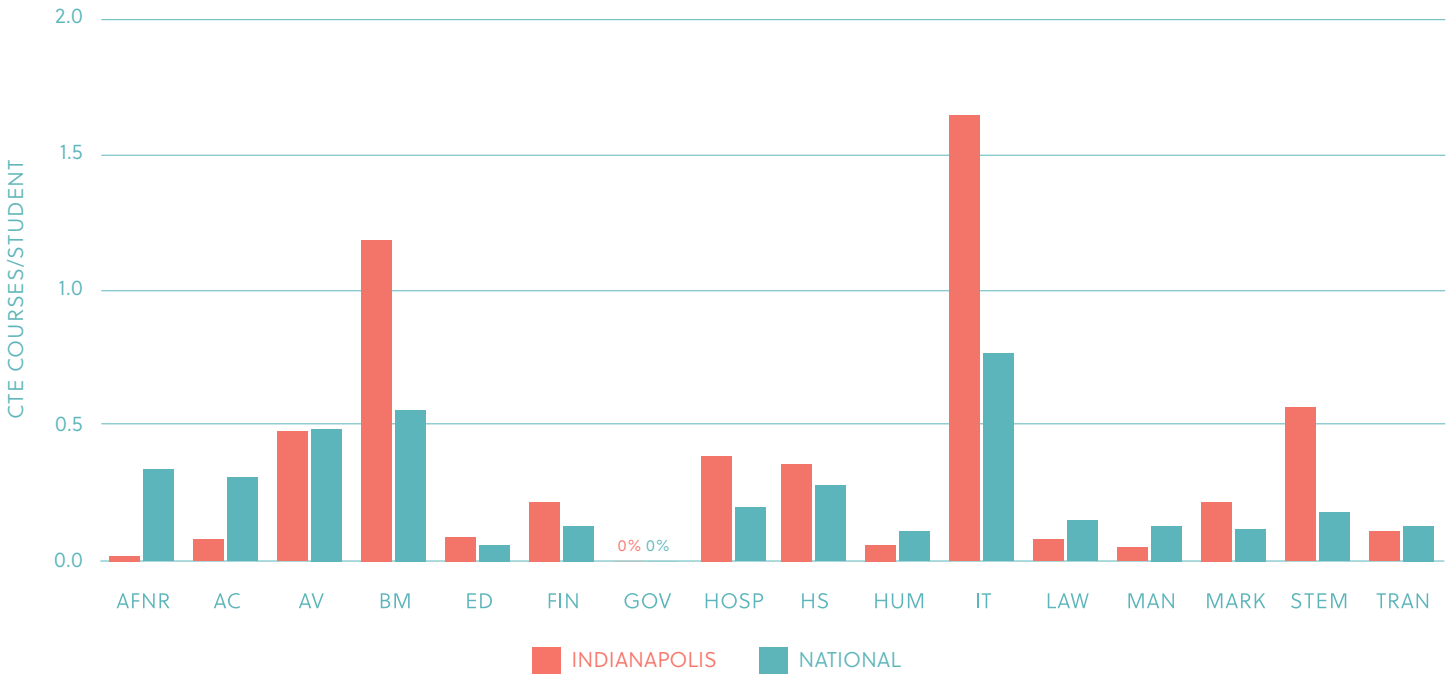
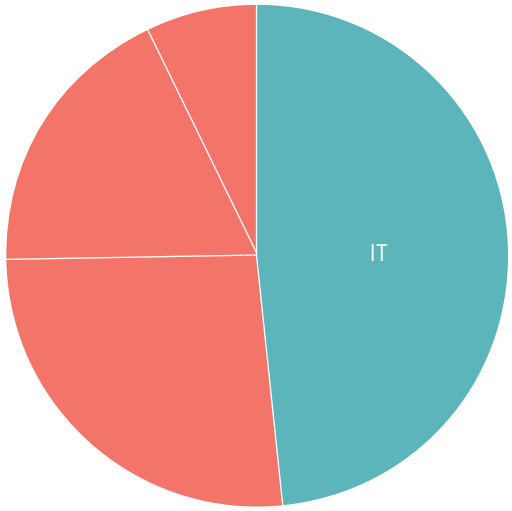


FIGURE 5 CTE concentrations in Indianapolis

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

The IT field alone accounts for nearly half of the CTE concentrations in Indianapolis.



IT	48.3%
BM	26.2%
STEM	18.2%
MAN	7.3%
AFNR	0.0%
AC	0.0%
AV	0.0%
ED	0.0%
FIN	0.0%
GOV	0.0%
HOSP	0.0%
HS	0.0%
HUM	0.0%
LAW	0.0%
MARK	0.0%
TRAN	0.0%

FIGURE 6 CTE concentrations in Indianapolis versus the United States

Compared to their peers in the rest of the U.S., Indianapolis high school students are much more likely to concentrate in IT; STEM; and Business Management & Administration. However, they are less likely to concentrate in most other fields.

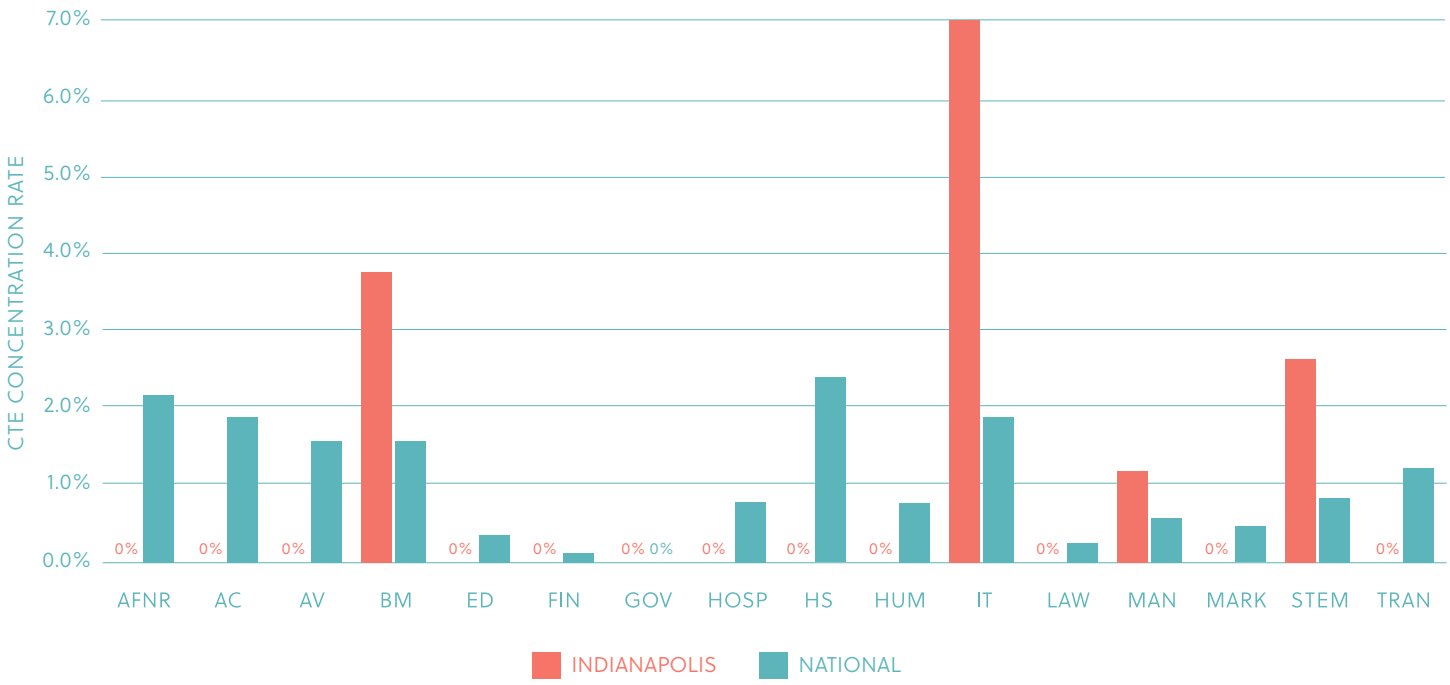
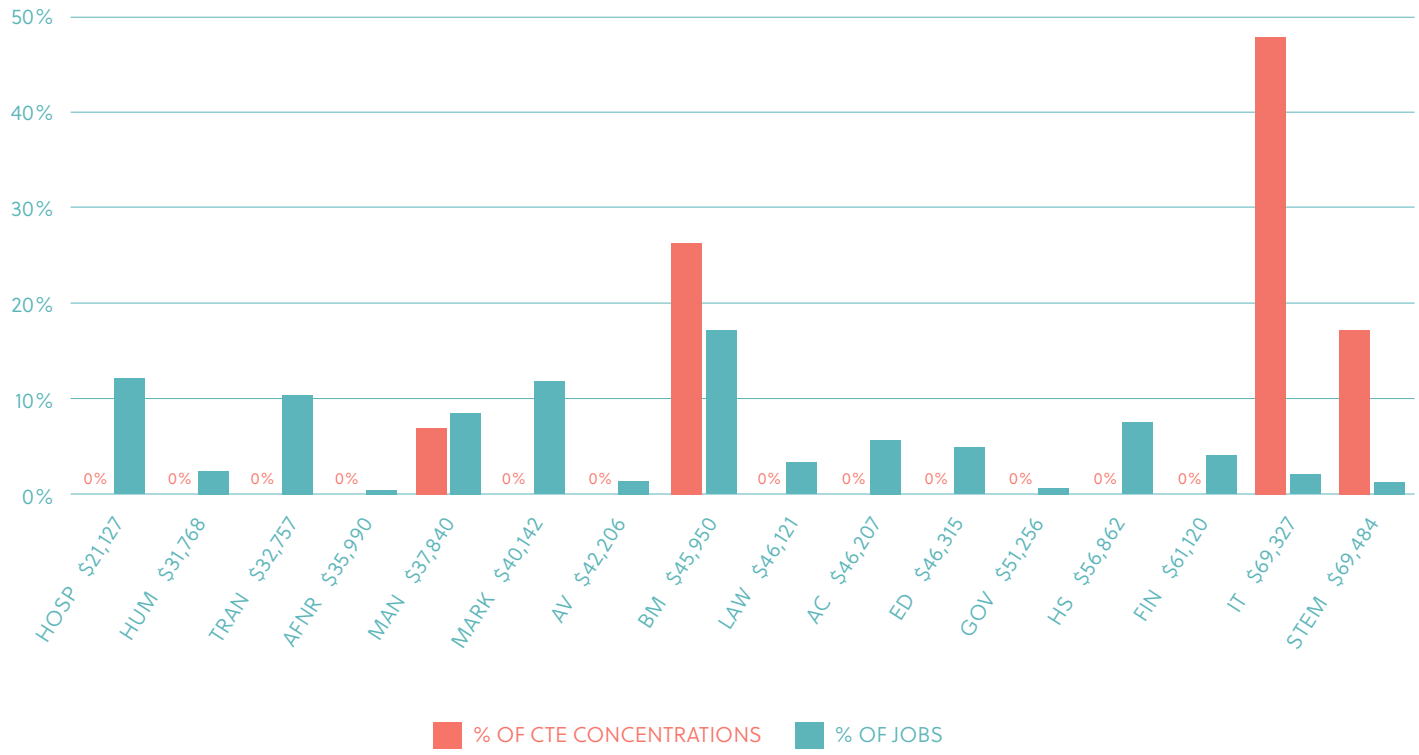


FIGURE 7 Employment and CTE concentrations in Indianapolis

The distribution of CTE concentrations in Indianapolis is highly skewed towards higher-paying fields. For example, the IT and STEM fields account for half of all CTE concentrations, but just 3.3 percent of local employment. And conversely, almost no Indianapolis students concentrate in lower-paying fields such as Hospitality & Tourism; Human Services; Marketing; and Transportation, Distribution & Logistics.



