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DEPARTMENT OF EDUCATION

FULL REPORT N^o. 1:

Work-Based Learning in Pennsylvania:

Descriptive Findings for CTE and Non-CTE Secondary Students

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Pennsylvania Department of Education

Office of Administration

This report is the first in a series regarding work-based learning (WBL) in Pennsylvania (PA) secondary schools. This first brief focuses on descriptive statistics for two cohorts of CTE and non-CTE high school graduates, reporting student demographics, outcomes, and rates of participation in WBL.



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ABSTRACT:

2019 cohort % – 2020 cohort %

Informed by previous research for the Commonwealth (Miller & Riccardo, 2021) and by several research questions from the [Pennsylvania Department of Education's \(PDE\) research agenda](#), the current research report presents findings from a descriptive study of work-based learning (WBL) for two cohorts of PA high school graduates from 2019 ($N = 125,143$) and 2020 ($N = 121,895$). In addition to examining differences by CTE status and career cluster, differences between students were considered for various outcomes of interest, including postsecondary enrollment and earning a non-degree credential (i.e., an industry-recognized credential or occupational competency certificate). Data related to these outcomes, as well as individual student-level information, were obtained from joint Pennsylvania Information Management System (PIMS) and National Student Clearinghouse (NSC) Student Tracker Services data sources. For the 2019 and 2020 graduation cohorts (respectively), descriptive results showed that just over 16% of students in both cohorts participated in some form of WBL. CTE students participated in WBL within their CTE program at a rate of 32.4% – 39%, while only 12.6% – 10.6% of non-CTE students participated in WBL outside of a CTE program. An examination of CTE WBL participation rates showed that cooperative work experiences and simulated work environments were the most popular CTE WBL opportunities for the graduates of 2019 and 2020, respectively. For CTE students, the most popular career clusters for CTE programs were Health Science and Architecture & Construction, while the Business, Management & Administration, Marketing, Sales & Service, and Science, Technology, Engineering & Mathematics clusters had the lowest participation. Meanwhile, approximately one quarter of non-CTE students who participated in WBL did so in the Education and Training career cluster. Lastly, non-CTE students enrolled in postsecondary at higher rates when compared to CTE students, but CTE students graduated high school with an industry recognized credential at much higher rates than non-CTE students. Results are considered through the lens of Pennsylvania's various and diverse student groups to examine topics of equity by CTE student status and involvement in WBL.

KEY FINDINGS:

2019 cohort % – 2020 cohort %

- A consistent proportion of students across both cohorts (16.7% – 16.4%) participated in some form of work-based learning (WBL) by high school graduation.
- 32.4% – 39.0% of CTE students participated in WBL during a PDE-approved CTE program (CTE WBL), while 5.2% – 4.9% participated in WBL outside of CTE (non-CTE WBL). 12.6% – 10.6% of non-CTE students participated in non-CTE WBL.
- The majority of students who participated in CTE WBL were male (56.6% – 57.2%), but the majority who participated in non-CTE WBL were female (54.2% – 54.3%).
- Cooperative work experiences and simulated work environments were the most popular WBL opportunities among CTE WBL participants.
- Almost a quarter (23.5% – 23.5%) of all non-CTE students taking WBL opportunities did so in the Education and Training career cluster.
- Non-CTE students enrolled in postsecondary at higher rates (63.8% – 60.2%) than CTE students (31.2% – 28.5%). CTE students graduated with industry recognized credentials at much higher rates (55.8% – 51.4%) than non-CTE students (6.2% – 4.3%).

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

Literature

Pennsylvania's secondary students engage in various forms of work-based learning (WBL) experiences that are recognized by the Pennsylvania Department of Education (PDE), including internships, registered apprenticeships, simulated work environments, job exploration, school sponsored enterprises, and cooperative work, agriculture, and work-based experiences.

Research has found that participation in many of these opportunities is associated with positive social, cognitive, and career outcomes (Alfeld, Charner, Johnson, & Watts, 2013; Maertz & Stoeberl, 2014). More specifically, recent research for the Commonwealth indicates that secondary Career and Technical Education (CTE) students who participate in key WBL opportunities, like internships, job exploration, and work-based experiences, may have higher odds than their peers of achieving certain academic outcomes, such as graduating from high school and enrolling in postsecondary education (Miller & Riccardo, 2021). Although the rate of participation in these individual opportunities was relatively low (4.1%, 8.7%, and 3.1%, respectively), analyses showed that outcomes were often favorable for the 25% of CTE participants in PA who engaged in at least one type of WBL opportunity during their program (Miller & Riccardo, 2021). Considering the relative benefit to outcomes for CTE students who engage in various kinds of WBL, a goal of the current research was to extend analysis to also investigate WBL engagement among the non-CTE student population.

Key differences have been identified between CTE students and non-CTE students. In recent PA cohorts, a greater proportion of CTE participants were male, economically disadvantaged, Special Education status, and attended rural high schools compared to non-CTE students (Miller & Riccardo, 2021). These demographic differences help to contextualize the observed differences in academic outcomes between these populations. Non-CTE students in PA were found to have higher odds of enrolling in postsecondary education, persistence, retention, and degree completion compared to CTE participants (Miller & Riccardo, 2021). Still, CTE participants had higher odds than non-CTE students of graduating on-time from high school (Miller & Riccardo, 2021), suggesting that although CTE students are less involved in postsecondary education, academic outcomes at the secondary level remain favorable. With this in mind, the present study expands analysis of academic outcomes to include non-degree credential earning by the time of high school graduation.

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As the first of a series of reports regarding the most recent data on WBL in Pennsylvania, the current report details descriptive statistics for key variables of interest. Specifically, this report describes the following for two cohorts of PA high school graduates:

- Student-level demographics like gender, race, and economic disadvantage status
 - Participation in career and technical education
 - Participation in work-based learning
 - Career pathways/clusters (for applicable students)
 - Student outcomes like postsecondary enrollment and non-degree credential earning (defined as earning an industry recognized credential, or earning an occupational competency certificate via achievement on a NOCTI/NIMS assessment)
-

Method

Two cohorts of PA high school graduates from the 2018–19 and 2019–20 school years (SYs) were included for analysis in the present study. All students were followed to potential postsecondary enrollment by October 1st in the fall semester after their high school graduation. A total of 125,143 students were followed as part of the 2019 graduating class and 121,895 students were followed as part of the 2020 graduating class. All 247,038 students across both graduating classes attended a public Pennsylvania local education agency (LEA), which may include school districts, career and technical centers, intermediate units, charter schools, or cyber charter schools.

The present study was concerned with several outcomes for these cohorts of PA graduates: a) postsecondary enrollment by October 1st and b) earning a non-degree credential by high school graduation, defined as earning either an industry-recognized credential (ICN) or earning a PDE-awarded occupational competency certificate (OCC) for achievement on a National Occupational Competency Testing Institute (NOCTI) or National Institute for Metalworking Skills (NIMS) credentialing test. These certificates include the Pennsylvania Skills Certificate and Pennsylvania Certificate of Competency. NOCTI/NIMS assessments were waived in 2020 due to COVID-19, limiting OCC analysis in the current study to the 2019 graduates. Note that for the current study, longitudinal analysis for both cohorts did not begin at the start of high school but in students' assumed Grade 11, the year before their reported high school graduation. In other words, the decision was made to limit high school data to students' last two years of high school, when most students participate in WBL.

ICN

*Industry-Recognized
Credential earned during
students' last two years of
high school*

OCC

*Occupational Competency
Certificate earned through
achievement on a NOCTI or
NIMS credentialing test*

NOCTI

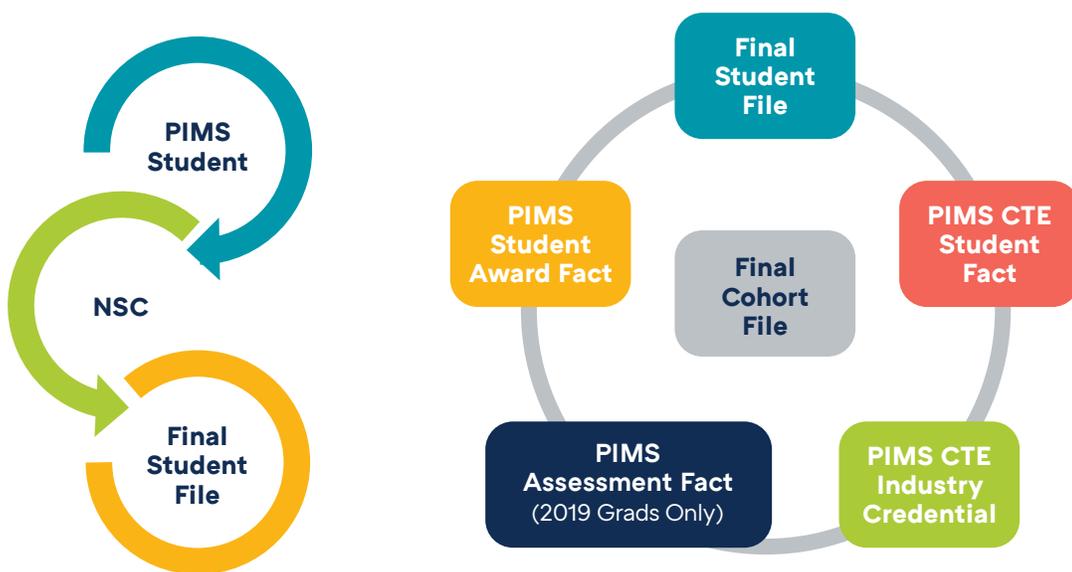
*National Occupational
Competency Testing Institute*

NIMS

*National Institute for
Metalworking Skills*

Research questions were answered through the analysis of several linked datasets from Pennsylvania’s Information Management System (PIMS) and the National Student Clearinghouse (NSC) Student Tracker Services. PIMS data records were obtained for school years 2017–18 through 2019–20 as the source for all secondary-level student information. NSC records were obtained for the 2019–20 and 2020–21 SYs to track students to potential postsecondary enrollment. The current study limited the timeframe for postsecondary enrollment to the fall after high school graduation, defined as October 1st of their graduating year according to the NSC enrollment date. Figure 1 displays the general linking procedure for both graduate cohorts. More detailed information on data decisions will be made available in [a future report in this series](#).

