MLDS Center
Maryland Longitudinal Data System

Better Data • Informed Choices • Improved Results

December 2018

2018 Annual Report on the Maryland Longitudinal Data System and Center

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This Annual Report of the Governing Board of the Maryland Longitudinal Data System Center is submitted to the Governor and the Maryland General Assembly in compliance with Education Article § 24-705 of the Annotated Code of Maryland.

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Highlights

The Maryland Longitudinal Data System (MLDS) Center is pleased to report on the significant progress it has made over the past year to refine and improve the System and increase output.

- With 10 years of data and a cross-sector match rate of 95%, the Center is capable of looking at long-term student outcomes with a high level of confidence.

- As a result of new dashboards, other new web content, and enhanced outreach, the Center had a **180%** increase in its website traffic.

- Submitted grants to federal funders, including the Institute of Education Sciences, and national foundations, including the Spencer Foundation, to increase the Center's capacity to provide data driven research and analyses to inform State and local policy.

- The Center also increased the number of:
  - Dashboards, data analyses, and summaries for the website; and
  - Seminars and presentations to stakeholders about the Center and its work.

- The Center is fulfilling the goal of providing timely and actionable data to help inform policy by:
  - Providing research and analysis to the *Commission on Excellence and Innovation in Education* (Kirwan Commission) that was used to help analyze decisions on school funding.
  - Extracting data to help the Department of Legislative Services and the Maryland Higher Education Commission more accurately assess the fiscal impact of legislation.
  - Analyzing the college enrollment and employment outcomes of healthcare CTE completers for the University System of Maryland's Healthcare Workforce Workgroup.
  - Compiling and analyzing for MSDE's High School Graduation Task Force.

- Increased the system's security profile by implementing an Intrusion Detection System to monitor all traffic to MLDS servers that maintain critical data.

Introduction

This Annual Report is submitted in fulfillment of the requirement under Education Article, §24-705, Annotated Code of Maryland. The Governing Board must provide information to the Governor and General Assembly annually on the following:

1. An update on the implementation of the MLDS and activities of the MLDS Center;
2. List of all studies performed by the Center during the reporting period;
3. List of all currently warehoused data that are determined to be no longer necessary to carry out the mission of the Center;
4. Any proposed or planned expansion of data maintained in the database; and
5. Any other recommendations made by the Governing Board.

The following sections of the report will address of each of the five statutorily required topics.

Section 1. Implementation of the MLDS and Activities of the Center

1.1 System Implementation and Management

A. Metrics

The following table shows the summary individual person counts from the data loaded into the System from the partner agencies.

Table 1: Number of individual records in the MLDS by Data Source

Data Source	Count as of 11/16/2017	Count as of 11/16/2108	Percent Change
MSDE	1,980,714	2,019,394	2%
MHEC	1,389,867	1,639,221	18%
DLLR	1,381,175	1,503,249	9%
Net Total	**3,029,122**	**3,150,147**	**4%**

B. Identity Resolution

The Center's ability to match K-12 student data to higher education and workforce data remains at a high level as demonstrated in the following analyses. The Center assesses the match rate by determining the number of Maryland public school 12th graders for whom one or more cross-sector matches can be found. This year, the overall match rate has increased to 95%, a two percent increase from last year.

Table 2: Counts of Cross-Sector Linkages for 12th Grade Cohorts in the MLDS by Total and Cohort Year

Md. Public School 12th Graders	Total for all 12th Grade Cohorts (8)	12th Grade Cohort Year									
		2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Total count for 12th grade cohorts	616,971	66,461	61,551	61,697	63,079	60,515	60,976	60,478	61,306	60,354	60,552
K12 only (no links to other sectors)	39,948	6,625	3,366	2,931	3,388	2,755	2,992	3,385	4,008	4,459	6,037
K12 and College (no Workforce)	52,166	7,171	4,087	3,749	3,698	3,780	4,013	4,683	5,534	6,824	8,627
K12 and Workforce (no College)	125,871	11,426	11,288	11,676	12,761	11,843	12,251	12,746	13,397	13,508	14,975
K12, College, and Workforce	398,986	41,239	42,810	43,341	43,232	42,137	41,720	39,664	38,367	35,563	30,913
Percent matched across all 3 sectors	**65%**	**62%**	**70%**	**70%**	**69%**	**70%**	**68%**	**66%**	**63%**	**59%**	**51%**

