



Report on the Cyber Warrior Diversity Program

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In accordance with Education Article §11–1404, the Maryland Higher Education Commission (MHEC) on or before December 1, 2021 is required to prepare a report regarding the Cyber Warrior Diversity Program. Specifically, the Commission shall compare successful completers of each Program to similarly situated students who did not enroll in either Program with regard to the following characteristics: (1) employment rate, (2) wage earnings, and (3) job retention rate.

Background

The Cyber Warrior Diversity Program (CWDP) was established in 2018 with the purpose to train students in computer networking and cybersecurity. By law, the CWDP is offered at Baltimore City Community College, Bowie State University, Coppin State University, Morgan State University, the University of Maryland Eastern Shore, and the University of Maryland Baltimore County Training Centers that are located in the State. Each Program shall provide students with the training necessary to achieve the following CompTIA certifications: CompTIA A+, CompTIA Network+, and CompTIA Security+.

Analysis

MHEC does not have access to employment data, including wage data. Therefore, MHEC collaborated with the Maryland Longitudinal Data System Center (MLDS) to conduct this analysis. MLDS is only able to report on wage earnings. MLDS is unable to report on and evaluate employment rates and job retention rates. MHEC (as well as the colleges and universities) would not have regular access to employment rates or job retention rates for specific students.

The analysis presented here focuses on wage earnings and leverages a methodology regarding full quarter wages called “Full-Quarter Employment Methodology.” This methodology excludes individuals from the median calculation who do not have wage data in either the fiscal quarter before or after the period of interest. Utilizing this methodology may indirectly address job retention rates.

Cyber Warrior Diversity Student Outcomes

Between 2019 and 2020, there were a total of 344 students enrolled in a Cyber Warrior Diversity Program in the State at any given time.ⁱ Of the 344 students, 119 students are found with full-quarter wages with a median quarterly wage of \$5,577.ⁱⁱ Table 1 provides a breakout of specific labor sectors for Cyber Warrior Diversity Program students.

Table 1: Cyber Warrior Diversity Students - Wage Earning by Labor Sector (2019-2020)

Results by Labor Sector ⁱⁱⁱ (NAICS Codes)	Overall with FQW ^{iv}	
	Total with Full-Quarter Wages	Median Quarterly Wage ^v
Goods Production (11, 21, 23, 31, 32, 33)	*	*
Trade, Transportation, and Utilities (22, 42, 43, 44, 45, 48, 49)	24	\$4,293
Information, Public Administration, and Other Services (51, 81, 92, 99)	17	\$7,487
Finance, Real Estate, and Professional & Business Services (52, 53, 54, 55, 56)	33	\$6,817
Education and Health (61, 62)	30	\$7,201
Leisure and Hospitality (71, 72)	*	*
	119	\$5,577

*MLDS Center may only report aggregate, de-identified data. Data requests containing data elements subject to the Family Educational Rights and Privacy Act (FERPA) require suppressing values less than 10 to avoid unauthorized disclosure of protected information. Data requests that are not subject to FERPA are suppressed whenever values are less than 3 to avoid unauthorized disclosure even when protected information is not present. Additional values are masked to prevent calculating masked values

Comparison Group: Career and Technical Education High School Students

The Statute requires the Commission to compare successful completers of each program to similarly situated students. For a comparison group, we identified high school graduates who were completers, concentrators or both in the Career and Technical Education Clusters of: Java Database Academy (Oracle), IT Networking Academy (Cisco), or Project Lead the Way (PLTW) Computer Science.^{vi}

There were a total of 1,160 high school graduates who completed and/or concentrated in one of the three IT clusters (using the 2017-2018 and 2018-2019 cohorts). Of the 1,160 high school CTE IT graduates, 397 are found with full-quarter wages with a median quarterly wage of \$3,327. Table 2 provides both a breakout of wage earnings by sector and college attainment for high school CTE IT graduates.