1 Technically, this area comprises the metropolitan statistical area known as Indianapolis-Carmel, IN. Because only 130 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Indianapolis

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	INDIANAPOLIS	INDIANAPOLIS	U.S.	INDIANAPOLIS	U.S.	INDIANAPOLIS	U.S.
AFNR	4,163	0.5	1.0	35,989	37,851	0.8	0.9
AC	49,820	5.7	6.2	46,207	44,563	1.1	1.0
AV	11,928	1.4	1.4	42,205	50,110	1.0	1.1
BM	150,180	17.2	18.0	45,950	47,744	1.1	1.1
ED	43,000	4.9	6.8	46,314	51,809	1.1	1.2
FIN	35,295	4.0	3.9	61,119	63,196	1.4	1.4
GOV	5,598	0.6	0.8	51,255	51,524	1.2	1.2
HOSP	106,028	12.1	12.5	21,126	22,387	0.5	0.5
HS	65,965	7.5	7.2	56,861	57,439	1.3	1.3
HUM	21,448	2.5	3.4	31,768	32,322	0.7	0.7
IT	18,303	2.1	2.0	69,327	79,829	1.6	1.8
LAW	29,283	3.4	3.7	46,121	52,811	1.1	1.2
MAN	74,493	8.5	8.9	37,840	37,403	0.9	0.9
MARK	103,485	11.9	11.6	40,141	39,678	0.9	0.9
STEM	11,048	1.3	1.5	69,483	86,651	1.6	2.0
TRAN	90,780	10.4	8.2	32,757	34,501	0.8	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Indianapolis

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	INDIANAPOLIS	U.S.	INDIANAPOLIS	U.S.	INDIANAPOLIS	U.S.	INDIANAPOLIS	U.S.
AFNR	0.0	0.3	0.3	8.7	0.0	2.1	0.0	12.8
AC	0.1	0.3	1.4	7.9	0.0	1.9	0.0	11.3
AV	0.5	0.5	8.6	12.4	0.0	1.5	0.0	9.0
BM	1.2	0.6	21.3	14.0	3.8	1.5	26.2	8.9
ED	0.1	0.1	1.5	1.5	0.0	0.4	0.0	2.2
FIN	0.2	0.1	4.0	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
HOSP	0.4	0.2	7.0	5.1	0.0	0.9	0.0	5.2
HS	0.4	0.3	6.4	7.0	0.0	2.4	0.0	14.4
HUM	0.1	0.1	1.1	2.7	0.0	0.7	0.0	4.0
IT	1.6	0.8	29.7	19.3	7.0	1.9	48.3	11.2
LAW	0.1	0.1	1.5	3.7	0.0	0.4	0.0	2.2
MAN	0.1	0.1	0.9	3.3	1.1	0.5	7.3	3.0
MARK	0.2	0.1	3.9	3.0	0.0	0.4	0.0	2.7
STEM	0.6	0.2	10.3	4.7	2.6	0.8	18.2	4.8
TRAN	0.1	0.1	2.1	3.4	0.0	1.2	0.0	7.5
TOTAL	**5.6**	**4.0**	**100**	**100**	**12.6****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Los Angeles

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the Los Angeles metropolitan area.[1]

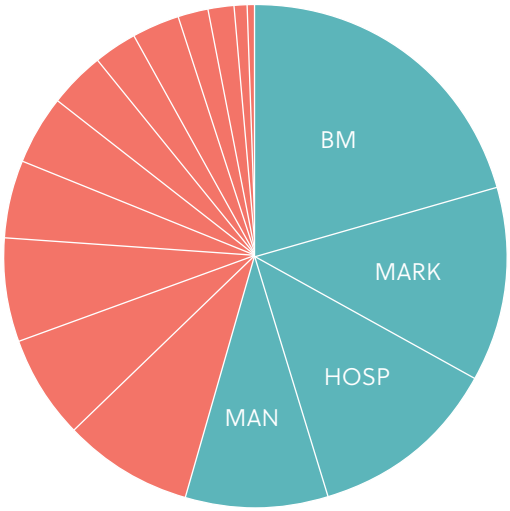
Given the number of local jobs they support, higher-paying fields account for a disproportionate share of Los Angeles CTE. In fact, two such fields—IT and Arts, A/V Technology & Communications—account for almost one-third of CTE course-taking. In contrast, almost no Los Angeles students take courses in low-wage industries such as Manufacturing and Human Services.

Of the four large industries that support the majority of Los Angeles jobs—Marketing; Manufacturing; Hospitality & Tourism; and Business Management & Administration—only one (Hospitality & Tourism) sees meaningful levels of CTE course-taking at the high school level. And in general, students in the Los Angeles area are unlikely to concentrate in any of the sixteen CTE clusters.

Leaders involved in education and workforce development in Los Angeles should consider how more students might be encouraged to focus on underserved industries with strong current and future job prospects.

FIGURE 1 Employment in Los Angeles

Currently, more than half of the jobs in the Los Angeles metropolitan area are in four fields: Business Management & Administration; Marketing; Hospitality & Tourism; and Manufacturing. Compared to the rest of the U.S., Los Angeles has a slightly larger Business Management & Administration sector, but fewer jobs in Human Services and Architecture & Construction.



BM	19.9%
MARK	11.9%
HOSP	11.9%
MAN	8.8%
TRAN	7.9%
ED	6.4%
HS	6.3%
AC	4.8%
FIN	4.3%
LAW	3.5%
AV	2.8%
HUM	2.8%
IT	2.0%
STEM	1.6%
AFNR	0.6%
GOV	0.5%

FIGURE 2 Industry wages in Los Angeles versus the United States

On average, STEM and IT are the highest-paying fields in Los Angeles—and the rest of the United States—while Hospitality & Tourism and Transportation, Distribution & Logistics are the lowest-paying fields. STEM and IT wages are higher in Los Angeles than in the rest of the country, with the average Los Angeles STEM worker making $98,000, or about twice as much as the average Los Angeles worker. (See Table 1 for wages.)

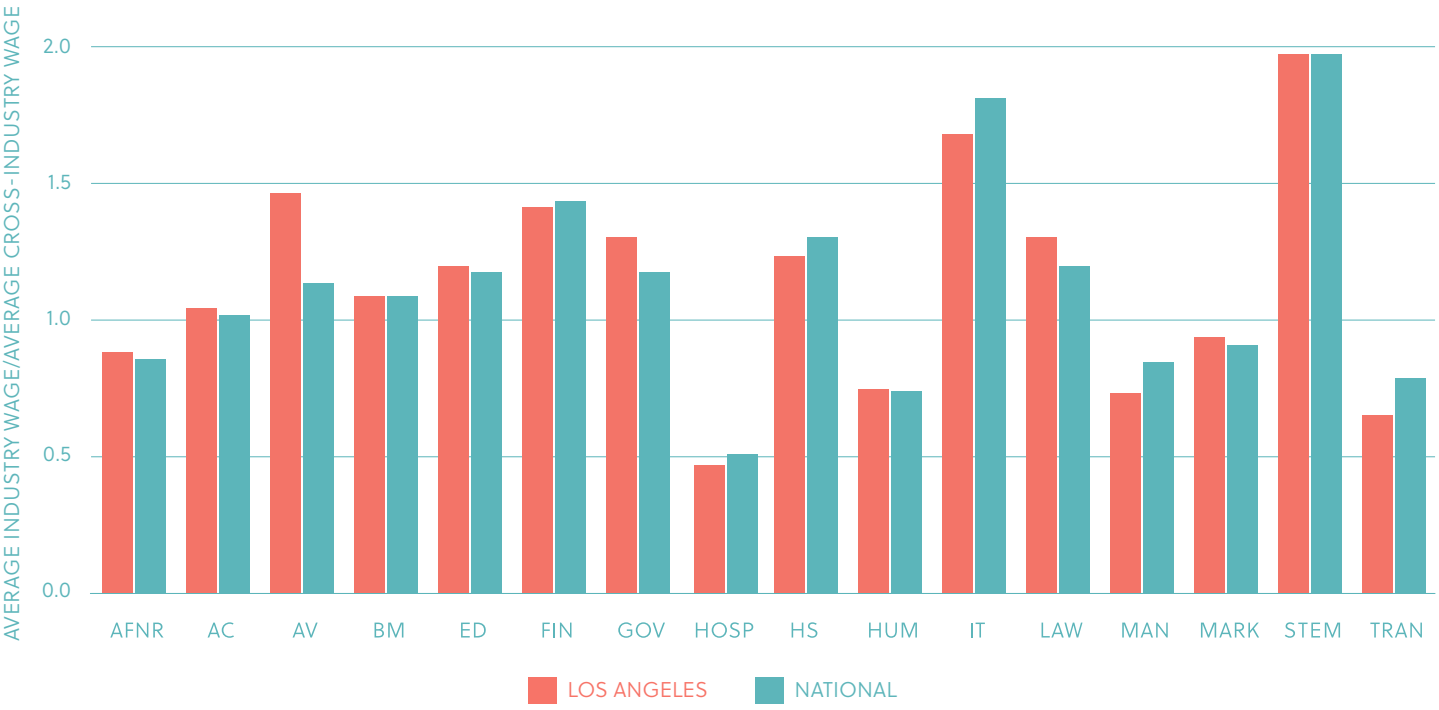
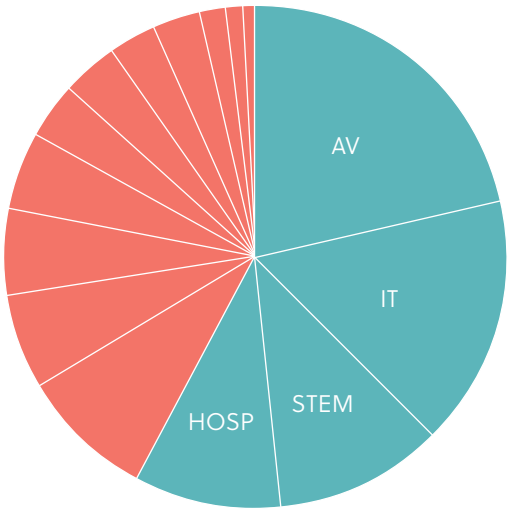


FIGURE 3 CTE course-taking in Los Angeles

Over half of the CTE courses taken by high school students in the Los Angeles metropolitan area are in four fields: Arts, A/V Technology & Communications; IT; STEM; and Hospitality & Tourism. Almost no students take CTE courses in Government & Public Administration; Education & Training; or Finance.



AV	21.6%
IT	16.0%
STEM	11.0%
HOSP	9.4%
BM	8.7%
HUM	6.1%
LAW	5.5%
AFNR	4.9%
TRAN	3.7%
AC	3.5%
MARK	3.1%
HS	3.0%
MAN	1.8%
FIN	1.1%
ED	0.7%
GOV	0.0%

FIGURE 4 CTE course-taking in Los Angeles versus the United States

Compared to students in the rest of the country, students in Los Angeles take more courses in STEM and Arts, A/V Technology & Communications. However, they take fewer courses in IT; Manufacturing; and Business Management & Administration.

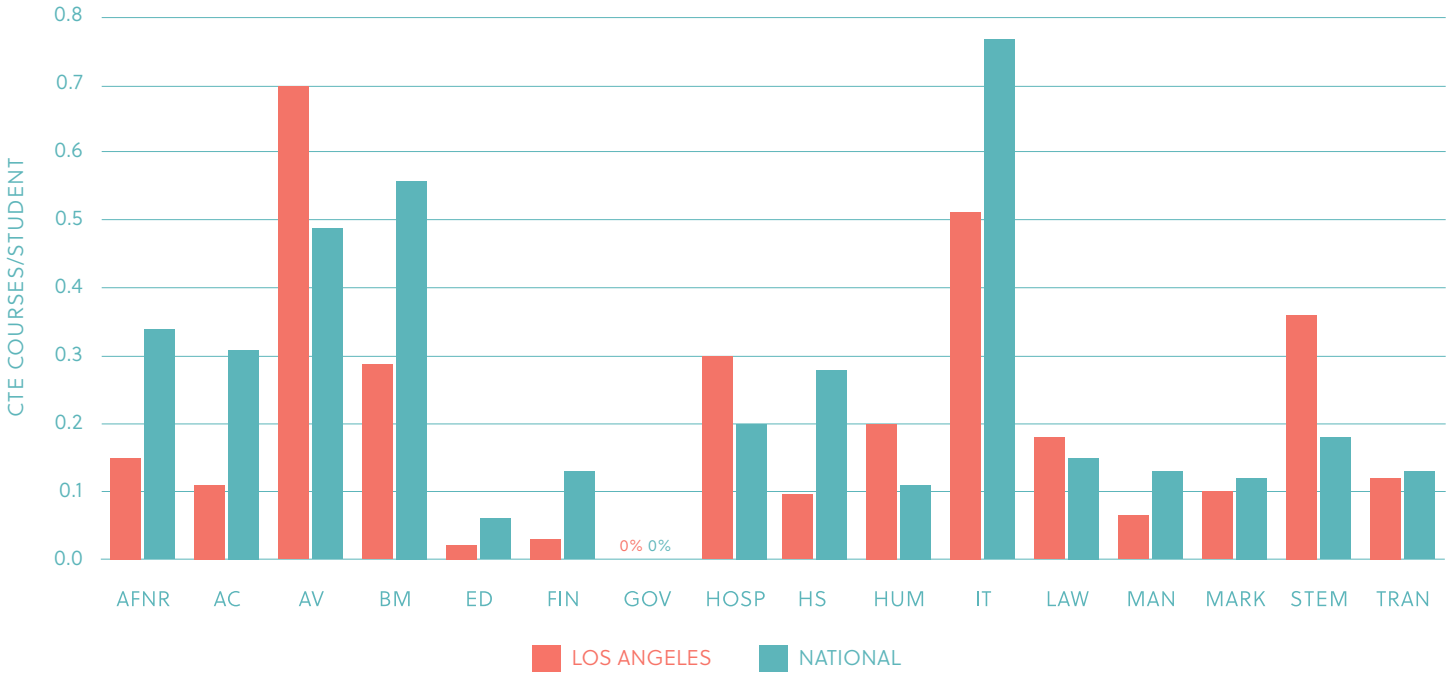
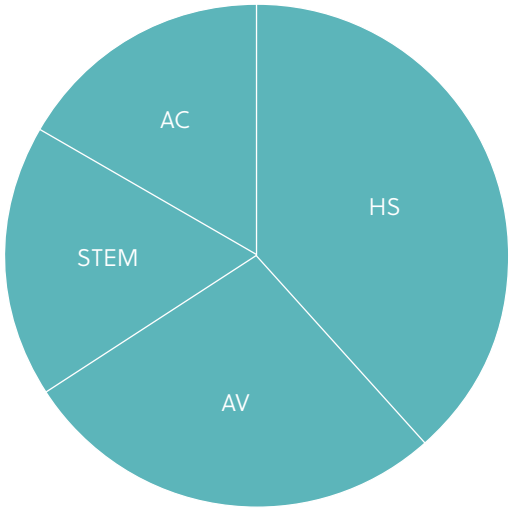


FIGURE 5 CTE concentrations in Los Angeles

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

Nearly all of the CTE concentrations in Los Angeles are in four fields: Health Science; Arts, A/V Technology & Communications; STEM; and Architecture & Construction.