Table 3: Percent of 12th Grade Cohorts in the MLDS with one or more cross-sector matches

Academic Year	Total for all 12th Grade Cohorts (8)	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
2018	94%	90%	95%	95%	95%	95%	95%	94%	93%	93%	90%
2017	92%	89%	93%	94%	94%	94%	93%	93%	91%	83%	83%
2016	92%	87%	92%	93%	93%	93%	92%	90%	85%	N/A	N/A
2015	88%	87%	91%	91%	90%	89%	87%	82%	88%	N/A	N/A
Difference	**↑ 2%**	**↑ 1%**	**↑ 2%**	**↑ 1%**	**↑ 1%**	**↑ 1%**	**↑ 2%**	**↑ 1%**	**↑ 2%**	**↑ 10%**	**↑ 7%**

These high match rates indicate that if a student is not matched to a higher education or workforce record it is most likely due to the fact that the student is not in either of those data sets, as opposed to insufficient data or weak data matching routines.

C. Security

1. Intrusion Detection System (IDS)

Over the past year, the Center implemented an Intrusion Detection System (IDS) to enhance its security profile. An intrusion detection system is a combination of hardware, software, and services that monitor all traffic into and out of a server to identify suspicious or inappropriate traffic. The Center implemented the IDS for a year (October 2017 through October 2018). The IDS was provided and monitored by a security contractor under the DoIT enterprise services contract. The experience of using the IDS was extremely beneficial. The IDS reporting and recommendations from the security contractor provided important insights and recommendations for improving the Center's system architecture. Further, by using the IDS the MLDS system managers gained an in-depth understanding of IDS and how to implement and manage its own IDS. Accordingly, the Center has decided to move off of the vendor provided solution and is currently implementing its own IDS.

2. Department of Homeland Security Cyber-Security Audit

The National Cybersecurity and Communications Integration Center (NCCIC) under the Department of Homeland Security is charged with reducing the risk of systemic cybersecurity and communications challenges in its role as "the Nation's flagship cyber defense, incident response, and operational integration center." NCCIC, through its U.S. Computer Emergency Readiness Team (U.S. CERT), offers National Cybersecurity Assessments and Technical Services (NCATS)[1]. All of the services are available at no cost to state and local government. The services include:

1. Cyber Hygiene: Vulnerability Scanning
2. Phishing Campaign Assessment (PCA)
3. Risk and Vulnerability Assessment (RVA)
4. Validated Architecture & Design Review (VADR)

Center staff have begun working with the U.S. CERT to begin the audit of the Center's system.

[1] https://www.us-cert.gov/resources/ncats

D. Data Center Hosting

The MLDS Center's data system is built using a suite of Oracle products. The Center's Oracle license has been procured through and substantially funded by MSDE. MSDE no longer needs this Oracle license.[2] As a result, after the current fiscal year, the MLDS Center will need to fully fund its own Oracle license. As a result, the Center will need to consider the following possibilities:

1. Continue with a similar Oracle License either within the MSDE's data center or at the State's enterprise data center;
2. Move to Oracle's Cloud hosted environment; or
3. Move to the State's enterprise system and covert to its database platform.

Each option has important security, technical, and cost impacts that need to be considered. The Center plans to engage a consultant to help review the options and make a recommendation to the Governing Board.

1.2 Activities of the Center

A. Stakeholder Engagement

The Center continues to work directly with stakeholders to provide information and analysis to help them use data to inform decision making. Directly engaging stakeholders ensures that the Center's work is focused on the critical policy needs of the state.

1. Maryland Higher Education Commission

College Pathways to Careers

The Center has been working over the past several months on a project to develop dashboards on College Degree Pathways to Careers. This project started as a data requests from MHEC related to graduation, transfer and workforce outcomes for associate's degree students attending Maryland community colleges.