FIGURE 1. Data File Linking Procedure



Note. The merging process was performed twice: once for the high school graduates of 2019 and a second time for the graduates of 2020.

Results

What is the description and breakdown of the full 2019 and 2020 graduation cohorts?

Results showed that many students (17.9% – 18.5%) followed in the present study qualified as CTE students by participating in a PDE-approved CTE program. A majority of the students in both graduation classes were White (70.5% – 69.8%), followed by Black/African American (13.1% – 12.9%), Hispanic (9.8% – 10.3%), Asian (4.1% – 4.3%), and multi-racial (2.3% – 2.5%). American Indian/Alaskan Native and Native Hawaiian or other Pacific Islander students constituted a combined 0.2% in both cohorts. Just under half (45.4% – 45.2%) of students were considered historically underperforming, a combination status variable

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

indicating if a student met any of the requirements for the economically disadvantaged, special education, or English learner (EL) statuses. Additionally, over half (54.8% – 55%) of all students were from schools in suburban geographic locales, while only 9.6% – 9.7% were from towns. Table 1 shows that demographic proportions remained relatively stable between the graduates of 2019 and 2020.

TABLE 1. Overall Student Population Demographics by High School Graduation Class

	2019 High School Graduating Class (N = 125,143)	2020 High School Graduating Class (N = 121,895)
Gender		
Male	50.3% (63,005)	50.3% (61,369)
Female	49.7% (62,138)	49.7% (60,526)
Race/Ethnicity		
American Indian/Alaskan Native	0.1% (187)	0.1% (177)
Asian	4.1% (5,150)	4.3% (5,185)
Black/African American	13.1% (16,392)	12.9% (15,743)
Hispanic	9.8% (12,290)	10.3% (12,560)
Multi-Racial	2.3% (2,842)	2.5% (3,026)
Native Hawaiian or Pacific Islander	0.1% (104)	0.1% (102)
White	70.5% (88,178)	69.8% (85,102)
Historically Underperforming		
Yes	45.4% (56,839)	45.2% (55,116)
No	54.6% (68,304)	54.8% (66,779)
Special Education		
Yes	15.7% (19,706)	15.6% (19,025)
No	84.3% (105,437)	84.4% (102,870)
English Learner (EL)		
Yes	2.9% (3,667)	3.1% (3,758)
No	97.1% (121,476)	96.9% (118,137)
Economically Disadvantaged		
Yes	37.6% (47,092)	37.4% (45,626)
No	62.4% (78,051)	62.6% (76,269)
Geographic Locale		
City	19.0% (23,787)	19.0% (23,168)
Rural	16.6% (20,752)	16.3% (19,889)
Suburban	54.8% (68,560)	55.0% (66,984)
Town	9.6% (12,044)	9.7% (11,854)
CTE Student		
Yes	17.9% (22,412)	18.5% (22,501)
No	82.1 (102,731)	81.5% (99,394)

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

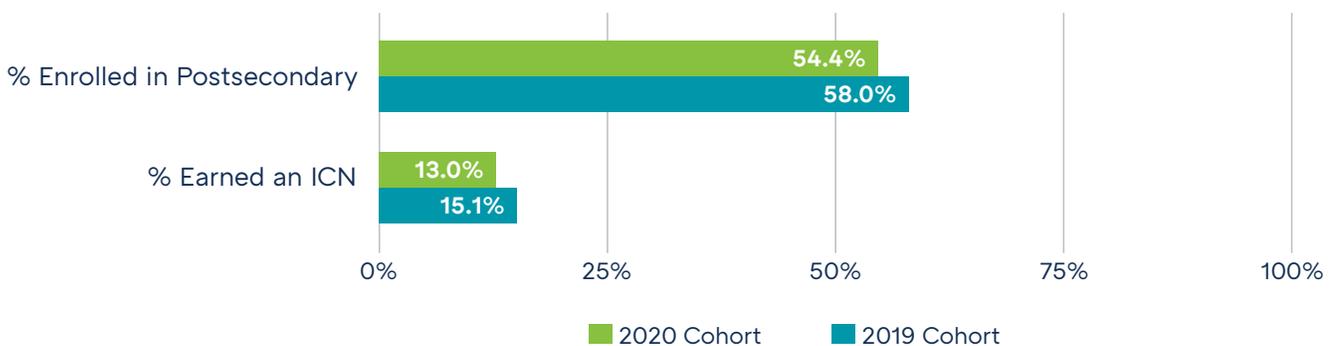
What proportion of graduates enrolled in postsecondary or earned an industry credential (ICN)?

Descriptive findings (shown in Figure 2) indicate that the graduates of 2020 enrolled in postsecondary and earned industry recognized credentials (ICNs) at slightly lower rates than the graduates of 2019. Specifically, 54.4% of the graduates of 2020 enrolled in postsecondary education, while 58% of the graduates of 2019 enrolled in postsecondary. Similarly, 13% of students in the 2020 graduating class earned an ICN, compared to 15.1% of the 2019 graduating class. Findings indicate relative parity between cohorts, showing that over half of both cohorts enrolled in postsecondary education, compared to a much smaller percentage who earned an ICN.

Findings indicate relative parity between cohorts, showing that over half of both cohorts enrolled in postsecondary education, compared to a much smaller percentage who earned an ICN.

Figures 3 and 4 show demographic findings related to postsecondary enrollment and ICN earning for the graduation cohorts of 2019 and 2020, respectively. Results showed that female students were more likely to enroll in postsecondary (64.8% - 61.8%) when compared to male students (51.2% - 47%). In both cohorts, students who graduated from schools in cities were least likely to earn an ICN when compared to students in other geographic locales. Overall, results indicate several demographic differences in outcomes between student groups.

FIGURE 2. Academic Outcomes by Cohort: Full 2019 and 2020 Graduate Cohorts



Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% - 2020%).

FIGURE 3. Outcome Variables by Student Group Demographics: 2019 Graduation Cohort