HS	35.2%
AV	25.0%
STEM	23.3%
AC	16.5%
AFNR	0.0%
BM	0.0%
ED	0.0%
FIN	0.0%
GOV	0.0%
HOSP	0.0%
HUM	0.0%
IT	0.0%
LAW	0.0%
MAN	0.0%
MARK	0.0%
TRAN	0.0%

FIGURE 6 CTE concentrations in Los Angeles versus the United States

Compared to their peers in the rest of the U.S., high school students in Los Angeles are less likely to concentrate in nearly every field—including relatively popular fields such as Health Science and Arts, A/V Technology & Communications.

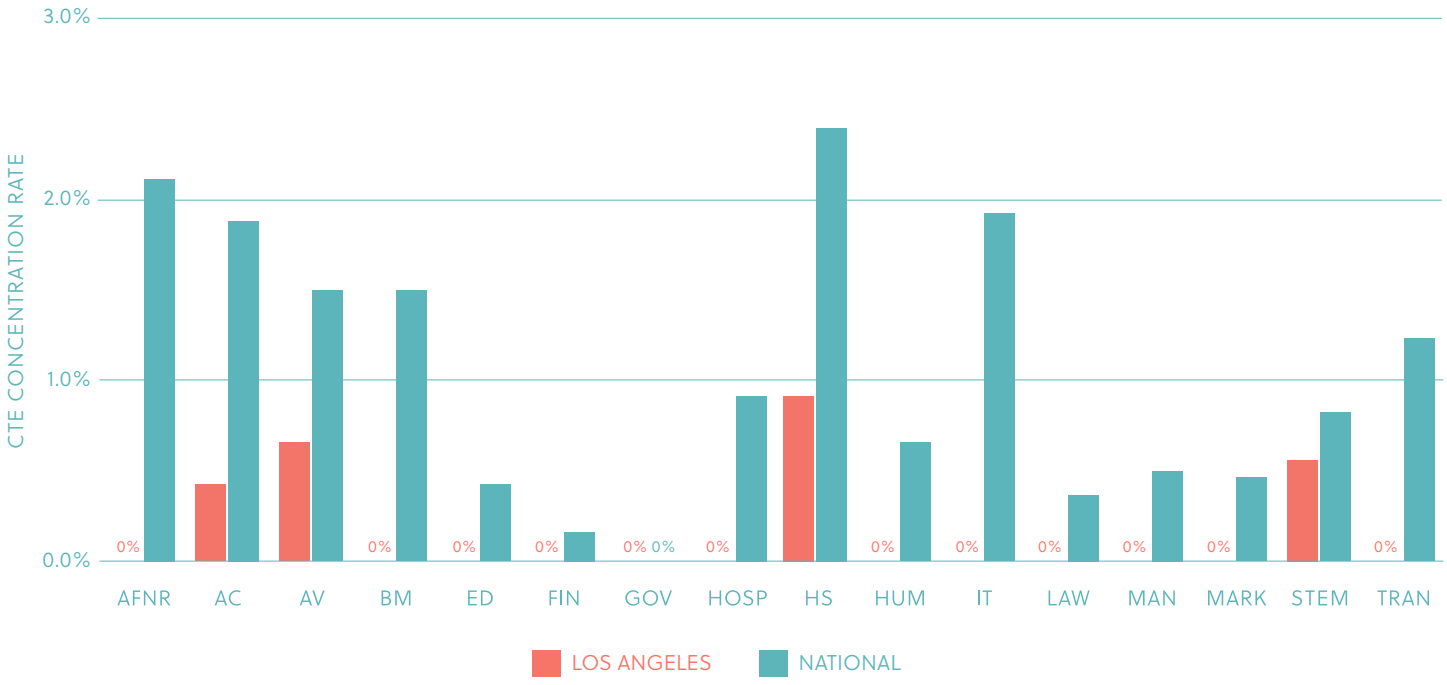


FIGURE 7 Employment and CTE concentrations in Los Angeles

The distribution of CTE concentrations in Los Angeles is highly skewed towards fields with higher average wages. For example, the STEM and Arts, A/V Technology & Communications fields (which have average annual wages of $98,000 and $72,000, respectively) account for almost half of local CTE concentrations, but just 4.4 percent of local employment. Conversely, almost no Los Angeles students concentrate in lower-paying fields such as Marketing; Manufacturing; Hospitality & Tourism; and Transportation, Distribution & Logistics—despite the fact that they support a majority of local jobs.

1 Technically, this area comprises the metropolitan statistical area known as Los Angeles-Long Beach-Santa Ana, CA. Because only 470 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Los Angeles

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	LA	LA	U.S.	LA	U.S.	LA	U.S.
AFNR	32,363	0.6	1.0	43,705	37,852	0.9	0.9
AC	259,660	4.8	6.2	51,601	44,564	1.0	1.0
AV	148,480	2.8	1.4	71,773	50,110	1.5	1.4
BM	1,067,723	19.9	18.0	54,732	47,745	1.1	1.1
ED	341,515	6.3	6.8	59,011	51,810	1.2	1.2
FIN	231,375	4.3	3.9	70,239	63,197	1.4	1.4
GOV	25,160	0.5	0.8	66,352	51,525	1.3	1.3
HOSP	641,315	11.9	12.5	23,178	22,388	0.5	0.5
HS	338,328	6.3	7.2	60,955	57,440	1.2	1.2
HUM	148,043	2.8	3.4	36,995	32,322	0.8	0.7
IT	105,783	2.0	2.0	84,226	79,830	1.7	1.7
LAW	186,515	3.5	3.7	65,120	52,812	1.3	1.3
MAN	473,273	8.8	8.9	36,192	37,404	0.7	0.7
MARK	641,530	11.9	11.6	45,881	39,679	0.9	0.9
STEM	86,655	1.6	1.5	98,249	86,651	2.0	2.0
TRAN	425,650	7.9	8.2	34,279	34,502	0.7	0.7

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Los Angeles

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	LA	U.S.	LA	U.S.	LA	U.S.	LA	U.S.
AFNR	0.2	0.3	4.9	8.7	0.0	2.1	0.0	12.8
AC	0.1	0.3	3.5	7.9	0.4	1.9	16.5	11.3
AV	0.7	0.5	21.6	12.4	0.6	1.5	25.0	9.0
BM	0.3	0.6	8.7	14.0	0.0	1.5	0.0	8.9
ED	0.0	0.1	0.7	1.5	0.0	0.4	0.0	2.2
FIN	0.0	0.1	1.1	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
HOSP	0.3	0.2	9.4	5.1	0.0	0.9	0.0	5.2
HS	0.1	0.3	3.0	7.0	0.9	2.4	35.2	14.4
HUM	0.2	0.1	6.1	2.7	0.0	0.7	0.0	4.0
IT	0.5	0.8	16.0	19.3	0.0	1.9	0.0	11.2
LAW	0.2	0.1	5.5	3.7	0.0	0.4	0.0	2.2
MAN	0.1	0.1	1.8	3.3	0.0	0.5	0.0	3.0
MARK	0.1	0.1	3.1	3.0	0.0	0.4	0.0	2.7
STEM	0.4	0.2	11.0	4.7	0.6	0.8	23.3	4.8
TRAN	0.1	0.1	3.7	3.4	0.0	1.2	0.0	7.5
Total	**3.3**	**4.0**	**100**	**100**	**2.4****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

New York City

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the New York City metropolitan area.[1]

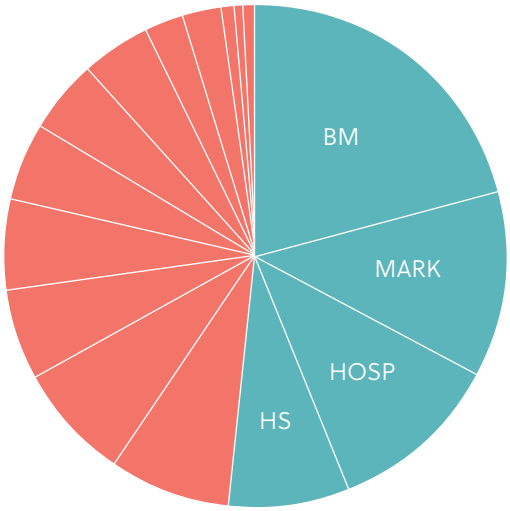
Given the number of jobs they support, higher-paying career clusters account for a disproportionate share of CTE course-taking in New York City. For example, the IT and STEM fields account for 17 percent of local CTE course-taking but only 3 percent of local employment. In contrast, CTE concentrations in New York City are skewed towards lower-paying fields. For example, two of the lowest-paying industries—Hospitality & Tourism and Transportation, Distribution & Logistics—account for half of concentrations, but just 18 percent of employment.

Of the four large industries that support the majority of New York City jobs—Marketing; Health Science; Business Management & Administration; and Hospitality & Tourism—only two see meaningful levels of CTE course-taking at the high school level.

Leaders who are involved in education and workforce development in New York City should consider how more students might be encouraged to focus on underserved clusters with strong job prospects.

FIGURE 1 Employment in New York City

Currently, almost half of the jobs in the New York City metropolitan area are in four industries: Business Management & Administration; Marketing; Hospitality & Tourism; and Health Science. Compared to the rest of the U.S., New York City has an unusually large Finance sector, but fewer jobs in Architecture & Construction and Manufacturing.



BM	19.8%
MARK	11.3%
HOSP	10.5%
HS	7.4%
ED	7.4%
TRAN	7.1%
MAN	5.5%
FIN	5.3%
AC	4.8%
HUM	4.6%
LAW	4.0%
IT	2.4%
AV	2.3%
STEM	0.9%
GOV	0.6%
AFNR	0.6%

FIGURE 2 Industry wages in New York City versus the United States

On average, the IT; STEM; and Finance sectors have the highest wages in New York City, while the Hospitality & Tourism and Human Services sectors have the lowest wages. In general, wage ratios in New York City are similar to industry wage ratios for the country as a whole. However, average wages in the city Finance sector are somewhat higher in other places, with the average New York City Finance worker making approximately $93,000, or about 1.7 times as much as the average New York City worker. (See Table 1 for wages.)

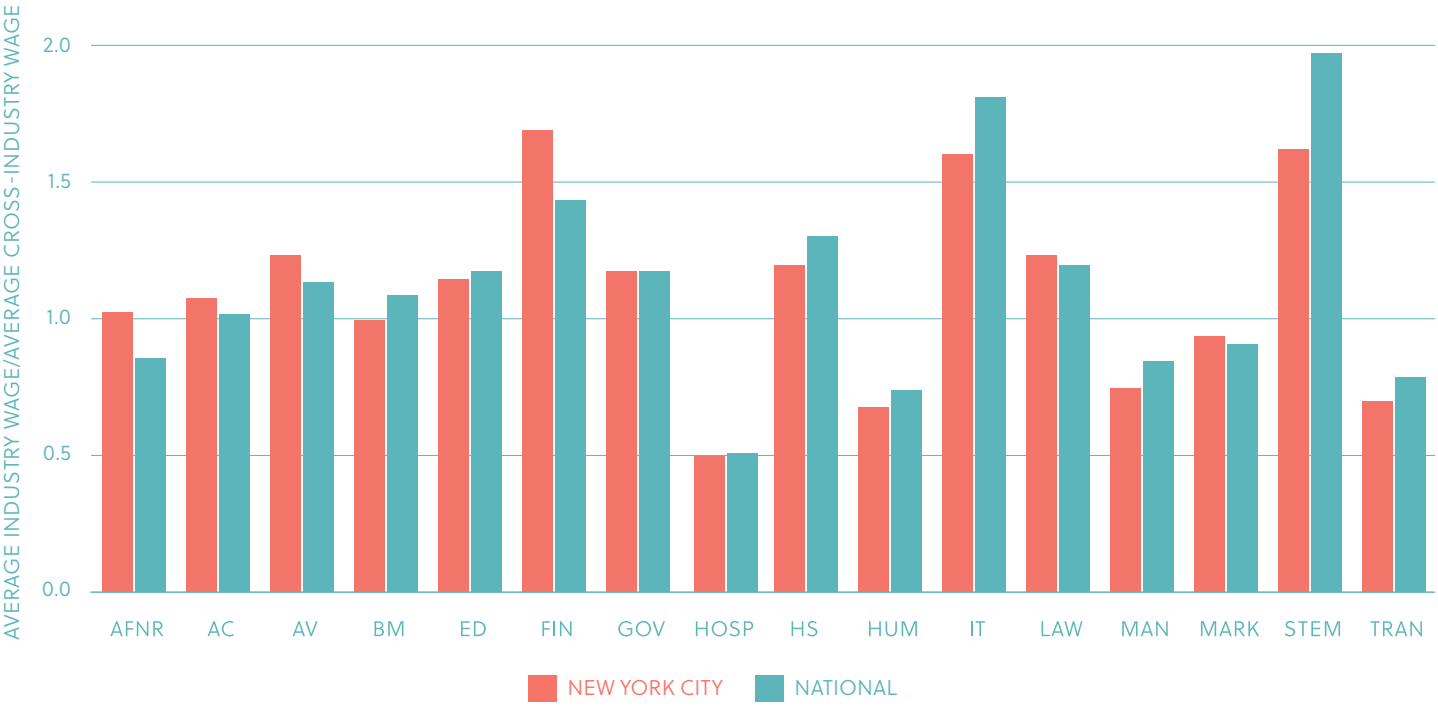
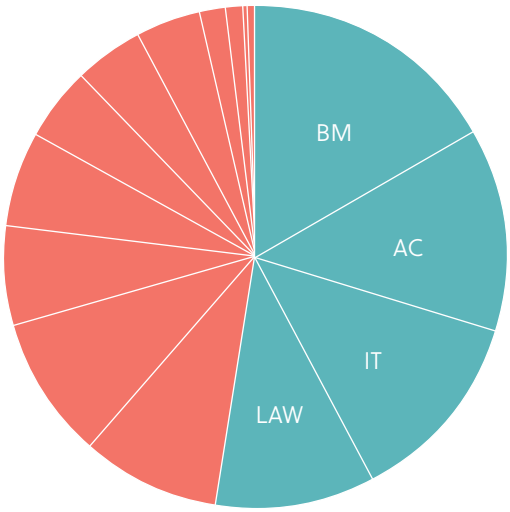


FIGURE 3 CTE course-taking in New York City

Over half of the CTE courses taken by students in the New York City metropolitan area are in four fields: Business Management & Administration; Architecture & Construction; IT; and Law, Public Safety, Corrections & Security. Almost no students take CTE courses in Government & Public Administration; Education & Training; or Agriculture; Food & Natural Resources.