Table 2: High School CTE IT Graduates - Wage Earning by Labor Sector and College Attainment (2017-2018 and 2018-2019 cohorts)

Results by Labor Sector ^{vii} (NAICS Codes)	Overall with FQW		Some College ^{viii}		No College ^{ix}	
	Total	Median Quarterly Wage	Total with Full-Quarter Wages	Median Quarterly Wage	Total with Full-Quarter Wages	Median Quarterly Wage
Goods Production (11, 21, 23, 31, 32, 33)	15	\$6,527	*	*	*	*
Trade, Transportation, and Utilities (22, 42, 43, 44, 45, 48, 49)	160	\$3,171	107	\$2,811	53	\$3,932
Information, Public Administration, and Other Services (51, 81, 92, 99)	34	\$4,770	23	\$3,738	11	\$5,878
Finance, Real Estate, and Professional & Business Services (52, 53, 54, 55, 56)	34	\$4,406	19	\$3,327	15	\$5,605
Education and Health (61, 62)	22	\$3,567	*	*	*	*
Leisure and Hospitality (71, 72)	132	\$3,101	83	\$2,624	49	\$3,828
	397	\$3,327	249	\$2,899	148	\$4,117

*MLDS Center may only report aggregate, de-identified data. Data requests containing data elements subject to the Family Educational Rights and Privacy Act (FERPA) require suppressing values less than 10 to avoid unauthorized disclosure of protected information. Data requests that are not subject to FERPA are suppressed whenever values are less than 3 to avoid unauthorized disclosure even when protected information is not present. Additional values are masked to prevent calculating masked values

Through the analysis conducted by the MLDS, about 50% of the CWDP students are in the workforce. This should be taken with caution as students may still be enrolled in an undergraduate program at the time of analysis. Regardless, it appears that CWDP students have higher median quarterly wages compared to high school CTE IT graduates (\$5,577 and \$3,327, respectively). It is unclear if the high median wage is attributable to the CWDP explicitly or due to the fact that CWDP students will likely have some college credit, if not a full degree. What is unusual is that, of high school CTE IT graduates, those with no college have higher wages compared to those with some college (\$4,117 and \$2,899, respectively). There may be additional training opportunities that are not identified in current collections that may be driving these differences.

Conclusions

The CWDP is a unique program that can benefit students, particularly those who may not be initially interested in cybersecurity or cyber related professional fields. Providing programs like the CWDP allows students the opportunity to gain additional credentials and training that may not otherwise be available to them.

ⁱ The population of interest was students who complete one or more Cyber Warrior Diversity Programs at Baltimore City Community College, Bowie State University, Morgan State University or University of Maryland Eastern Shore. Coppin State University was eligible to participate in the Cyber Warrior Diversity Program but had zero enrollment in 2019 and 2020. Students participated in the Cyber Warrior Diversity Program in calendar years 2019 and 2020. Some students completed more than one CompTIA training within a calendar year and/or across calendar years. Students who complete the full Cyber Warrior Diversity Program (e.g., all 3 CompTIA trainings) may still be enrolled in college after completion of the full Cyber Warrior Diversity Program or may have graduated or withdrawn.

ⁱⁱ The median wage includes only wages from the last program participation (i.e. If a student completed the full Cyber Warrior Diversity Program in 2019 and 2020, the 2020 wages are used to derive the median.) The wages reported may reflect part-time in-school employment rather than employment tied to the CompTIA training.

ⁱⁱⁱ Wage data in the System include North American Industry Classification System (NAICS) codes for employers. This system classifies employers by sector rather than identifies the specific jobs performed by employees. For example, NAICS 62 is Health Care and Social Assistance, and NAICS 6221 is General Medical and Surgical Hospitals. Individuals who are doctors, hospital administrators, dietitians, and janitorial staff at a hospital would all have this same NAICS code. Employers select the sector and may change their sector designation at any time. NAICS codes can be found here: <https://www.naics.com/search-naics-codes-by-industry/>