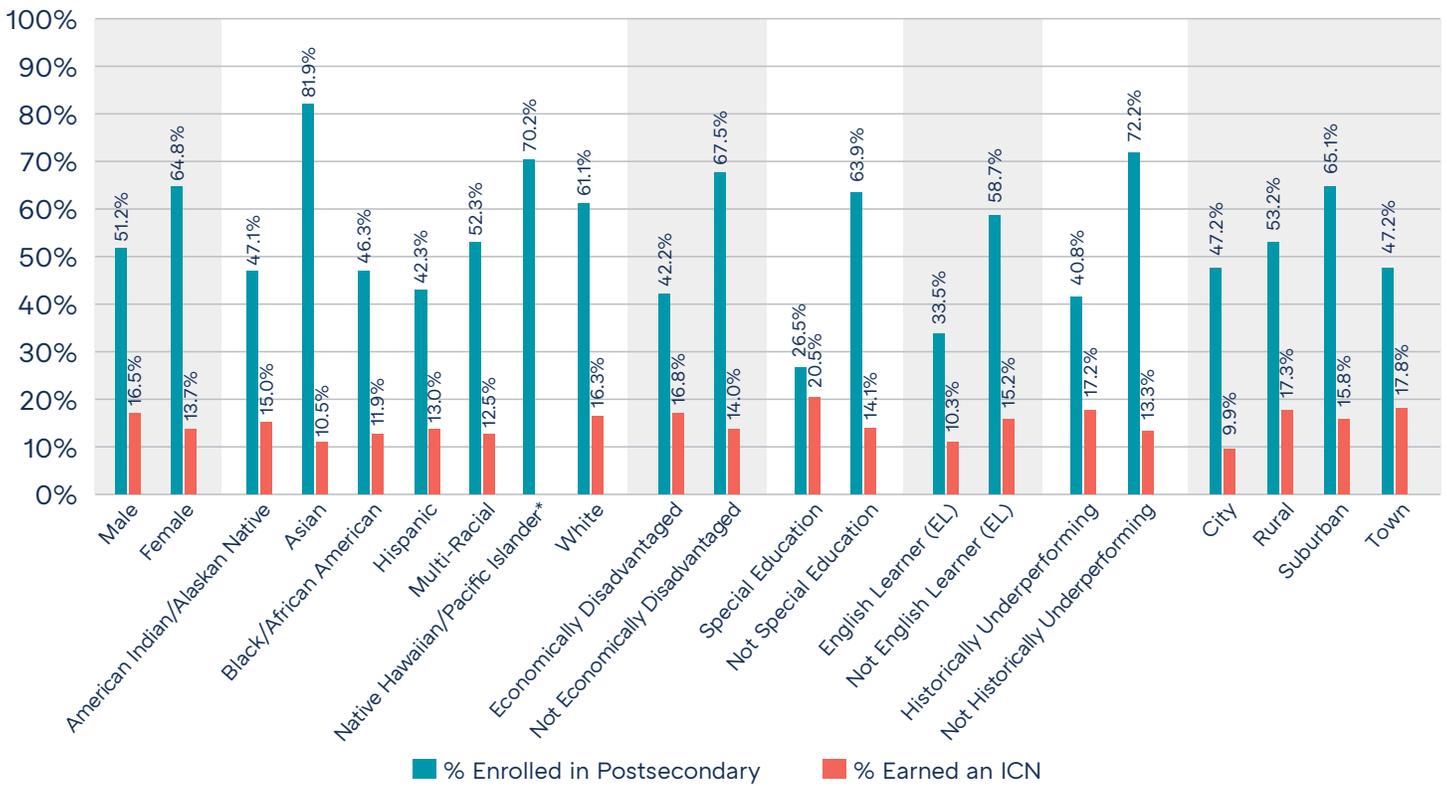
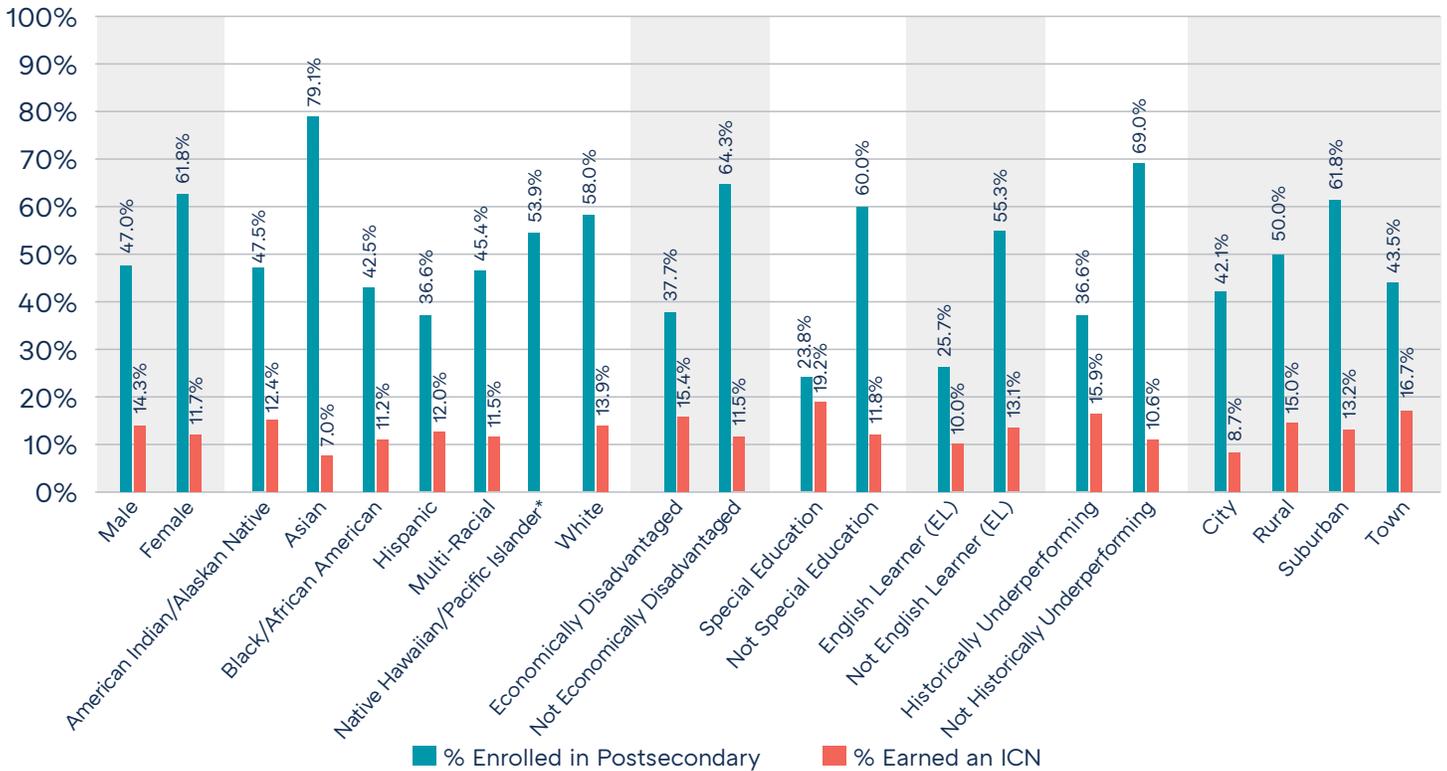


FIGURE 4. Outcome Variables by Student Group Demographics: 2020 Graduation Cohort



*Note. Native Hawaiian/Pacific Islander ICN rates are omitted due to small cell sizes.

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

What is the description and breakdown of CTE students and non-CTE students?

The current study followed 44,913 CTE students (22,412 in the 2019 cohort and 22,501 in the 2020 cohort) and 202,125 non-CTE students (102,731 in the 2019 cohort and 99,394 in the 2020 cohort). CTE students were overwhelmingly more likely to participate in a program of study (81.1% – 81.3%) when compared to the occupational or tech prep delivery method (21.2% – 20.8%). In addition to levels of WBL engagement, Table 2 displays demographic differences between CTE and non-CTE students. Results highlight several descriptive differences between the CTE and non-CTE student populations, remaining relatively stable across cohorts.

TABLE 2. Demographic differences between CTE and non-CTE students: Graduation cohorts of 2019 and 2020

	Graduates of 2019: CTE Students (N = 22,412)	Graduates of 2020: CTE Students (N = 22,501)	Graduates of 2019: Non-CTE Students (N = 102,731)	Graduates of 2020: Non-CTE Students (N = 99,394)
Gender				
Male	57.7% (12,935)	57.7% (12,989)	48.7% (50,070)	48.7% (48,380)
Female	42.3% (9,477)	42.3% (9,512)	51.3% (52,661)	51.3% (51,014)
Race/Ethnicity				
American Indian/Alaskan Native	*	*	0.1% (148)	0.1% (143)
Asian	1.6% (351)	1.5% (341)	4.7% (4,799)	4.9% (4,844)
Black/African American	12.0% (2,690)	12.2% (2,738)	13.3% (13,702)	13.1% (13,005)
Hispanic	11.7% (2,613)	12.5% (2,803)	9.4% (9,677)	9.8% (9,757)
Multi-Racial	2.1% (467)	2.5% (560)	2.3% (2,375)	2.5% (2,466)
Native Hawaiian or Pacific Islander	*	*	0.1% (88)	0.1% (94)
White	72.4% (16,236)	71.2% (16,017)	70.0% (71,942)	69.5% (69,085)
Historically Underperforming				
Yes	62.7% (14,061)	62.4% (14,038)	41.6% (42,778)	41.3% (41,078)
No	37.3% (8,351)	37.6% (8,463)	58.4% (59,953)	58.7% (58,316)
Special Education				
Yes	27.8% (6,228)	27.2% (6,119)	13.1% (13,478)	13.0% (12,906)
No	72.2% (16,184)	72.8% (16,382)	86.9% (89,253)	87.0% (86,488)
English Learner (EL)				
Yes	2.6% (590)	2.9% (662)	3.0% (3,077)	3.1% (3,096)
No	97.4% (21,822)	97.1% (21,839)	97.0% (99,654)	96.9% (96,298)
Economically Disadvantaged				
Yes	50.9% (11,408)	50.5% (11,354)	34.7% (35,684)	34.5% (34,272)
No	49.1% (11,004)	49.5% (11,147)	65.3% (67,047)	65.5% (65,122)
Geographic Locale				
City	19.5% (4,367)	19.5% (4,387)	18.9% (19,420)	18.9% (18,781)
Rural	23.3% (5,231)	22.9% (5,144)	15.1% (15,521)	14.8% (14,745)
Suburban	44.2% (9,896)	44.3% (9,968)	57.1% (58,664)	57.4% (57,016)
Town	13.0% (2,918)	13.3% (3,002)	8.9% (9,126)	8.9% (8,852)

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

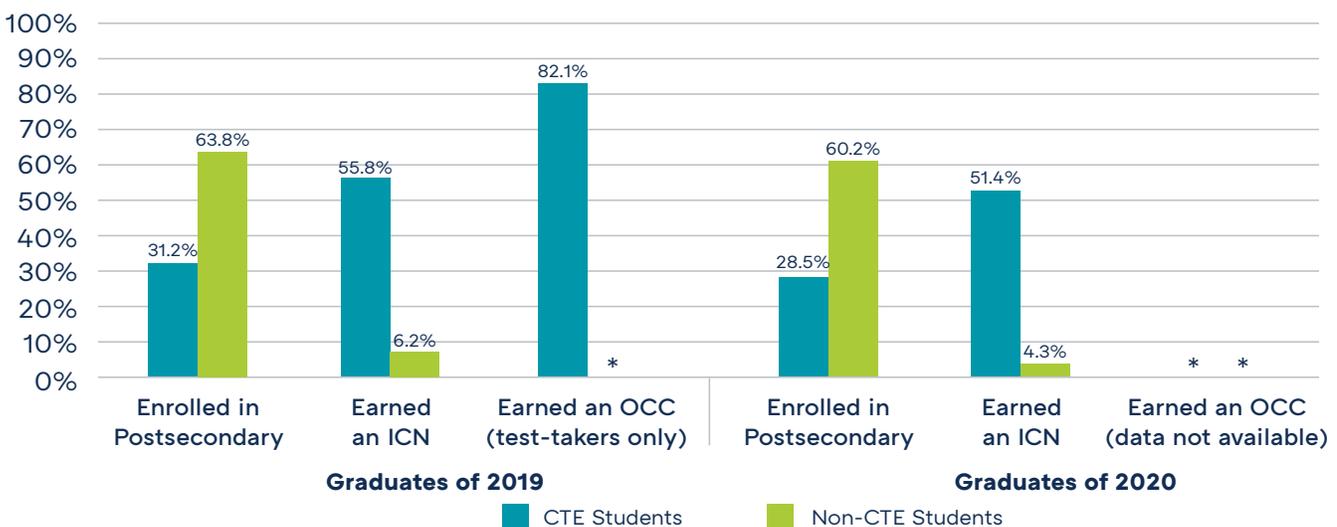
CTE WBL Engagement				
Did not participate	67.6% (15,155)	61.0% (13,722)	n/a	n/a
Participated for 1 year	21.9% (4,909)	28.1% (6,330)	n/a	n/a
Participated for 2 years	10.5% (2,348)	10.9% (2,449)	n/a	n/a
Participated in 1 type	25.5% (5,704)	27.6% (6,220)	n/a	n/a
Participated in multiple types	6.9% (1,553)	11.4% (2,559)	n/a	n/a
Non-CTE WBL Engagement				
Did not participate	n/a	n/a	87.4% (89,776)	89.4% (88,838)
Participated for 1 year	n/a	n/a	11.9% (12,217)	9.6% (9,546)
Participated for 2 years	n/a	n/a	0.7% (738)	1.0% (1,010)
Participated in 1 opportunity	n/a	n/a	11.1% (11,359)	8.6% (8,534)
Participated in multiple opportunities	n/a	n/a	1.6% (1,596)	2.0% (2,022)