BM	16.7%
AC	13.1%
IT	12.5%
LAW	10.2%
MAN	9.0%
AV	9.0%
HOSP	6.5%
FIN	6.0%
MARK	4.8%
TRAN	4.3%
STEM	4.3%
HS	1.6%
HUM	1.1%
AFNR	0.4%
ED	0.3%
GOV	0.0%

FIGURE 4 CTE course-taking in New York City versus the United States

Compared to students in the rest of the country, New York City high school students take about twice as many courses in Manufacturing, as well as Law, Public Safety, Corrections & Security. However, they take fewer courses in IT; Health Science; and Agriculture Food & Natural Resources.

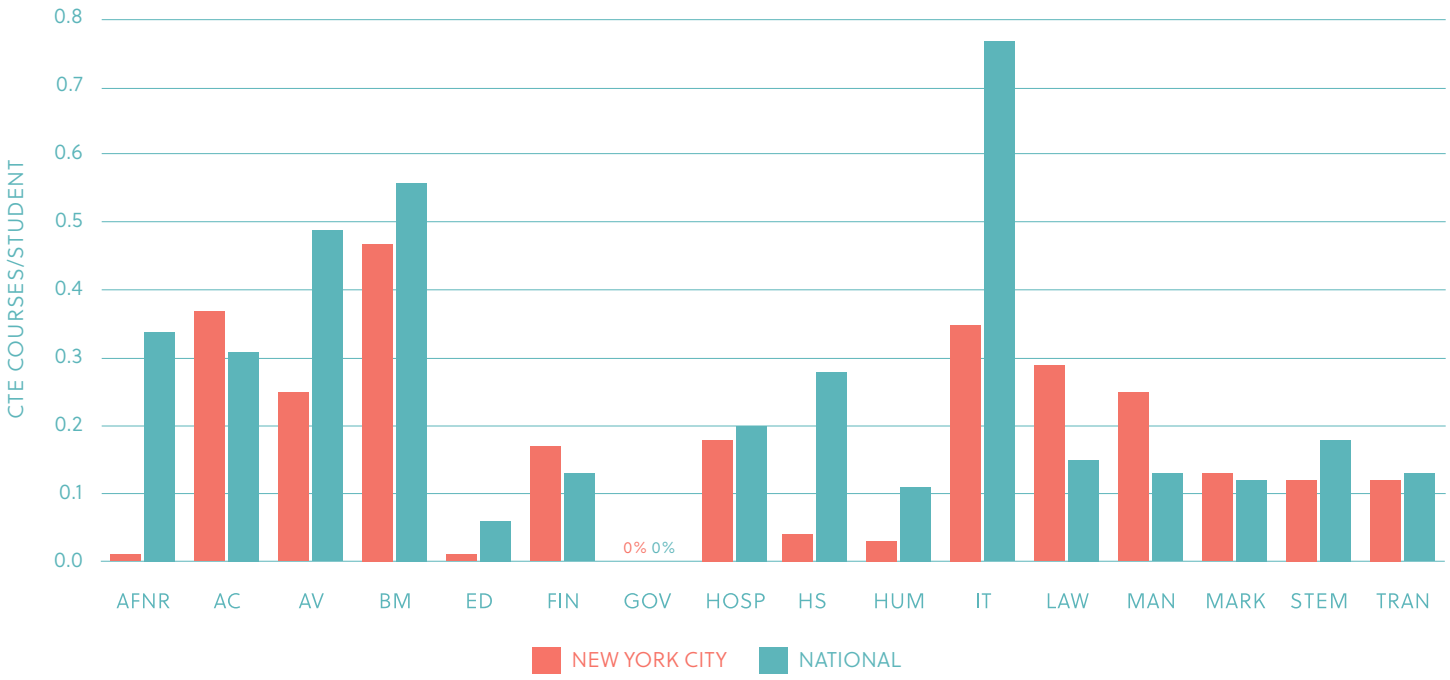
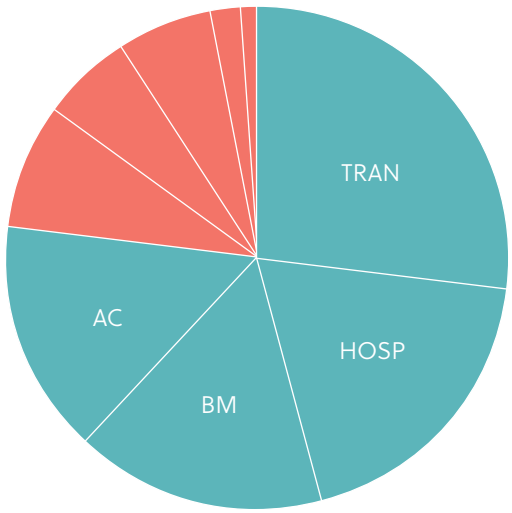


FIGURE 5 CTE concentrations in New York City

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

In New York City, four fields account for three-quarters of CTE concentrations: Transportation, Distribution & Logistics; Hospitality & Tourism; Business Management & Administration; and Architecture & Construction.



TRAN	26.6%
HOSP	18.5%
BM	16.4%
AC	14.8%
MAN	8.1%
AV	6.3%
IT	6.0%
HS	2.3%
LAW	1.0%
AFNR	0.0%
ED	0.0%
FIN	0.0%
GOV	0.0%
HUM	0.0%
MARK	0.0%
STEM	0.0%

FIGURE 6 CTE concentrations in New York City versus the United States

Compared to their peers in the rest of the U.S., high school students in New York City are somewhat more likely to concentrate in Hospitality & Tourism and Transportation, Distribution & Logistics. However, they are less likely to concentrate in IT; Health Science; and Architecture & Construction.

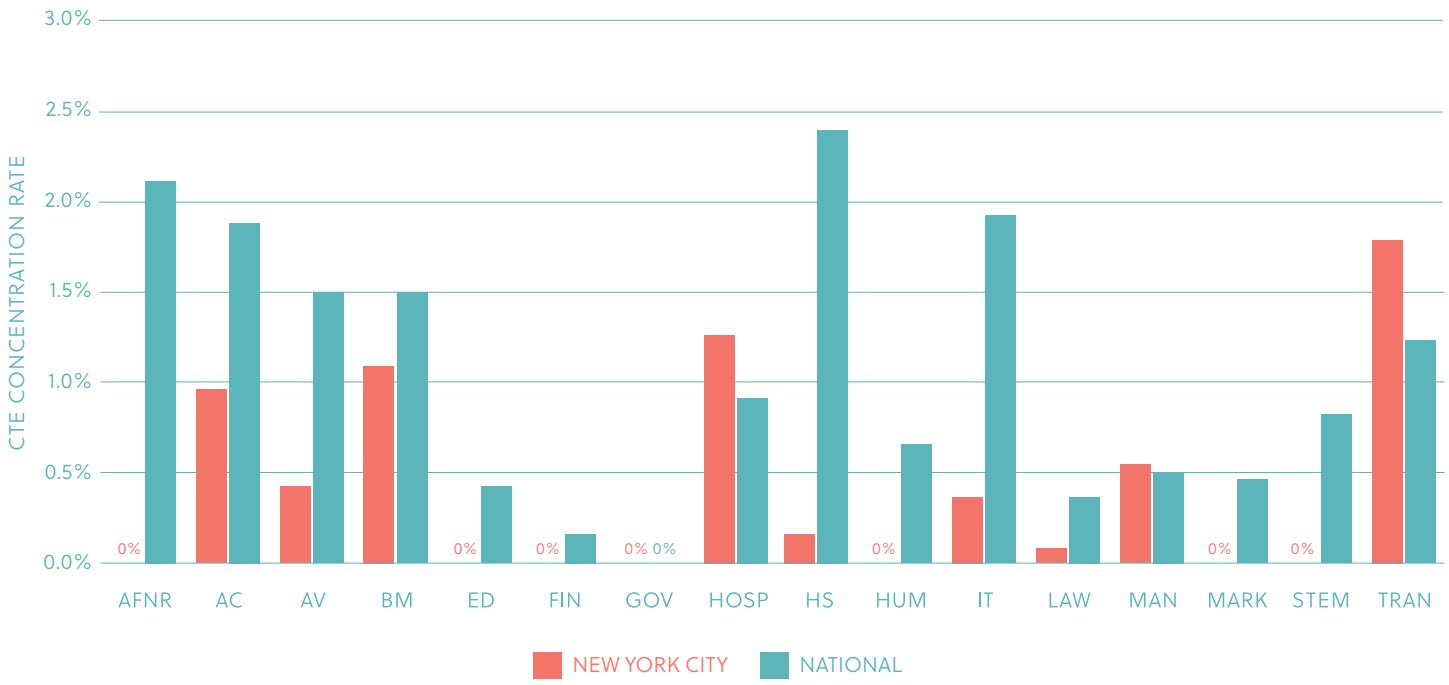
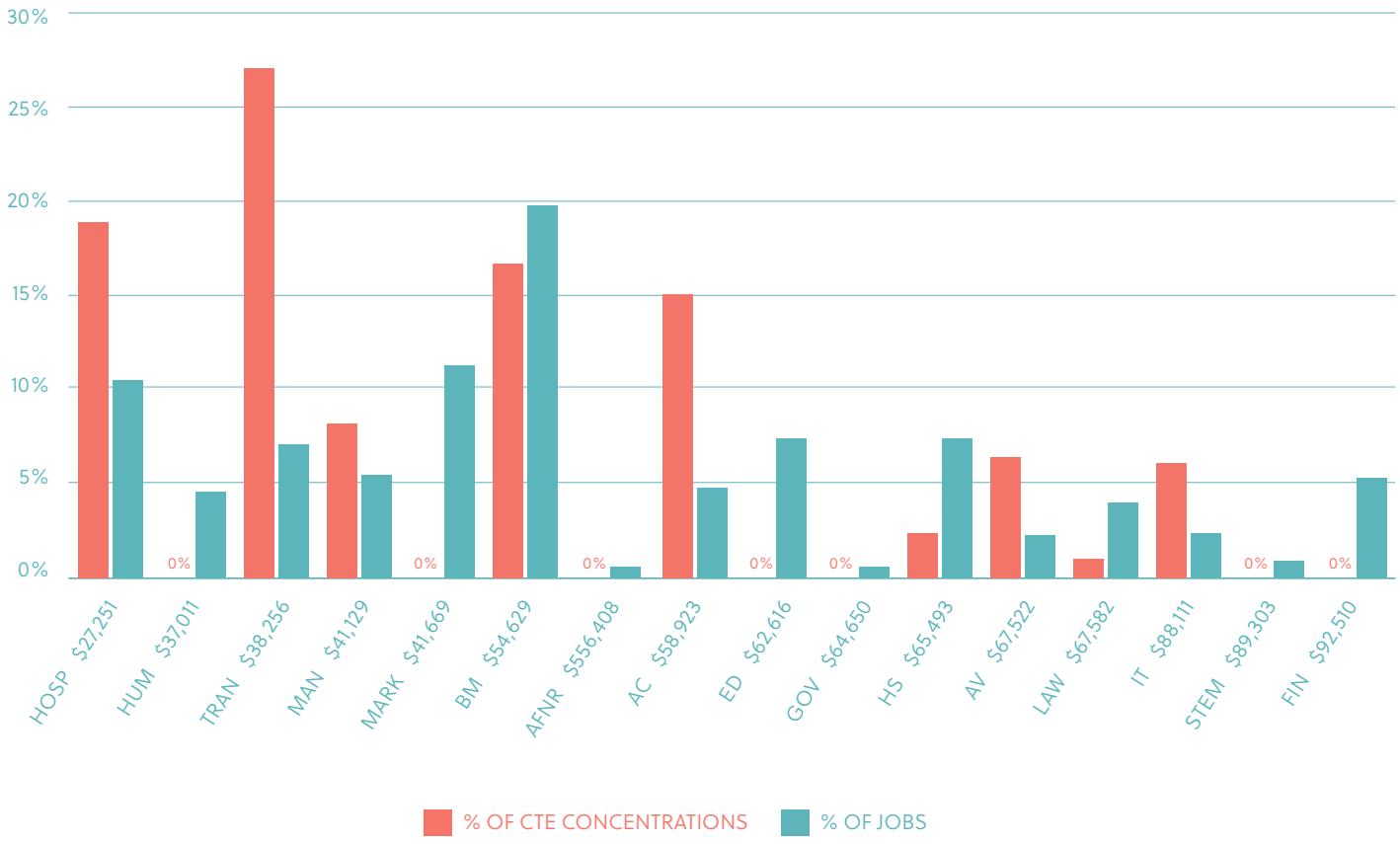


FIGURE 7 Employment and CTE concentrations in New York City

Unlike the distribution of CTE concentrations in most cities, distribution of CTE concentrations in New York City is skewed towards industries with *lower* average wages. For example, the Hospitality & Tourism and Transportation, Distribution & Logistics fields (which have average wages of $27,000 and $38,000, respectively) account for almost half of CTE concentrations. And conversely, almost no New York City students concentrate in higher wage sectors such as Finance; Health Science; or Education & Training, even though they account for one-fifth of local employment (and are unusually high-paying).