^{iv} The Cyber Warrior Diversity Program completers included in the wage analysis were selected by using the U. S. Census Bureau Stable or Full-Quarter Employment Methodology (referenced as Full-Quarter Wages). This methodology excludes individuals from the median calculation who do not have wage data in either the fiscal quarter before or after the period of interest. The period of interest for Cyber Warriors in the 2019 cohort was fiscal quarter 3 of 2019. The period of interest for Cyber Warriors in the 2020 cohort was fiscal quarter 3 of 2020. For the 2019 cohort, individuals were included in the median wage calculation if, in addition to having wages in fiscal quarter 3 of 2019, they also had wages in fiscal quarter 2 and fiscal quarter 4 of 2019. For the 2020 cohort, individuals were include in the median wage calculation if, in addition to having wages in fiscal quarter 3 of 2020, they also had wages in fiscal quarter 2 and fiscal quarter 4 of 2020. Due to COVID-19, wage data for Q3 and Q4 of 2020 are incomplete and late filings are not yet available. Therefore, for the 2020 cohort, Cyber Warriors were also included in the median wage calculation if they had wages in Q2 and Q3, or Q3 and Q4, or Q2 and Q4. When Q3 wages were not available, Q4 and Q2 wages were used in the median calculation to impute the missing value.

The Full-Quarter Methodology provides a standardized method of determining whose wages to include in the analysis. Restricting analysis to “stable wage earners” provides a clearer picture of wage outcomes for workers fully engaged in the workforce and eliminates the potential to deflate median wage calculations by including the wages, or the lack of wages, of workers who are absent, transient, or not fully engaged in the workforce. This method also reduces the impact of UI wage data limitations by excluding wages that may be incorrect due to incomplete or late filings.

^v The MLDS System contains workforce data from quarterly Unemployment Insurance (UI) filings beginning with the first fiscal quarter of 2008 for individuals with a Maryland educational record (see the MLDS Data Inventory for a definition of educational record). UI filings are only available for Maryland employees who work for an in-state employer required to file UI and have a Maryland education record. Examples of employers that are not required to file UI include the federal government (including the military), certain non-profits, and self-employed and independent contractors. Individuals working in temporary employment, including federal postsecondary work-study programs, are also not subject to UI filings. These omissions mean it is incorrect to assume that individuals not counted as “employed” are unemployed.

The UI wages reported reflect the compensation paid during a fiscal quarter, rather than when the compensation was earned. UI wages reflect the sum of all compensation, including bonuses, commissions, tips, and other forms of compensation. The UI wage data do not distinguish between part-time and full-time employment, hourly and salaried wages, regular wages and commissions, bonuses, and other incentive pay. The UI wage data provided do not indicate the number of days or the number of hours a person worked in a fiscal quarter.

UI filings for a fiscal quarter may be incomplete. Employers may have filed UI wages after the data have been transmitted to the MLDS Center or have omitted individuals from their file. Missing wage data and/or corrections to previously reported wages may be provided in subsequent fiscal quarters. While there is no time limit on correcting UI filings, most changes (additions and/or corrections) are completed within one fiscal quarter. The fiscal quarters used for analysis for the 2019 cohort have had at least three fiscal quarters of subsequent UI data reported, including the fiscal quarter used to derived median quarterly wages; therefore, errors in wage amounts due to corrections and late filings have been minimized. The fiscal quarters used for analysis for the 2020 cohort have not had at least three fiscal quarters of subsequent UI data reported, therefore, wage visibility may be reduced and/or wage amounts incorrect.

^{vi} More information on CTE clusters can be found on the Maryland State Department of Education's (MSDE) website: http://marylandpublicschools.org/programs/documents/cte/md_cte_programs_of_study_2021.pdf

^{vii} Wage data in the System include North American Industry Classification System (NAICS) codes for employers. This system classifies employers by sector rather than identifies the specific jobs performed by employees. For example, NAICS 62 is Health Care and Social Assistance, and NAICS 6221 is General Medical and Surgical Hospitals. Individuals who are doctors, hospital administrators, dietitians, and janitorial staff at a hospital would all have this same NAICS code. Employers select the sector and may change their sector designation at any time. NAICS codes can be found here: <https://www.naics.com/search-naics-codes-by-industry/>

^{viii} High school graduates with Some College may have a postsecondary degree, either at the Certificate level or the Associate's level. The population with a college degree is too small to report due to suppression so both those with some college and a degree are pooled. None of the Some College have a Bachelor's degree.

^{ix} Enrollment in college was determined using both in-state data provided by the Maryland Higher Education Commission and out-of-state data provided by the National Student Clearinghouse. Neither source provides data on high school graduates pursuing non-credit course work in college therefore some of the No College high school graduates may have taken non-credit workforce courses at a college.