*Note: Cell does not meet minimum reporting requirements.

Outcomes were also examined for CTE and non-CTE students (Figure 5). Across both cohorts, non-CTE students were more likely to enroll in postsecondary (63.8% – 60.2%) when compared to CTE students (31.2% – 28.5%). Just over half of CTE students in both cohorts earned an ICN (55.8% – 51.4%), compared to a much smaller percentage of non-CTE students (6.2% – 4.3%). Finally, while data related to OCC earning was limited to the graduates of 2019, descriptive findings showed that 70.2% ($n = 15,740$) of CTE students took a NOCTI or NIMS credentialing test during their junior or senior year, resulting in 82.1% earning an OCC.

Across both cohorts, non-CTE students were more likely to enroll in postsecondary when compared to CTE students. Just over half of CTE students in both cohorts earned an ICN, compared to a much smaller percentage of non-CTE students.

FIGURE 5. Outcomes of Interest for CTE vs. Non-CTE Students: Graduates of 2019 and 2020



*Missing values indicate an outcome where data was not available.

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

What is the description and breakdown of the CTE and non-CTE student populations by career cluster?

Another goal of the current report was to breakdown the student populations by career cluster. All CTE students can be classified as following a “career pathway” determined by their program CIP code, which can then be aggregated by subject into “career clusters”. Table 3 shows the percentage of CTE students in both the 2019 and 2020 graduate cohorts who participated in programs within each career cluster. The most popular programs were Health Science and Architecture & Construction. Programs within the Business, Management & Administration, Marketing, Sales & Service, and Science, Technology, Engineering & Mathematics clusters had the lowest participation.

All CTE students can be classified as following a “career pathway” determined by their program CIP code, which can then be aggregated by subject into “career clusters”.

TABLE 3. CTE Students by Career Cluster

Career Cluster	2019 Cohort		2020 Cohort	
	N	%	N	%
Agriculture, Food & Natural Resources	2,122	9.5%	2,108	9.4%
Architecture & Construction	3,237	14.4%	3,251	14.4%
Arts, A/V Technology & Communications	1,335	6.0%	1,361	6.0%
Business, Management & Administration	624	2.8%	586	2.6%
Health Science	3,429	15.3%	3,580	15.9%
Hospitality & Tourism	1,763	7.9%	1,668	7.4%
Human Resources	2,773	12.4%	2,840	12.6%
Information Technology	1,236	5.5%	1,233	5.5%
Law, Public Safety and Security	794	3.5%	858	3.8%
Manufacturing	2,043	9.1%	2,114	9.4%
Marketing, Sales & Service	335	1.5%	383	1.7%
Science, Technology, Engineering & Mathematics	462	2.1%	493	2.2%
Transportation, Distribution & Logistics	3,025	13.5%	2,798	12.4%
TOTAL (All CTE students)*	22,412		22,501	

*Note: Percentages do not add to 100% because students may have participated in multiple CTE programs in multiple career clusters.

CTE participation by career cluster likewise differed by notable student demographics like gender, race, and geographic school locale. Figures 6 and 7 display the most male- and female-dominated career clusters by graduate cohort. Male students constituted over 90% of all participants in the following career clusters: Architecture & Construction (92.0% – 92.5%); Manufacturing (90.4% – 91.1%); and Transportation, Distribution, & Logistics (91.9% – 91.9%). Conversely, the most female-dominated career clusters were Health Science (87.2% – 86.5%) and Human Resources (85.0% – 84.5%).

FIGURE 6. Most Male-dominated CTE Career Clusters by Graduate Cohort

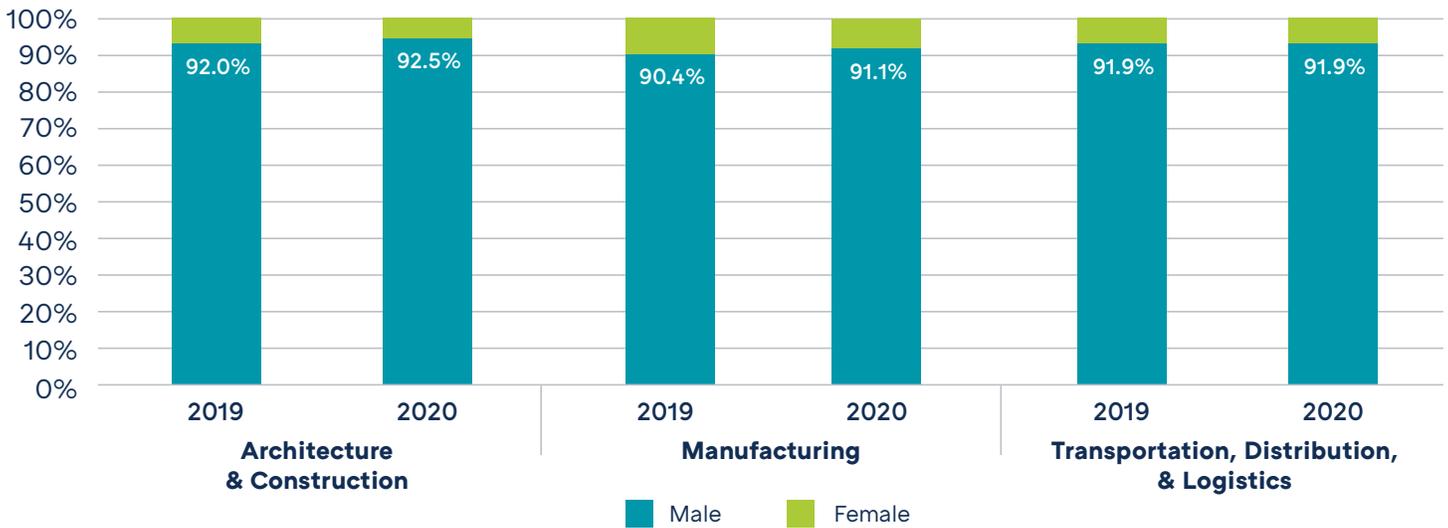
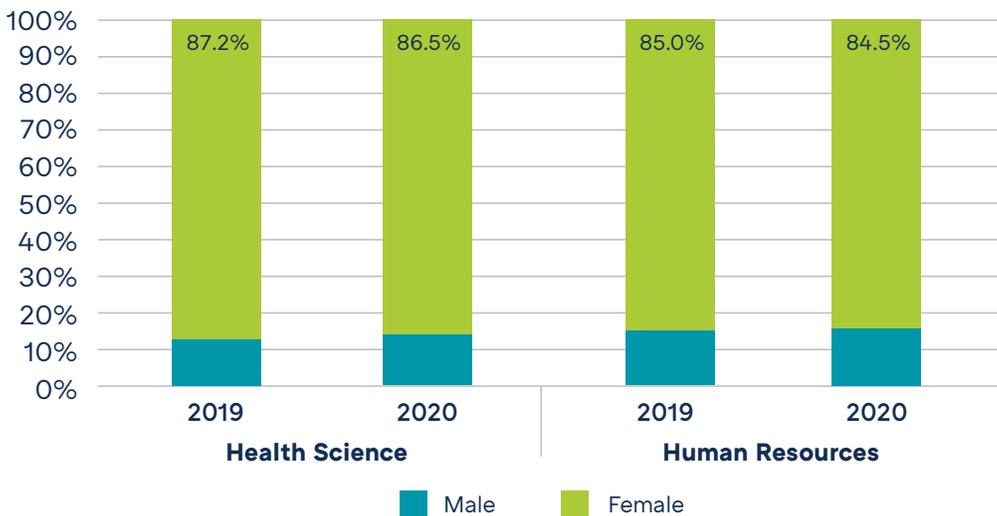


FIGURE 7. Most Female-dominated CTE Career Clusters by Graduate Cohort



Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

There were also notable differences in program participation by race. Black students were notably overrepresented among Marketing, Sales, & Service programs (31.3% – 32.4%) compared to the overall CTE student population (12.2% – 12.2%). This is also the only career cluster in which White students constituted less than 50% of participants (43.3% – 43.6%). In all others, White students had majority participation, particularly in Agriculture, Food & Natural Resources (88.2% – 86.9%) and Manufacturing (84.5% – 84.1%) programs.