1 Technically, this area comprises the metropolitan statistical area known as New York-Northern New Jersey-Long Island, NY-NJ-PA. Because only 670 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in New York City

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	NYC	NYC	U.S.	NYC	U.S.	NYC	U.S.
AFNR	47,195	0.6	1.0	56,408	37,852	1.0	0.9
AC	399,865	4.8	6.2	58,923	44,564	1.1	1.0
AV	185,595	2.3	1.4	67,522	50,110	1.2	1.1
BM	1,635,440	19.8	18.0	54,629	47,745	1.0	1.1
ED	610,978	7.4	6.8	62,616	51,810	1.1	1.2
FIN	440,810	5.3	3.9	92,510	63,197	1.7	1.4
GOV	52,608	0.6	0.8	64,650	51,525	1.2	1.2
HOSP	868,823	10.5	12.5	27,251	22,388	0.5	0.5
HS	613,243	7.4	7.2	65,493	57,440	1.2	1.3
HUM	381,348	4.6	3.4	37,011	32,322	0.7	0.7
IT	199,213	2.4	2.0	88,111	79,830	1.6	1.8
LAW	327,715	4.0	3.7	67,582	52,812	1.2	1.2
MAN	453,778	5.5	8.9	41,129	37,404	0.8	0.9
MARK	929,495	11.3	11.6	51,669	39,679	0.9	0.9
STEM	74,653	0.9	1.5	89,303	86,651	1.6	2.0
TRAN	584,903	7.1	8.2	38,256	34,502	0.7	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in New York City

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	NYC	U.S.	NYC	U.S.	NYC	U.S.	NYC	U.S.
AFNR	0.0	0.3	0.4	8.7	0.0	2.1	0.0	12.8
AC	0.4	0.3	13.1	7.9	1.0	1.9	14.8	11.3
AV	0.3	0.5	9.0	12.4	0.4	1.5	6.3	9.0
BM	0.5	0.6	16.7	14.0	1.1	1.5	16.4	8.9
ED	0.0	0.1	0.3	1.5	0.0	0.4	0.0	2.2
FIN	0.2	0.1	6.0	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
HOSP	0.2	0.2	6.5	5.1	1.2	0.9	18.5	5.2
HS	0.0	0.3	1.6	7.0	0.2	2.4	2.3	14.4
HUM	0.0	0.1	1.1	2.7	0.0	0.7	0.0	4.0
IT	0.4	0.8	12.5	19.3	0.4	1.9	6.0	11.2
LAW	0.3	0.1	10.2	3.7	0.1	0.4	1.0	2.2
MAN	0.3	0.1	9.0	3.3	0.5	0.5	8.1	3.0
MARK	0.1	0.1	4.8	3.0	0.0	0.4	0.0	2.7
STEM	0.1	0.2	4.3	4.7	0.0	0.8	0.0	4.8
TRAN	0.1	0.1	4.3	3.4	1.8	1.2	26.6	7.5
Total	**2.8**	**4.0**	**100**	**100**	**6.5****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Phoenix

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
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BM	Business Management & Administration
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FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and patterns of high school career and technical education (CTE) course-taking in the Phoenix metropolitan area.[1]

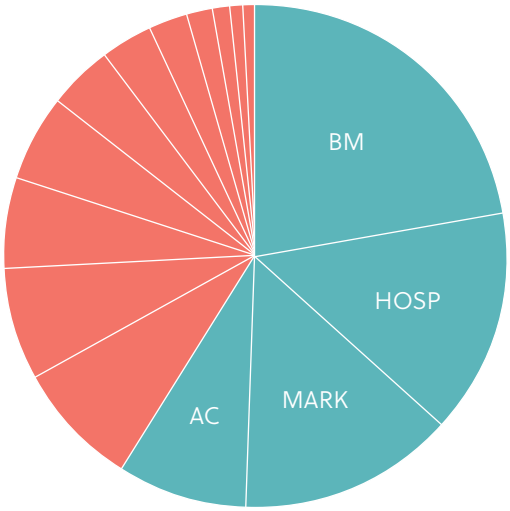
Given the number of jobs they support, higher-paying career fields account for a disproportionate share of Phoenix CTE. In fact, three such sectors—Health Science; STEM; and Business Management & Administration—account for almost half of CTE course-taking and more than 60 percent of CTE concentrations. In contrast, almost no Phoenix students take courses in low-wage clusters such as Hospitality & Tourism and Manufacturing, and relatively few focus on higher-paying fields such as Education & Training and Architecture & Construction.

Of the four large clusters that support the majority of Phoenix jobs—Business Management & Administration; Hospitality & Tourism; Marketing; and Architecture & Construction—only Business Management & Administration sees meaningful levels of CTE course-taking at the high school level.

Leaders who are involved in education and workforce development in Phoenix should consider how more students might be encouraged to focus on underserved clusters with strong current and future job prospects.

FIGURE 1 Employment in Phoenix

Currently, more than half of the jobs in the Phoenix metropolitan area are in four industry clusters: Business Management & Administration; Hospitality & Tourism; Marketing; and Architecture & Construction. Compared to the rest of the U.S., Phoenix has a larger Architecture & Construction sector, but fewer jobs in Education & Training and Human Services.



BM	19.6%
HOSP	12.7%
MARK	12.0%
AC	7.4%
TRAN	7.4%
MAN	7.0%
HS	6.3%
FIN	5.1%
ED	4.8%
LAW	3.8%
HUM	2.9%
IT	2.1%
STEM	1.4%
AV	1.1%
GOV	0.7%
AFNR	0.6%

FIGURE 2 Industry wages in Phoenix versus the United States

The STEM and IT clusters have the highest mean wages in Phoenix—and the rest of the United States—while the Hospitality & Tourism and Human Services sectors have the lowest wages. On average STEM and IT wages in Phoenix are comparable to the rest of the country with the average Phoenix STEM worker making approximately $86,000, more than twice as much as the average Phoenix worker. (See Table 1 for wages.)

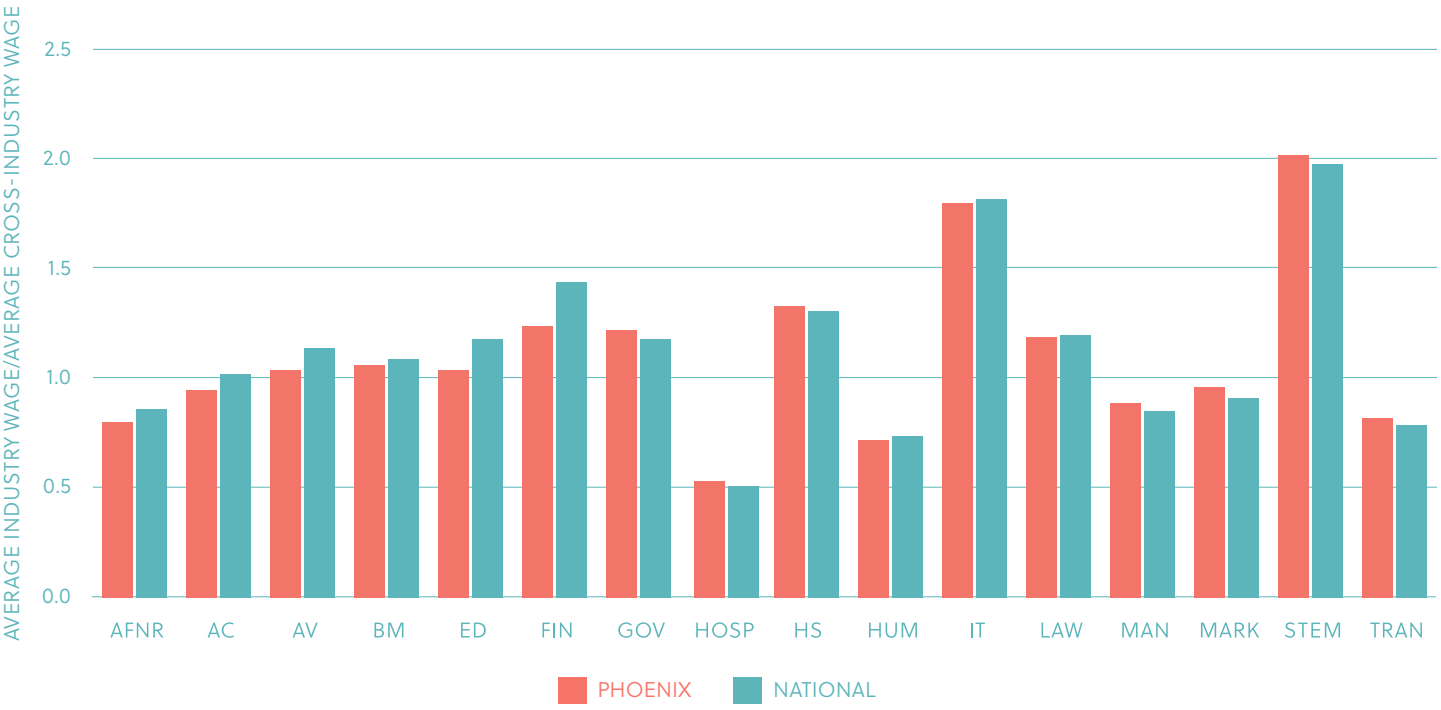
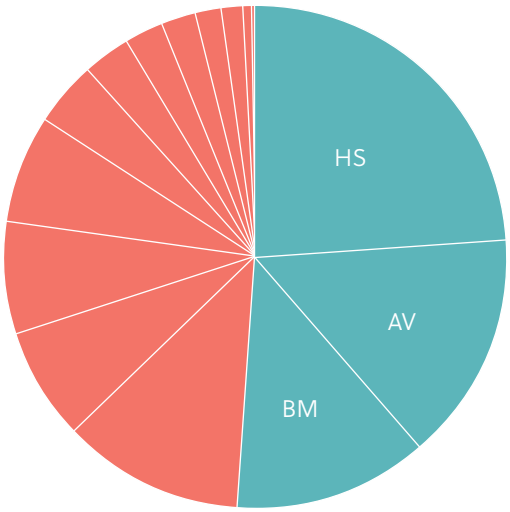


FIGURE 3 CTE course-taking in Phoenix

Almost half of the CTE courses taken by Phoenix high school students are in three fields: Health Science; Arts, A/V Technology & Communications; and Business Management & Administration. Almost no students take CTE courses in Government or Finance.



HS	22.3%
AV	13.7%
BM	11.6%
AFNR	10.9%
HOSP	6.8%
IT	6.8%
ED	6.7%
STEM	6.3%
TRAN	3.9%
MARK	2.8%
LAW	2.5%
AC	1.9%
HUM	1.7%
MAN	1.3%
FIN	0.4%
GOV	0.2%

FIGURE 4 CTE course-taking in Phoenix versus the United States

Almost half of the CTE courses taken by Phoenix high school students are in three fields: Health Science; Arts, A/V Technology & Communications; and Business Management & Administration. Almost no students take CTE courses in Government & Public Administration or Finance.

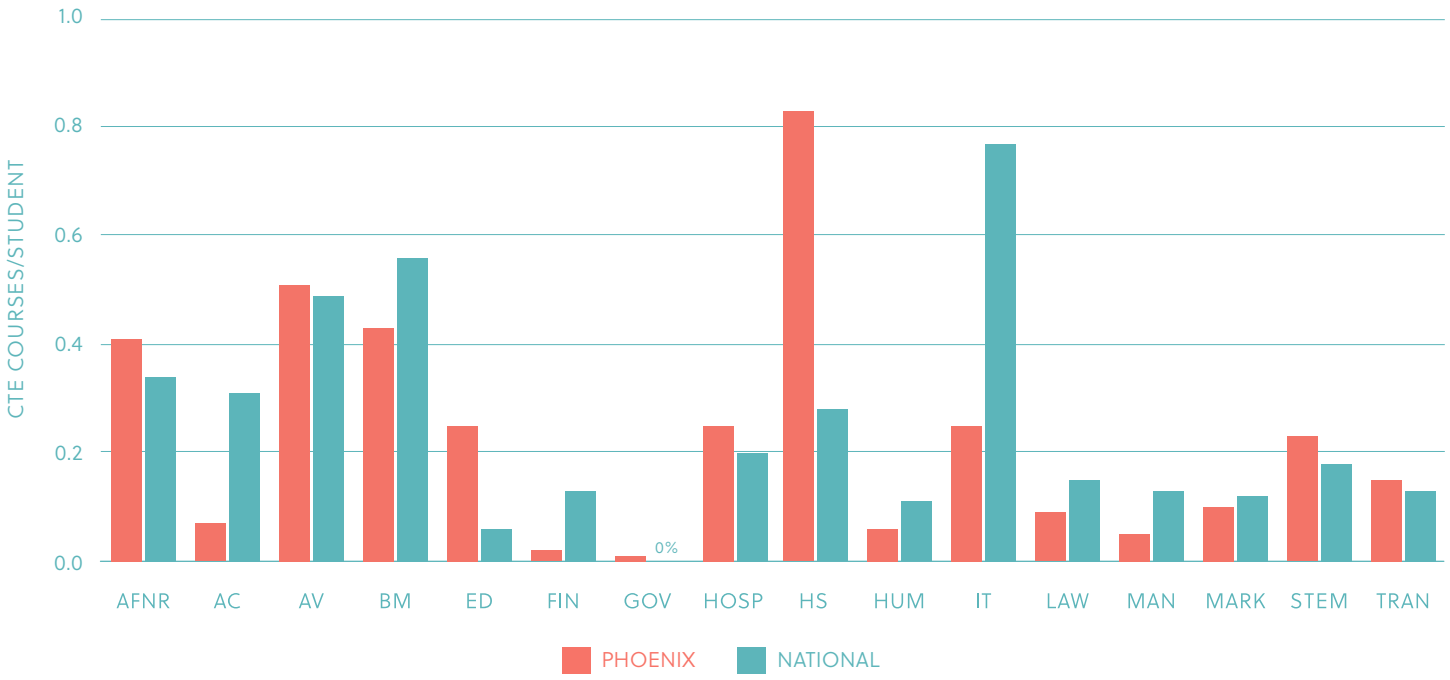
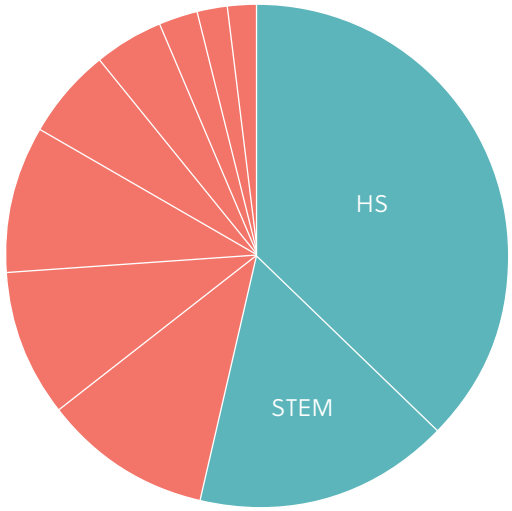


FIGURE 5 CTE concentrations in Phoenix

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

Between them, the Health Science and STEM clusters account for more than half of CTE concentrations in Phoenix.