Although 19.5% of all CTE students in both cohorts graduated from city schools, students from city schools were notably overrepresented in the following career clusters: Marketing, Sales, & Service (47.2% – 58.5%); Business, Management & Administration (45.8% – 39.9%); and Science, Technology, Engineering & Mathematics (42.6% – 40.4%). Almost half (47.1% – 45.6%) of all students in the Agriculture, Food & Natural Resources cluster attended rural schools. Rural students were conversely underrepresented among Science, Technology, Engineering & Mathematics programs, constituting only 4.7% of participants in both cohorts despite their relatively large representation among the overall CTE population (23.3% – 22.9%).

For non-CTE students, projected career pathways are less clear because these students are not involved in approved CTE programs with designated pathways/clusters that can be determined by CIP codes. However, WBL opportunities taken by non-CTE students align to career clusters by Award Code in the PIMS Student Award Fact template for Industry-Recognized Credentials and Work-Based Learning Experiences for Non-CTE Students. This template provided career cluster data for 12,955 non-CTE students in the 2019 cohort and 10,556 non-CTE students in the 2020 cohort who participated in WBL opportunities outside of CTE. Out of all non-CTE students in both cohorts, WBL participation in each career cluster was relatively low, ranging from 0.1% to 3.0% of the non-CTE population per cluster. To better represent the relative popularity of each career cluster, Table 4 shows the number of students who participated in each cluster as a percentage of the non-CTE students who participated in non-CTE WBL, i.e., the students for whom career cluster data were available in each cohort. This table shows that WBL opportunities taken by non-CTE students outside of a CTE program were most often affiliated with the Education and Training career cluster, followed by Health Science and Human Services.

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

Students from city schools were notably overrepresented in the following career clusters: Marketing, Sales, & Service; Business, Management & Administration; and Science, Technology, Engineering & Mathematics.

For non-CTE students, projected career pathways are less clear because these students are not involved in approved CTE programs with designated pathways/clusters that can be determined by CIP codes. However, WBL opportunities taken by non-CTE students align to career clusters.

WBL opportunities taken by non-CTE students outside of a CTE program were most often affiliated with the Education and Training career cluster, followed by Health Science and Human Services.

TABLE 4. Non-CTE WBL Participants by Career Cluster: Non-CTE Students Only

Career Cluster	2019 Cohort		2020 Cohort	
	N	%	N	%
Agriculture, Food & Natural Resources	497	3.8%	489	4.6%
Architecture & Construction	401	3.1%	361	3.4%
Arts, A/V Technology & Communications	1,011	7.8%	727	6.9%
Business, Management & Administration	1,155	8.9%	1,109	10.5%
Health Science	2,000	15.4%	1,590	15.1%
Hospitality & Tourism	765	5.9%	685	6.5%
Human Services	1,549	12.0%	1,126	10.7%
Information Technology	411	3.2%	273	2.6%
Law, Public Safety & Security	492	3.8%	393	3.7%
Manufacturing	322	2.5%	226	2.1%
Marketing, Sales & Service	1,145	8.8%	869	8.2%
Science, Technology, Engineering & Mathematics	948	7.3%	613	5.8%
Distribution Logistics	75	0.6%	81	0.8%
Education and Training	3,050	23.5%	2,476	23.5%
Government and Public Administration	212	1.6%	283	2.7%
Finance	287	2.2%	602	5.7%
TOTAL (Non-CTE WBL Participants)*	12,955		10,556	

*Note. Percentages do not add to 100% because students may have WBL data associating them with multiple career clusters.

Non-CTE students taking WBL opportunities in each of these career clusters differed in key ways in terms of student demographics. Figures 8 and 9 show the most male- and female-dominated career clusters for non-CTE students. The most male-dominated clusters in both cohorts were Architecture & Construction (83.3% – 85.6%), Information Technology (73.5% – 78.4%), Manufacturing (69.9% – 85.0%), and Distribution Logistics (84.0% – 86.4%). In contrast, the most female-dominated clusters were Health Science (72.7% – 76.2%), and Education and Training (66.0% – 70.2%).

FIGURE 8. Most Male-dominated Non-CTE Career Clusters by Graduate Cohort

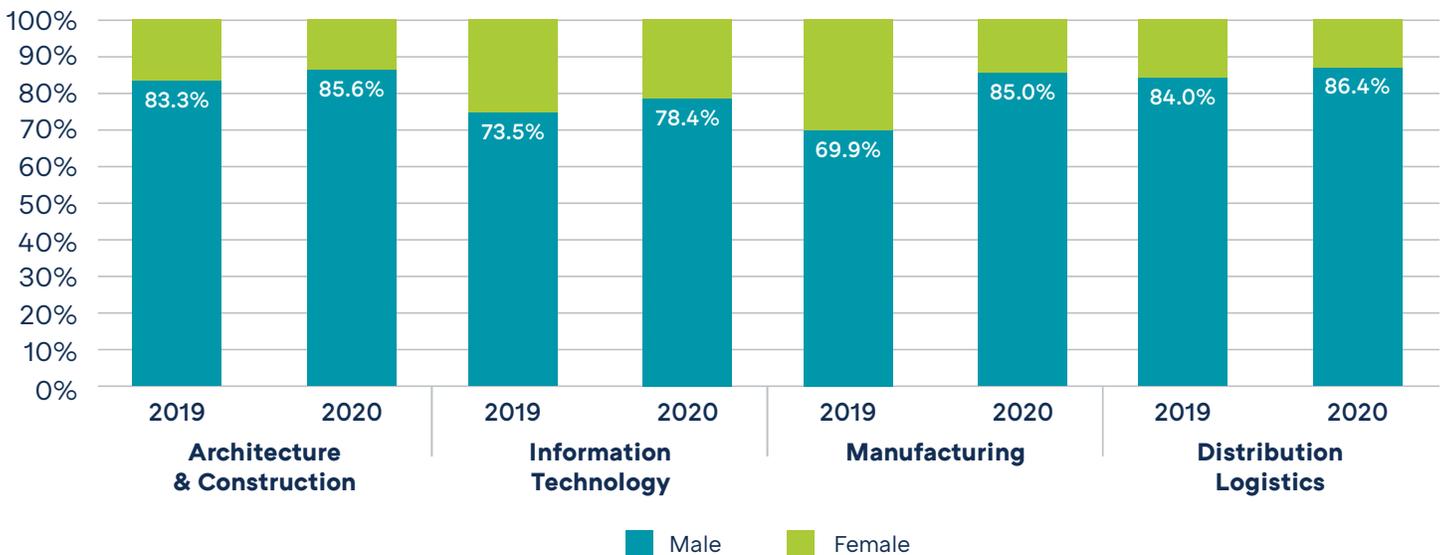
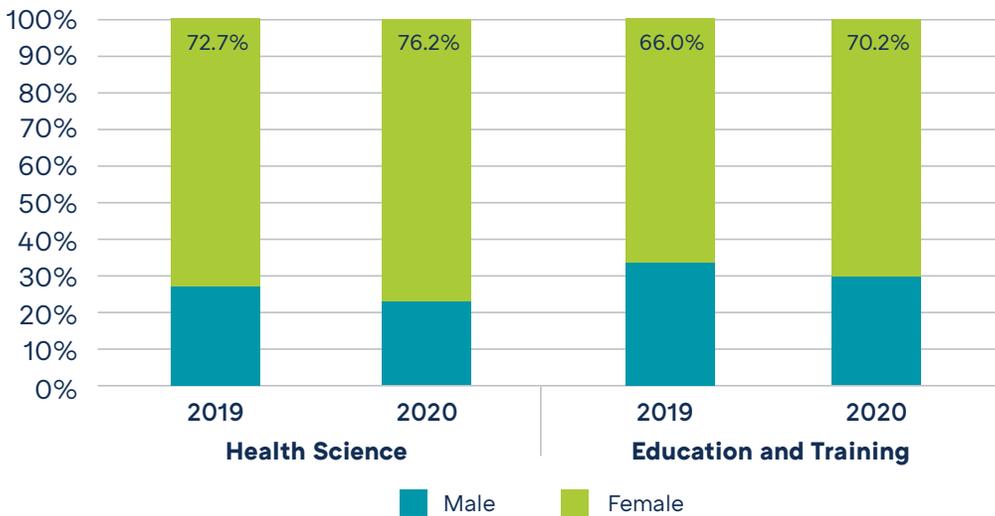


FIGURE 9. Most Female-dominated Non-CTE Career Clusters by Graduate Cohort



Although White students constituted the majority of students in each career cluster, Asian and Black non-CTE students were notably overrepresented in several career clusters relative to the total non-CTE population. Asian students made up less than five percent of all non-CTE students but were overrepresented in the following clusters: Information Technology (9.7% – 15.4%), Science, Technology, Engineering, & Mathematics (11.2% – 6.5%), and Finance (9.1% – 10.0%). Black students were most represented in Architecture & Construction (18.2% – 17.5%) and Government and Public Administration (19.3% – 15.9%). Despite constituting 13.1% – 13.3% of the non-CTE population, Black students made up less than four percent (3.9% – 3.3%) of non-CTE students within the Science, Technology, Engineering & Mathematics career cluster. Finally, the majority of non-CTE students in all career clusters graduated from schools in suburban locales, most dominantly in Arts, A/V Technology & Communications (86.6% – 85.3%), Science, Technology, Engineering & Mathematics (84.1% – 82.5%), and Finance (80.1% – 95.0%). More detailed analyses related to CTE career clusters will be made available in [a subsequent report in this series](#).