HS	37.4%
STEM	16.5%
AFNR	10.8%
BM	9.4%
TRAN	9.4%
AV	5.7%
HUM	4.6%
AC	2.4%
MAN	1.9%
ED	1.9%
FIN	0.0%
GOV	0.0%
HOSP	0.0%
IT	0.0%
LAW	0.0%
MARK	0.0%

FIGURE 6 CTE concentrations in Phoenix versus the United States

Compared to their peers in the rest of the U.S., Phoenix high school students are much more likely to concentrate in Health Science and STEM. However, they are somewhat less likely to concentrate in IT and Architecture & Construction.

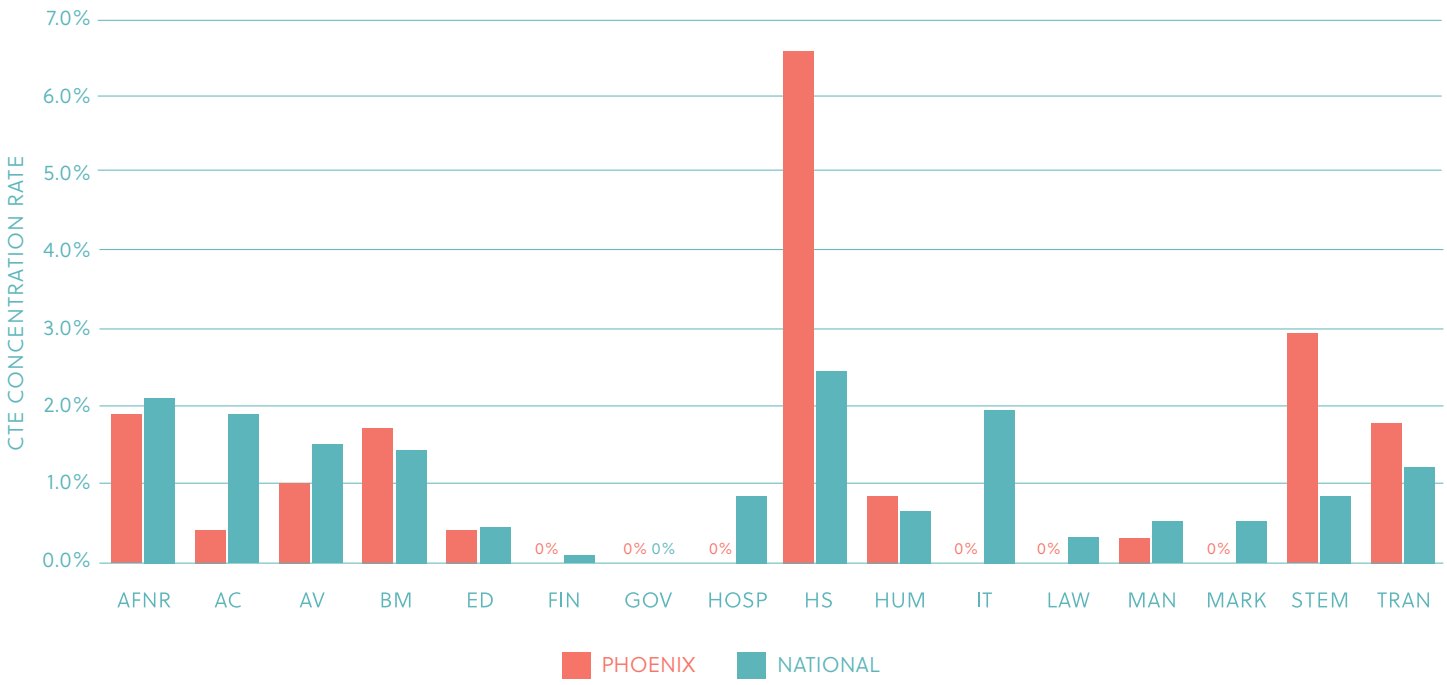
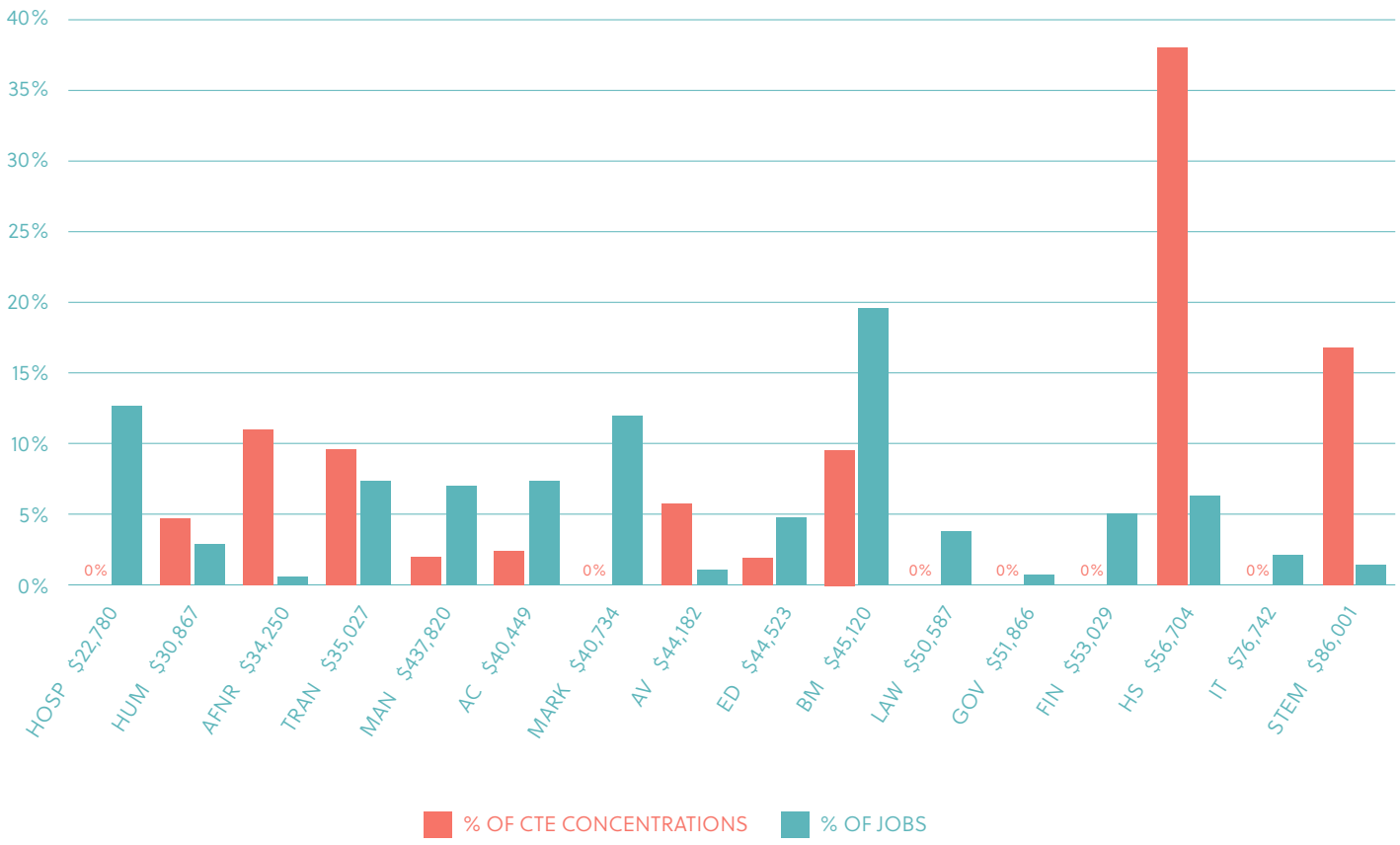


FIGURE 7 Employment and CTE concentrations in Phoenix

The distribution of CTE concentrations in Phoenix is highly skewed towards higher-paying fields. For example, the STEM and Health Science clusters account for half of concentrations, but just 8 percent of local employment. And conversely, almost no Phoenix students concentrate in Manufacturing; Marketing; or Hospitality & Tourism—despite the fact that they account for one-third of local employment.



1 Technically, this area comprises the metropolitan statistical area known as Phoenix-Mesa-Scottsdale, AZ. Because only 180 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Phoenix

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	PHOENIX	PHOENIX	U.S.	PHOENIX	U.S.	PHOENIX	U.S.
AFNR	11,010	0.6	1.0	34,250	37,852	0.8	0.9
AC	130,420	7.4	6.2	40,449	44,564	0.9	1.0
AV	18,510	1.1	1.4	44,182	50,110	1.0	1.1
BM	344,430	19.5	18.0	45,120	47,745	1.1	1.1
ED	84,515	4.9	6.8	44,523	51,810	1.0	1.2
FIN	89,823	5.1	3.9	53,029	63,197	1.2	1.4
GOV	11,980	0.7	0.8	51,866	51,525	1.2	1.2
HOSP	222,755	12.7	12.5	22,780	22,388	0.5	0.5
HS	111,050	6.3	7.2	56,704	57,440	1.3	1.3
HUM	51,685	2.9	3.4	30,867	32,322	0.7	0.7
IT	37,138	2.1	2.0	76,742	79,830	1.8	1.8
LAW	66,888	3.8	3.7	50,587	52,812	1.2	1.2
MAN	122,563	7.0	8.9	37,820	37,404	0.9	0.9
MARK	211,948	12.0	11.6	40,734	39,679	1.0	0.9
STEM	25,043	1.4	1.5	86,001	86,651	2.0	2.0
TRAN	130,150	7.4	8.2	35,027	34,502	0.8	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Phoenix

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	PHOENIX	U.S.	PHOENIX	U.S.	PHOENIX	U.S.	PHOENIX	U.S.
AFNR	0.4	0.3	10.9	8.7	1.9	2.1	10.8	12.8
AC	0.1	0.3	1.9	7.9	0.4	1.9	2.4	11.3
AV	0.5	0.5	13.7	12.4	1.0	1.5	5.7	9.0
BM	0.4	0.6	11.6	14.0	1.7	1.5	9.4	8.9
ED	0.2	0.1	6.7	1.5	0.3	0.4	1.9	2.2
FIN	0.0	0.1	0.4	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.2	0.1	0.0	0	0.0	0.0
HOSP	0.3	0.2	6.8	5.1	0.0	0.9	0.0	5.2
HS	0.8	0.3	22.3	7.0	6.6	2.4	37.4	14.4
HUM	0.1	0.1	1.7	2.7	0.8	0.7	4.6	4.0
IT	0.3	0.8	6.8	19.3	0.0	1.9	0.0	11.2
LAW	0.1	0.1	2.5	3.7	0.0	0.4	0.0	2.2
MAN	0.0	0.1	1.3	3.3	0.3	0.5	1.9	3.0
MARK	0.1	0.1	2.8	3.00	0.0	0.4	0.0	2.7
STEM	0.2	0.2	6.3	4.7	2.9	0.8	16.5	4.8
TRAN	0.1	0.1	3.9	3.4	1.7	1.2	9.4	7.5
Total	**3.7**	**4.0**	**100**	**100**	**17.4****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Seattle

The Sixteen Career Clusters

In most states, CTE courses are organized into sixteen "career clusters," which were developed in 1996 by the U.S. Department of Education, the Office of Vocational and Adult Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB). Although these clusters provide standardization and consistency across an ever-evolving labor market, the pace of that evolution has led some advocacy groups to argue that the clusters merit an update. We don't disagree, but they are currently the only option, and are therefore the basis for our analysis of local and national labor market "alignment." For simplicity's sake, we sometimes refer to them as "fields" or "industries."

AFNR	Agriculture, Food & Natural Resources
AC	Architecture & Construction
AV	Arts, A/V Technology & Communications
BM	Business Management & Administration
ED	Education & Training
FIN	Finance
GOV	Government & Public Administration
HS	Health Science
HOSP	Hospitality & Tourism
HUM	Human Services
IT	Information Technology
LAW	Law, Public Safety, Corrections & Security
MAN	Manufacturing
MARK	Marketing
STEM	Science, Technology, Engineering & Mathematics
TRAN	Transportation, Distribution & Logistics

Summary

This profile summarizes employment, wages, and high school career and technical education (CTE) course-taking patterns in the Seattle metropolitan area.[1]

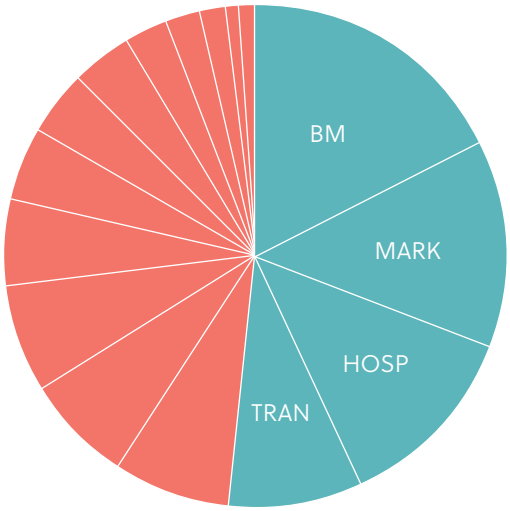
In general, the distribution of CTE course-taking in Seattle bears little relation to the distribution of jobs. For example, of the four large industries that support the majority of Seattle jobs—Marketing; Hospitality & Tourism; Business Management & Administration; and Transportation, Distribution & Logistics—only one (Business Management & Administration) sees a meaningful level of CTE course-taking.

Similarly, about two-fifths of CTE concentrations in Seattle are in Agriculture, Food & Natural Resources or Arts, A/V Technology & Communications. Yet few students concentrate in other fields such as Education & Training and Architecture & Construction.

Leaders in education and workforce development in the Seattle region should consider how more students might be encouraged to focus on underserved fields with strong current and future job prospects.

FIGURE 1 Employment in Seattle

Currently, almost half of the jobs in the Seattle metropolitan area are in four fields: Business Management & Administration; Marketing; Hospitality & Tourism; and Transportation. Compared to the rest of the U.S., Seattle has an unusually large IT sector, but fewer jobs in Education & Training and Manufacturing.



BM	16.6%
MARK	12.3%
HOSP	11.4%
TRAN	8.0%
MAN	7.0%
AC	6.7%
HS	6.3%
ED	5.2%
IT	4.5%
FIN	3.9%
HUM	3.5%
LAW	2.7%
STEM	2.1%
AV	1.6%
GOV	0.8%
AFNR	0.8%

FIGURE 2 Industry wages in Seattle versus the United States

On average, STEM and IT are the highest-paying fields in Seattle—and the rest of the United States—while Hospitality & Tourism and Human Services are the lowest-paying fields. The average Seattle STEM worker makes $91,000, or about 1.7 times as much as the average Seattle worker. (See Table 1 for wages.)

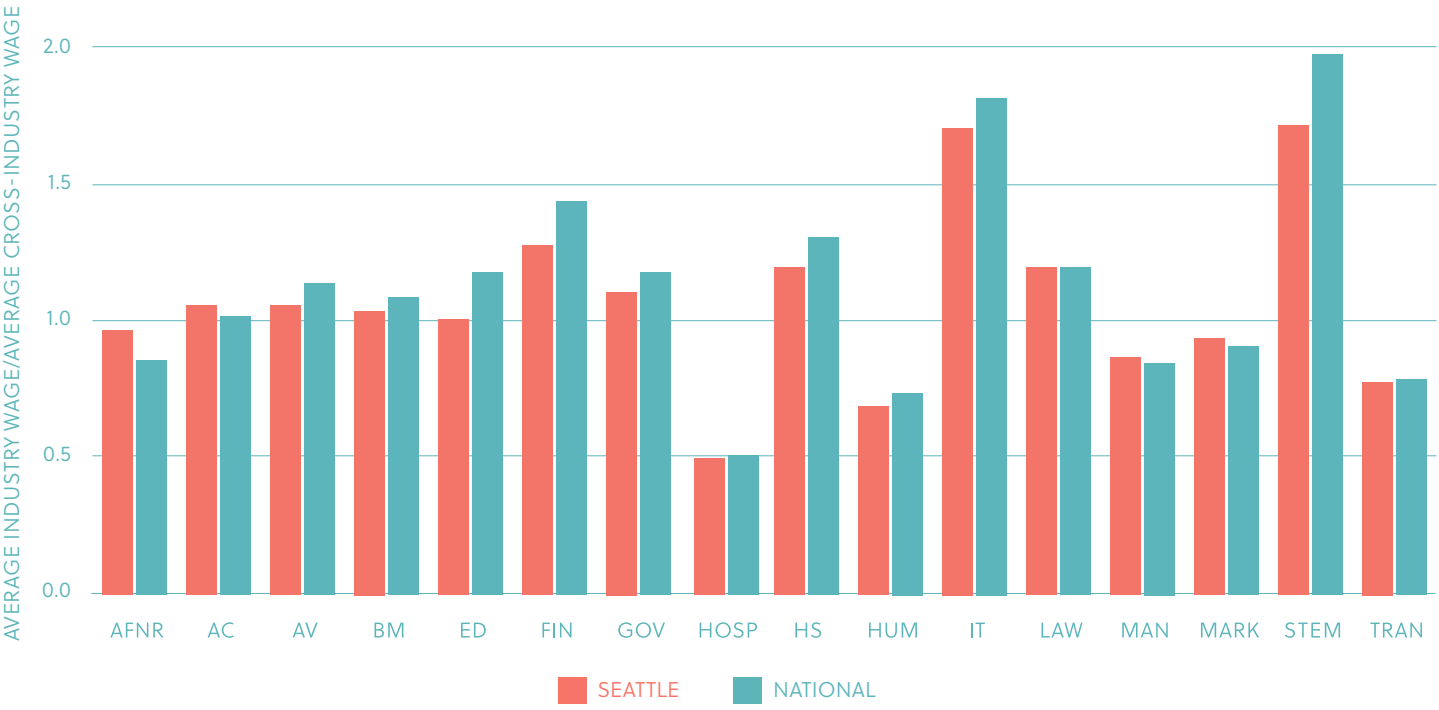
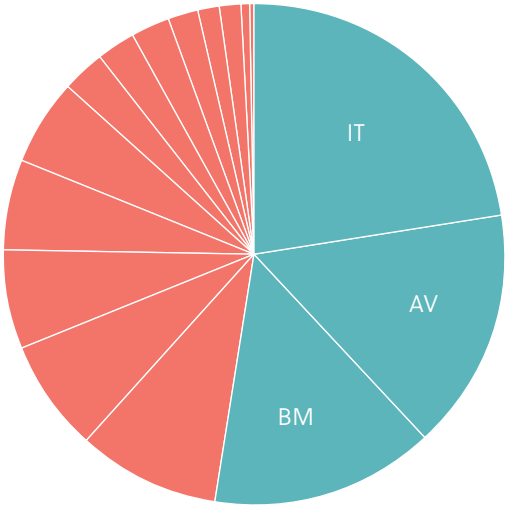


FIGURE 3 CTE course-taking in Seattle

Almost half of the CTE courses taken by Seattle students are in three fields: IT; Business Management & Administration; and Arts, A/V Technology & Communications. Almost no students take CTE courses in Manufacturing or Government & Public Administration.



IT	22.7%
AV	15.6%
BM	14.2%
AC	9.2%
HOSP	7.2%
AFNR	6.6%
HS	5.7%
MARK	5.6%
TRAN	2.8%
LAW	2.6%
STEM	2.5%
FIN	1.9%
ED	1.3%
HUM	1.3%
MAN	0.7%
GOV	0.1%

FIGURE 4 CTE course-taking in Seattle versus the United States

On average, Seattle high school students take more courses in IT and Arts, A/V Technology & Communications than their peers in the rest of the U.S. However, they take fewer courses in STEM; Manufacturing; and Human Services.

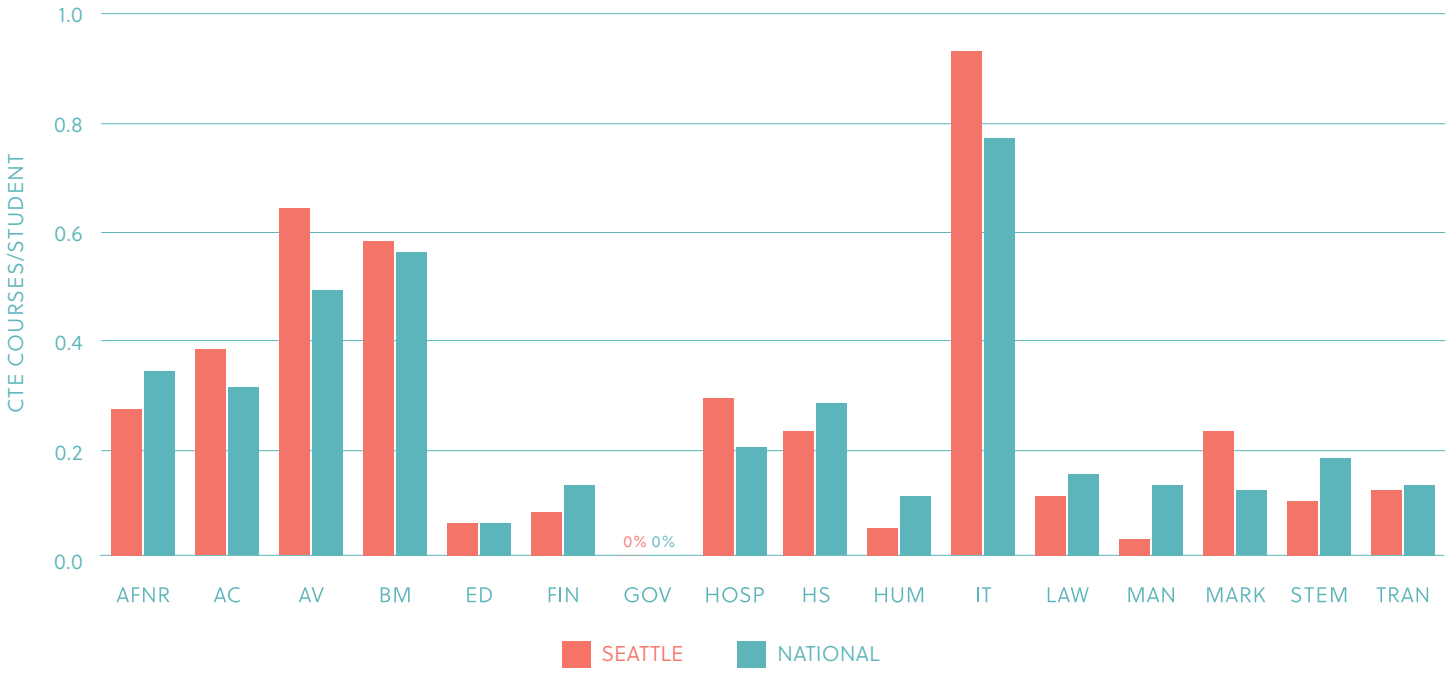
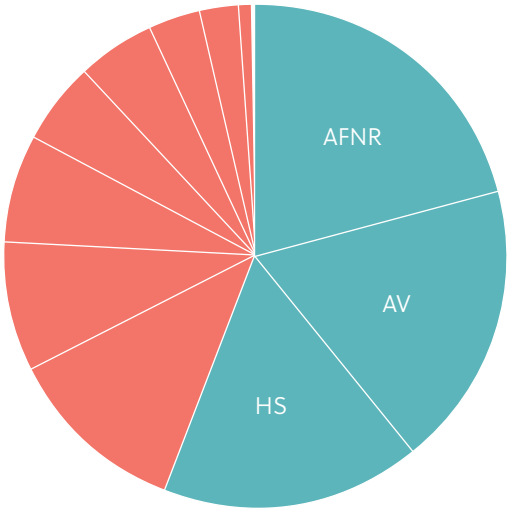


FIGURE 5 CTE concentrations in Seattle

Research suggests that students who "concentrate" in CTE by taking three or more courses in the same field (rather than a mix of unrelated courses) tend to do better in postsecondary educational settings and the labor market.

Collectively, the Agriculture, Food & Natural Resources; Arts, A/V Technology & Communications; and Health Science fields account for over half of CTE concentrations in Seattle.



AFNR	21.1%
AV	18.2%
HS	16.9%
LAW	11.7%
TRAN	8.1%
HOSP	7.0%
IT	5.3%
ED	5.2%
AC	3.3%
HUM	2.4%
MAN	1.0%
BM	0.0%
FIN	0.0%
GOV	0.0%
MARK	0.0%
STEM	0.0%

FIGURE 6 CTE concentrations in Seattle versus the United States

Compared to their peers in the rest of the U.S., high school students in Seattle are less likely to concentrate in most CTE career fields, including sectors that are important to the local economy such as Marketing and Business Management & Administration.