The majority of non-CTE students in all career clusters graduated from schools in suburban locales, most dominantly in Arts, A/V Technology & Communications, Science, Technology, Engineering & Mathematics, and Finance.

What is the description and breakdown of students who participate in any WBL? CTE WBL? Non-CTE WBL?

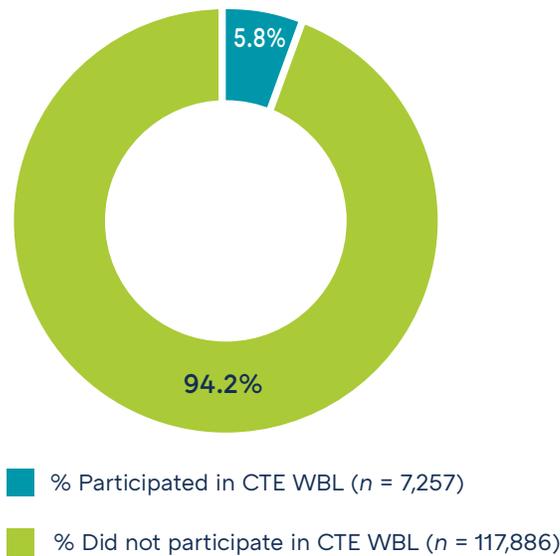
One major goal of the current report was to provide an overview of the characteristics of students who participate in various WBL opportunities in PA. Descriptive findings showed that a consistent proportion of students across both cohorts (16.7% – 16.4%)

Descriptive findings showed that a consistent proportion of students across both cohorts (16.7% – 16.4%) participated in some form of WBL by high school graduation.

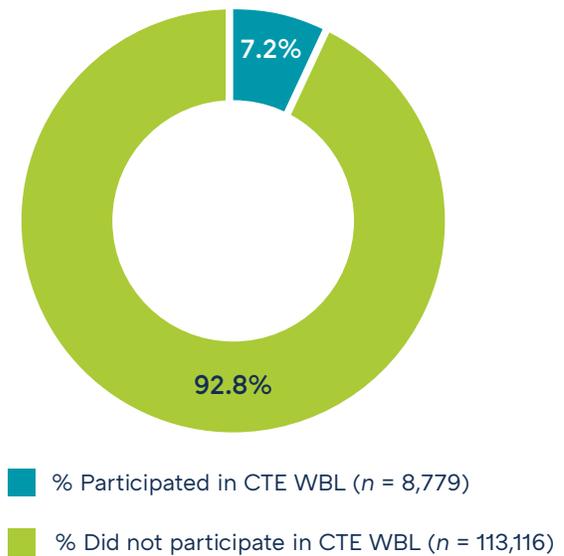
Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

participated in some form of WBL. Broken down further, Figure 10 shows that 5.8% of all graduates in the 2019 cohort participated in a WBL opportunity inside of a CTE program (CTE WBL), while Figure 12 shows that 11.3% of the full cohort participated in a WBL opportunity outside of a CTE program (non-CTE WBL). For the graduates of 2020, 7.2% of students participated in CTE WBL (Figure 11) and 9.6% participated in non-CTE WBL (Figure 13). Note that, in some cases, CTE students participated in WBL outside of their approved CTE program and are therefore included in the non-CTE WBL figures.

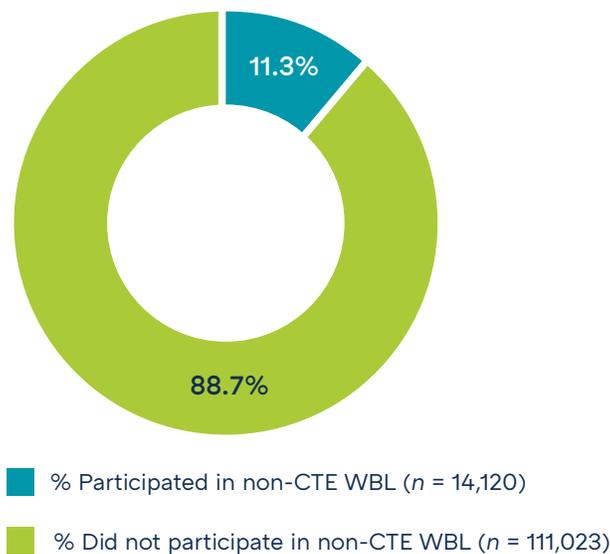
**FIGURE 10. Participation in CTE WBL:
Full 2019 Graduation Cohort**



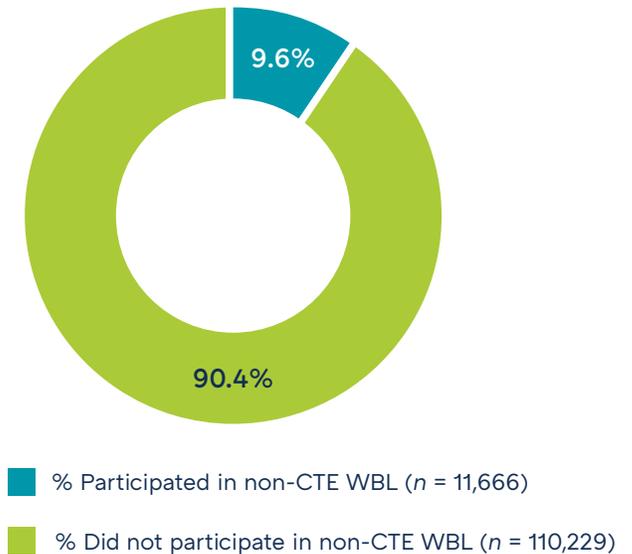
**FIGURE 11. Participation in CTE WBL:
Full 2020 Graduation Cohort**



**FIGURE 12. Participation in non-CTE WBL:
Full 2019 Graduation Cohort**



**FIGURE 13. Participation in non-CTE WBL:
Full 2020 Graduation Cohort**



Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

Additional descriptive analyses sought to examine potential demographic differences in participation in WBL. Several key differences between student groups, broken down by involvement with CTE WBL and non-CTE WBL, are noted below. For instance, Figure 14 shows that for the graduates of 2020, participants in CTE WBL were more likely to be male (57.2% versus 42.8%); however, Figure 15 indicates participants in non-CTE WBL were more likely to be female (54.3% versus 45.7%). Additionally, Figures 16 and 17 show descriptive differences in economic disadvantage status. Students who graduated in 2019 and participated in CTE WBL were slightly more likely to not be economically disadvantaged (53.4% versus 46.6%), while graduates who participated in non-CTE WBL were even less likely to be economically disadvantaged (31% versus 69%). Additional student groups and their participation rates in CTE and non-CTE WBL are displayed in Table 5, showing relative descriptive parity between cohorts.

For the graduates of 2020, participants in CTE WBL were more likely to be male; however, Figure 15 indicates participants in non-CTE WBL were more likely to be female.

FIGURE 14. Participants in CTE WBL by Gender: Graduates of 2020

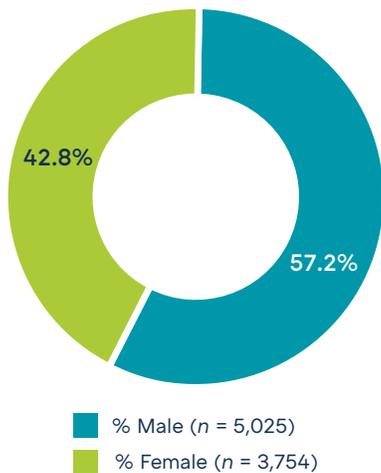


FIGURE 15. Participants in non-CTE WBL by Gender: Graduates of 2020

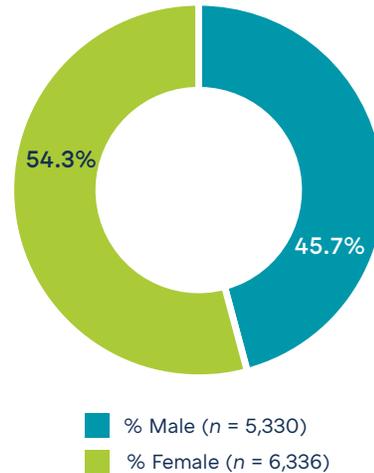


FIGURE 16. Participants in CTE WBL by Economic Disadvantage Status: Graduates of 2019

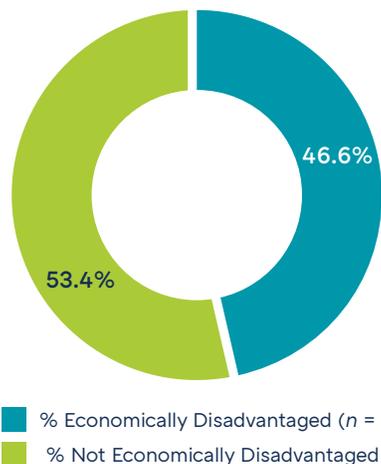


FIGURE 17. Participants in non-CTE WBL by Economic Disadvantage Status: Graduates of 2019

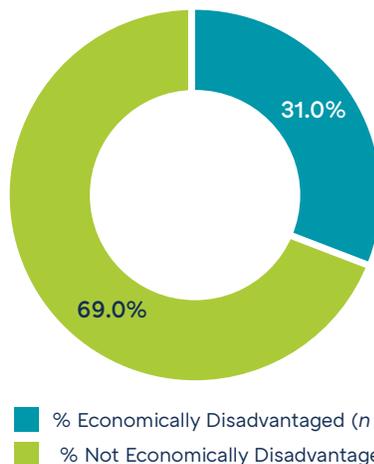


TABLE 5. Student Groups and Participation in CTE and non-CTE WBL: Graduates of 2019 and 2020