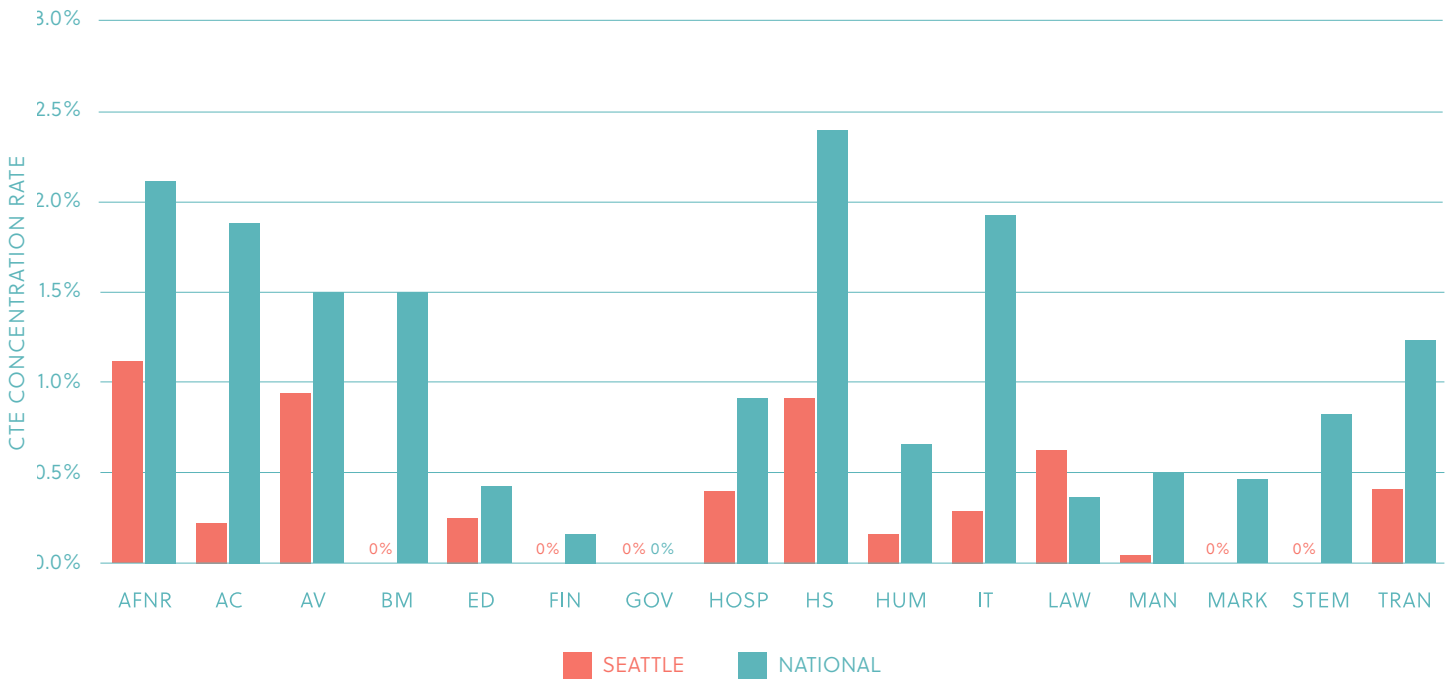
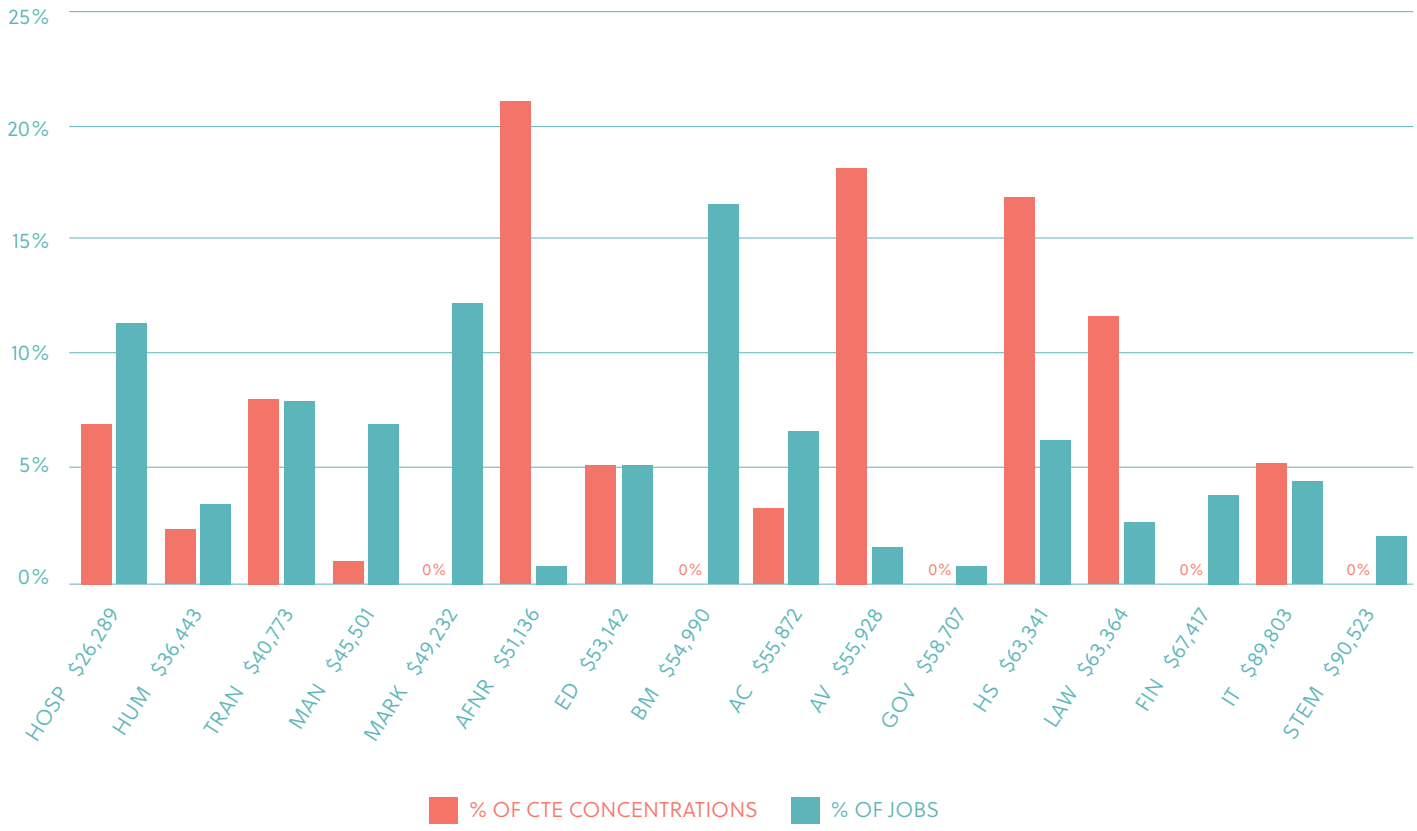


FIGURE 7 Employment and CTE concentrations in Seattle

There is no obvious relationship between the distribution of CTE concentrations and the distribution of jobs in the Seattle region. For example, the Health Science; Law; Public Safety, Corrections & Security; and Arts, A/V Technology & Communications fields account for nearly half of local CTE concentrations, but just 10 percent of local employment. And conversely, almost no Seattle students concentrate in Manufacturing; Marketing; or Business Management & Administration, which support one out of every three jobs in Seattle. Also notable is the strong mismatch in Agriculture, Food & Natural Resources, which accounts for less than 1 percent of local employment, but more than one-fifth of local concentrations.



1 Technically, this area comprises the metropolitan statistical area known as Seattle-Tacoma-Bellevue, WA. Because only 350 students were sampled in this area, our estimates for CTE course-taking and concentration rates are approximate. Local stakeholders should be sure to gather more detailed information about which courses students are taking before making any programmatic changes.

TABLE 1 Labor Market Demand in Seattle

CAREER CLUSTERS	EMPLOYMENT			WAGES			
	TOTAL EMPLOYMENT	% OF TOTAL EMPLOYMENT		AVERAGE ($)		RATIO*	
	SEATTLE	SEATTLE	U.S.	SEATTLE	U.S.	SEATTLE	U.S.
AFNR	12,920	0.8	1.0	51,136	37,852	1.0	0.9
AC	110,370	6.6	6.2	55,872	44,564	1.1	1.0
AV	26,035	1.6	1.4	55,928	50,110	1.1	1.1
BM	275,523	16.6	18.0	54,990	47,745	1.0	1.1
ED	86,638	5.2	6.8	53,142	51,810	1.0	1.2
FIN	64,978	3.9	3.9	67,417	63,197	1.3	1.4
GOV	13,855	0.8	0.8	58,707	51,525	1.1	1.2
HOSP	189,340	11.4	12.5	26,289	22,388	0.5	0.5
HS	104,468	6.3	7.2	63,341	57,440	1.2	1.3
HUM	57,563	3.5	3.4	36,443	32,322	0.7	0.7
IT	74,375	4.5	2.0	89,803	79,830	1.7	1.8
LAW	45,260	2.7	3.7	63,365	52,812	1.2	1.2
MAN	115,868	7.0	8.9	45,501	37,404	0.9	0.9
MARK	203,188	12.3	11.6	49,232	39,679	0.9	0.9
STEM	34,390	2.1	1.5	90,523	86,651	1.7	2.0
TRAN	133,263	8.0	8.2	40,773	34,502	0.8	0.8

**Wage ratios are calculated by dividing the mean industry wage by the cross-industry average.*

TABLE 2 High School CTE in Seattle

CAREER CLUSTERS	COURSES				CONCENTRATIONS			
	COURSES/STUDENT		% OF TOTAL CTE COURSES		% OF STUDENTS WHO CONCENTRATE*		% OF TOTAL CONCENTRATIONS	
	SEATTLE	U.S.	SEATTLE	U.S.	SEATTLE	U.S.	SEATTLE	U.S.
AFNR	0.3	0.3	6.6	8.7	1.1	2.1	21.1	12.8
AC	0.4	0.3	9.2	7.9	0.2	1.9	3.3	11.3
AV	0.6	0.5	15.6	12.4	0.9	1.5	18.2	9.0
BM	0.6	0.6	14.2	14.0	0.0	1.5	0.0	8.9
ED	0.1	0.1	1.3	1.5	0.3	0.4	5.2	2.2
FIN	0.1	0.1	1.9	3.3	0.0	0.1	0.0	0.8
GOV	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
HOSP	0.3	0.2	7.2	5.1	0.4	0.9	7.0	5.2
HS	0.2	0.3	5.7	7.0	0.9	2.4	16.9	14.4
HUM	0.1	0.1	1.3	2.7	0.1	0.7	2.4	4.0
IT	0.9	0.8	22.7	19.3	0.3	1.9	5.3	11.2
LAW	0.1	0.1	2.6	3.7	0.6	0.4	11.7	2.2
MAN	0.0	0.1	0.7	3.3	0.1	0.5	1.0	3.0
MARK	0.2	0.1	5.6	3.0	0.0	0.4	0.0	2.7
STEM	0.1	0.2	2.5	4.7	2.9	0.8	0.0	4.8
TRAN	0.1	0.1	2.8	3.4	1.7	1.2	8.1	7.5
Total	**4.1**	**4.0**	**100**	**100**	**5.2****	**15.5**	**100**	**100**

**To concentrate, a student must take at least three courses in the same career cluster.*

***Because some students concentrate in more than one cluster, the proportion of students concentrating in any given cluster is less than the sum of the cluster-specific concentration rates.*

Appendix

To quantify the relationship between local employment and wages and high school CTE, we used the following linear probability model:

$$Y_{ijr} = \alpha + \delta EMP_r + \beta WAGE_r + \boldsymbol{X'}_i\boldsymbol{\theta} + \delta_j + \varepsilon_{ijr}$$

where Y_{ijr} is a generic CTE outcome of interest (i.e., courses or concentration) for student i in school j in geographical region r. The parameter δ represents the average population relationship between employment in a given CTE cluster in a student's region and a given CTE course-taking outcome. The parameter β represents the average population relationship between the (weighted) average annual wages in a given CTE cluster in a student's region and a given CTE course-taking outcome. The vector $\boldsymbol{X'}_i$ contains a number of student-level controls related to CTE course-taking including: gender, race, a standardized measure of school engagement, U.S. Census region (Northeast, South, Midwest, West); rates of BA attainment within a student's home state; credits earned in advanced/enriched coursework, whether a student was below the 2008 Census Bureau poverty level, whether a student had a parent who worked in a given CTE cluster, whether a student had an IEP, cumulative high school GPA, whether a student experienced a dropout event (defined as an unexcused stoppage of high school attendance for a period of four weeks or more), whether a student completed dual enrollment coursework, and whether a student planned to attend a four-year postsecondary institution after high school. The parameter δ represents school fixed-effects. Finally, the error term ε_{ijr} was clustered at the school level to account for correlated observations among students attending the same schools.

Endnotes

1 Quoctrung Bui and Claire Cain Miller, "The Typical American Lives Only 18 Miles From Mom," *New York Times*, December 23, 2015, https://www.nytimes.com/interactive/2015/12/24/upshot/24up-family.html/.

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4 See "CTE Courses and BLS Occupations" in the "Report Materials" section of our report's landing page: https://fordhaminstitute.org/national/research/how-aligned-career-and-technical-education-local-labor-markets.

5 Concentrators are students who completed three or more courses in one of sixteen nationally recognized career clusters.

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11 U.S. Department of Education, "Postsecondary and Labor Force Transitions Among Public High School Career and Technical Education Participants," *Issue Tables*, NCES 2011–234 (January 2011), https://nces.ed.gov/pubs2011/2011234.pdf.

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13 Alexis Wolfe, "Trump Signs Career and Technical Education Bill into Law," *American Institute of Physics*, August 10 2018, https://www.aip.org/fyi/2018/trump-signs-career-and-technical-education-bill-law.

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20 As of 2012, forty-seven states used this framework.

21 An alternative approach to modeling binary outcomes is through binary logistic regression. Because the results produced by logistic and linear probability models were similar, we elected to report the results from the linear probability models only.

22 The school engagement measure was created by NCES through factor analysis (alpha = 0.65) using the following variables: (1) how often a ninth-grader attends class without their homework completed, (2) how often a ninth-grader attends class without a pencil or paper, (3) how often a ninth-grader attends class without books, and (4) how often a ninth-grader attends class late.

23 For more on how CTE Courses and BLS Occupations align, see the "Report Materials" section of our report landing page: https://fordhaminstitute.org/national/research/how-aligned-career-and-technical-education-local-labor-markets.

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About This Report

About the Authors

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