	2019 High School Graduating Class (N = 125,143)		2020 High School Graduating Class (N = 121,895)	
	CTE WBL Participants (n = 7,257)	Non-CTE WBL Participants (n = 14,120)	CTE WBL Participants (n = 8,779)	Non-CTE WBL Participants (n = 11,666)
Gender				
Male	56.6% (4,105)	45.8% (6,463)	57.2% (5,025)	45.7% (5,330)
Female	43.4% (3,152)	54.2% (7,657)	42.8% (3,754)	54.3% (6,336)
Race/Ethnicity				
American Indian/Alaskan Native	*	*	*	*
Asian	1.3% (91)	5.3% (753)	1.1% (95)	4.5% (525)
Black/African American	9.0% (656)	9.6% (1,353)	10.9% (955)	8.5% (995)
Hispanic	10.1% (733)	6.3% (888)	11.7% (1,029)	7.0% (822)
Multi-Racial	2.1% (131)	1.7% (247)	2.1% (186)	2.2% (261)
Native Hawaiian or Pacific Islander	*	*	*	*
White	77.5% (5,626)	76.8% (10,850)	74.0% (6,494)	77.5% (9,044)
Historically Underperforming				
Yes	57.5% (4,173)	38.9% (5,487)	59.5% (5,222)	39.6% (4,615)
No	42.5% (3,084)	61.1% (8,633)	40.5% (3,557)	60.4% (7,051)
Economic Disadvantage				
Yes	46.6% (3,382)	31.0% (4,383)	48.4% (4,245)	32.3% (3,765)
No	53.4% (3,875)	69.0% (9,737)	51.6% (4,534)	67.7% (7,901)
Special Education				
Yes	24.3% (1,764)	16.0% (2,258)	25.0% (2,192)	16.0% (1,871)
No	75.7% (5,493)	84.0% (11,862)	75.0% (6,587)	84.0% (9,795)
English Learner (EL)				
Yes	1.9% (138)	1.3% (179)	2.8% (244)	1.6% (181)
No	98.1% (7,119)	98.7% (13,941)	97.2% (8,535)	98.4% (11,485)
Geographic Locale				
City	21.1% (1,534)	11.1% (1,566)	17.5% (1,535)	9.2% (1,072)
Rural	25.7% (1,862)	13.7% (1,940)	23.8% (2,089)	13.8% (1,606)
Suburban	40.8% (2,963)	67.6% (9,552)	43.3% (3,804)	69.2% (8,074)
Town	12.4% (898)	7.5% (1,062)	15.4% (1,351)	7.8% (914)

*Note: Cell does not meet minimum reporting requirements.

What is the description and breakdown of students who participate in specific CTE WBL opportunities?

The available data allowed the researchers to track 7 total WBL opportunities within CTE for the graduates of 2019 and 8 total CTE WBL opportunities for the graduates of 2020 (with the addition of simulated work environment). Figures 18 and 19 show the percentage of CTE students who participated in any kind of CTE WBL opportunity and the percentage of those students (CTE WBL participants) who engaged in each specific WBL opportunity for the graduate cohorts of 2019 and 2020, respectively.

Percentages reported parenthetically in text are for the 2019 and 2020 cohorts, respectively (2019% – 2020%).

Cooperative work experience was the most popular WBL opportunity among 2019 CTE WBL participants, while simulated work environment was the most popular opportunity for the CTE WBL participants of 2020. Note that findings for this question are limited to CTE students due to limitations in the WBL data for non-CTE students.

For more information regarding each CTE WBL opportunity in PA, refer to page 189 of the [PIMS CTE Student Fact Template](#).

FIGURE 18. CTE WBL Engagement: Graduates of 2019

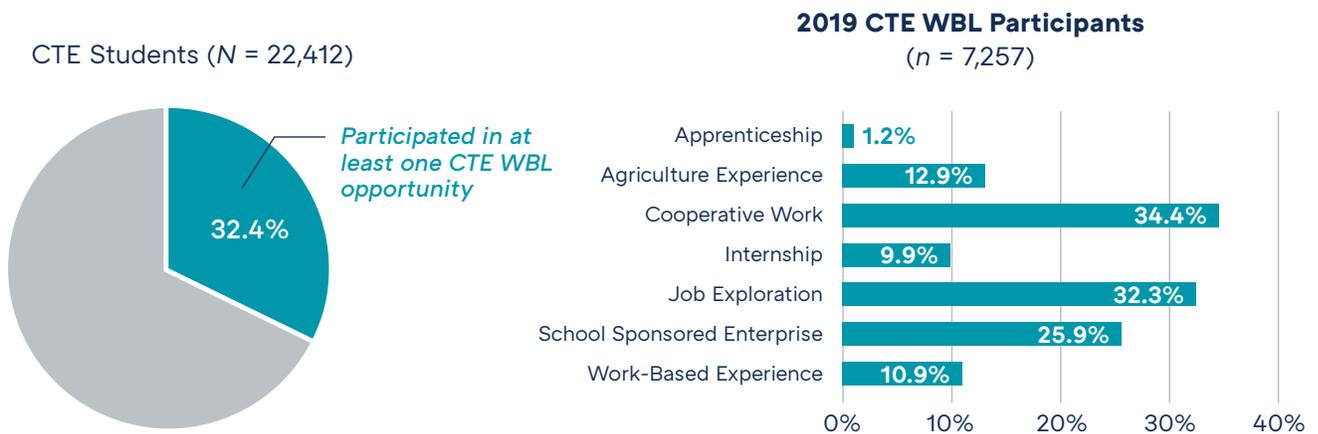
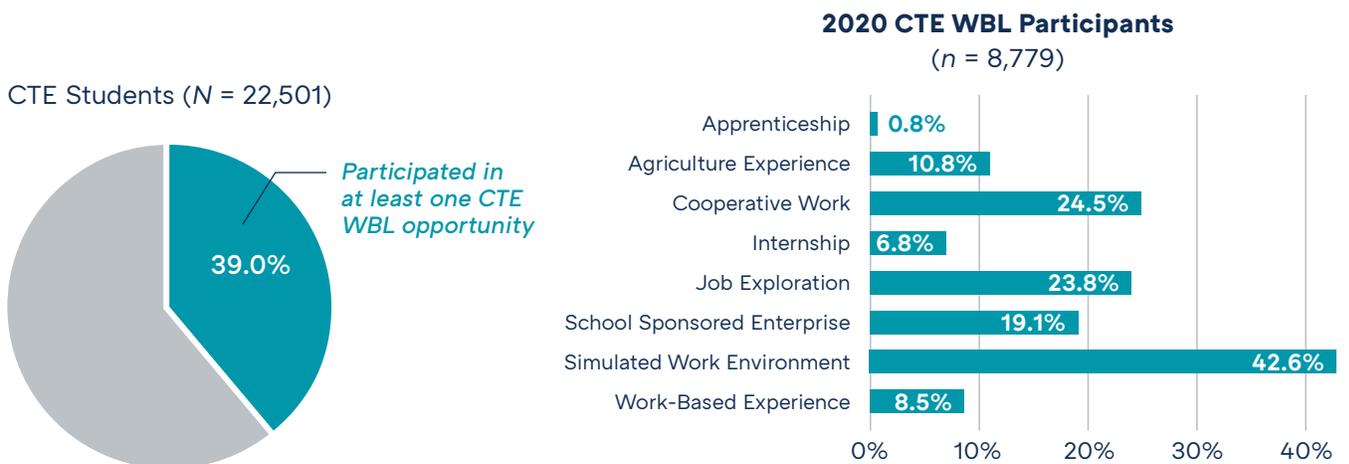


FIGURE 19. CTE WBL Engagement: Graduates of 2020



Participation in the specific CTE WBL opportunities also differed by student demographics. Figures 20 and 21 display two WBL opportunities whose participants were predominately female and male, respectively. For the 2020 cohort, approaching 70% of CTE graduates who did an internship were female, while 73.9% of cooperative work experience students were male. Figure 22 shows that for the graduates of 2019, most participants in school sponsored enterprises qualified as historically underperforming (67.8%), while Figure 23 shows that for the graduates of 2020, most students who participated in

apprenticeships were economically disadvantaged (67.1%). Lastly, several notable differences in demographics are highlighted in Figures 24 and 25. Figure 24 shows that students in the 2019 graduation cohort who participated in internships most often graduated from suburban schools, while students who participated in agriculture experiences and school sponsored enterprises were most likely to attend schools in rural locales and cities, respectively. Figure 25 provides a descriptive overview of race/ethnicity for five CTE WBL opportunities in 2020. Notably, White students in the 2020 cohort constituted over 80% of the participants in cooperative work experiences and job explorations, while Black/African American and Hispanic students were most well-represented in the school sponsored enterprise opportunity.

FIGURE 20. Participants in Internship by Gender: 2020 Graduation Cohort

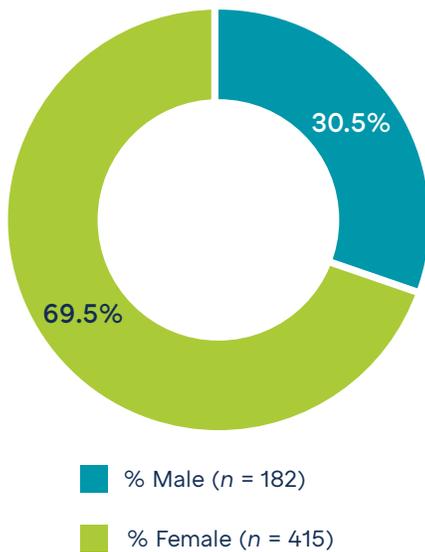


FIGURE 21. Participants in Cooperative Work Experience by Gender: 2020 Graduation Cohort

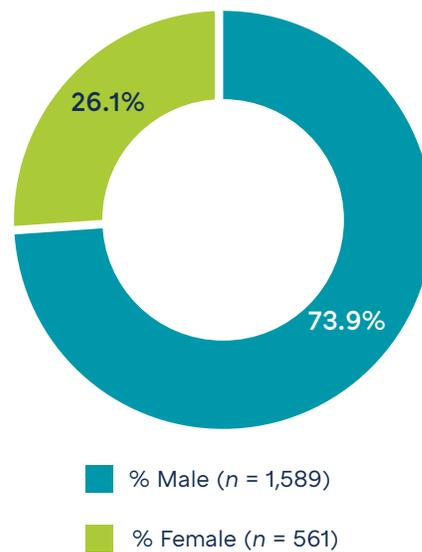


FIGURE 22. Participants in School Sponsored Enterprise by Historically Underperforming Status: 2019 Graduation Cohort

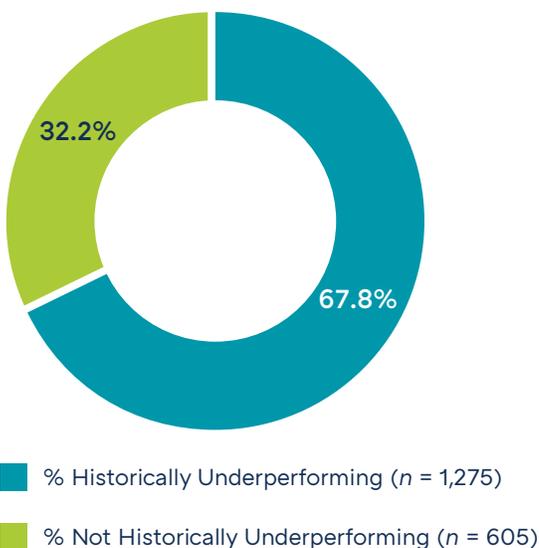


FIGURE 23. Participants in Apprenticeship by Economically Disadvantaged Status: 2020 Graduation Cohort

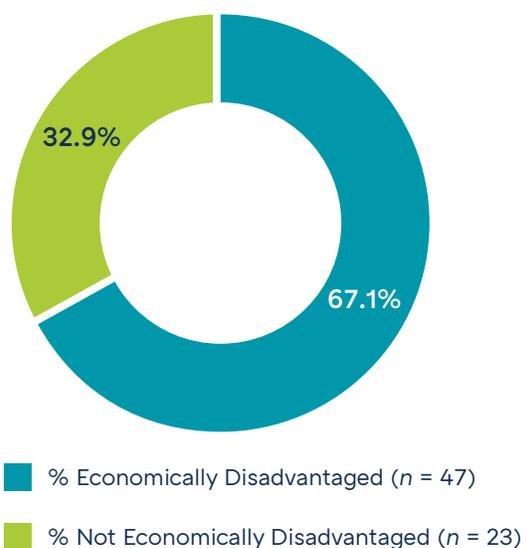


FIGURE 24. Participants in Various CTE WBL Opportunities by Geographic Locale: Graduates of 2019

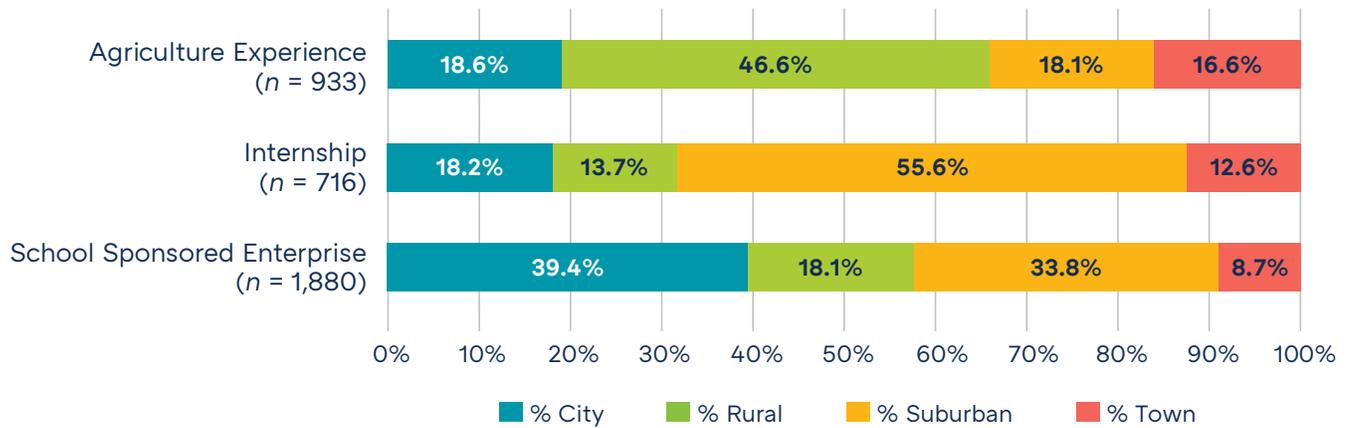
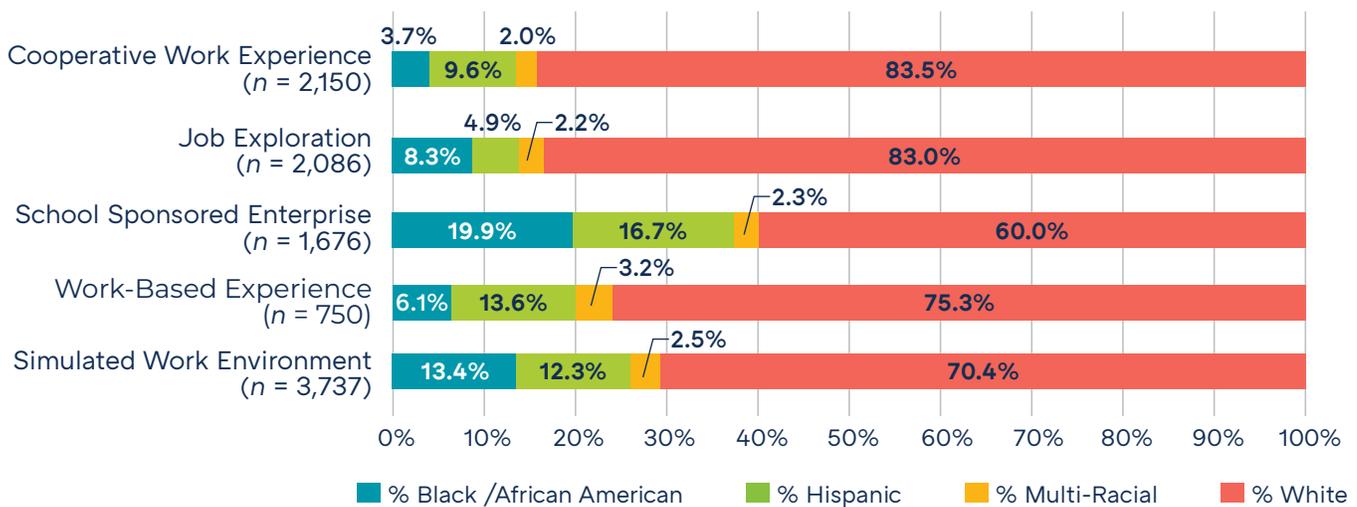


FIGURE 25. Participants in Various CTE WBL Opportunities by Race/Ethnicity: Graduates of 2020



*Note: American Indian/Alaskan Native, Asian, and Native Hawaiian/Pacific Islander students not reported above due to low cell counts.

Conclusion

This report sought to highlight key descriptive findings for two cohorts of Pennsylvania high school graduates. Reporting results for both CTE and non-CTE students, the current report describes notable student-level demographic characteristics, outcomes, affiliation with career pathways/clusters, and rates of participation in the various WBL opportunities offered in PA schools. Results from this brief can provide necessary context as future research in this series explores the impact of WBL for PA secondary students. The next report in this series will utilize chi-square and logistic regression techniques to further investigate potential associations between participating in WBL and student outcomes like postsecondary enrollment and earning a non-degree credential (i.e., an industry-recognized credential or occupational competency certificate).

References

- Alfeld, C., Charner, I., Johnson, L., & Watts, E. (2013). Work-based learning opportunities for high school students. National Institute for Work and Learning. <https://files.eric.ed.gov/fulltext/ED574519.pdf>
- Maertz, C. P., & Stoeberl, P. A. (2014). Building successful internships: Lessons from the research for interns, schools, and employers. Career Development International. https://www.researchgate.net/profile/CarlMaertz/publication/263338139_Building_successful_internships_Lessons_from_the_research_for_interns_schools_and_employers/links/5447bae90cf2d62c3050a995/Building-successful-internships-Lessons-from-the-research-for-interns-schools-and-employers.pdf
- Miller, C. M., & Riccardo, R. (2021). Investigating the differential academic outcomes of Career and Technical Education (CTE) students in Pennsylvania (PA) secondary schools. Pennsylvania Department of Education. <https://www.education.pa.gov/Documents/Data%20and%20Statistics/Research%20and%20Evaluation/FullReportInvestigatingDifferentialAcademicOutcomesCTEStudentsPASecondarySchools.pdf>

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