- The first request focused on outcomes for students graduating with an Associate of Applied Science (AAS) degree. This analysis included data on employment after graduating with the AAS as well as employment for AAS students that subsequently earned a bachelor's degree.
- The second request explored the educational and workforce outcomes for students enrolled in Engineering-related Associate's degree programs (ASE) at Maryland community colleges. The Center presented this analysis to the ASE Oversight Council. The ASE Oversight Council is tasked with reviewing the education and workforce outcomes for these programs. The Center will be

[2] MSDE used the Oracle license to maintain a series of P-12 Longitudinal Data System Dashboards on its LearnMD.org website. Those dashboards were one component of a broader project under the 2009 Federal Race to the Top Grant. MSDE has determined that of the 21 dashboards, all but three are no longer used or fulfilling a compelling business need for MSDE. MLDS Center has agreed to maintain the three dashboards on its website and eventually use MLDS Center data to develop new dashboards to replace them.

working closely with MHEC and the ASE Oversight Council to expand this study to support their on-going work. (See Attachment A)

- Finally, the Center completed its preliminary analysis of the educational and workforce outcomes for students enrolled in Associate of Arts in Teaching (AAT) in Maryland community colleges. The results were presented at the AAT Oversight Council meeting in May and will be incorporated into the Center's on-going work related to studying the teacher pipeline. (See Attachment B)

As part of the development process, the Center has been conducting a series of outreach events to solicit input and direction from key stakeholders on the scope and information to be provided in these dashboards as well as to establish common metrics and definitions so that the dashboards will be useful and relevant to these stakeholders. The stakeholders include:

1. Maryland Higher Education Commission;
2. Associate of Arts in Teaching Council;
3. Associate of Science in Engineering Council;
4. Student Transfer Advisory Council (STAC);
5. The Governor's P-20 Leadership Council of Maryland;
6. MHEC Segmental Advisory Council;
7. Maryland Community College Research Group (MCCRG);
8. Maryland Council of Community College Chief Academic Officers (M4CAO); and
9. Maryland Community College Presidents

Fiscal Impact of Legislation

The Center was asked by MHEC to provide data to help them develop a fiscal estimate for HB 860 (2018) – *Income Tax Credit – Individuals Working in STEM Fields – Student Loan Payments*. The bill provides an income tax credit for individuals working in STEM fields. The Center provided data on the number of Maryland students who would meet the eligibility requirements to earn the tax credit. To be eligible for the tax credit a student must: (a) have graduated from an accredited IHE; (b) have outstanding student loan debt; and (c) be employed by a Maryland based employer and work in a STEM field.

College Enrollment

The Center provided data to MHEC's Office of Outreach and Grants Management to support a new project intended to assist Maryland high schools in establishing practices and local policies to increase the number of high school seniors applying to college, completing the Free Application for Federal Student Aid (FAFSA) and developing post-secondary strategies in 17 counties The data provided an analysis of the college-going patterns and FAFSA applications of high school students in 2013 and 2014 compared to those of students in 2015, the first year the program was implemented.

Strategic Decisions

The Center provided data to MHEC on the education and workforce outcomes of AAS graduates to support MHEC's strategic decision-making process regarding implementing applied baccalaureate degrees at community colleges. Data were used to quantify the number of AAS graduates in select programs that enter the workforce after graduation compared to the number of AAS graduates who enroll in and graduate from a bachelor's degree before entering the workforce.

Student Outcome Achievement Report

The Center provided a set of data tables for MHEC's *Student Outcome and Achievement Report* (SOAR). SOAR provides stakeholders in high school and postsecondary education with information on the academic performance of recent high school graduation during their first year in college.

2. Maryland State Department of Education

Graduation Task Force

The State Department of Education convened the *High School Graduation Task Force* (HSGTF) in January 2018. Decisions of the HSGTF were informed by current research, data, and experts, consistently available to all members. At one of the Task Force's initial meetings, the co-chair Dr. Dara Shaw, Executive Director for Research and Strategic Data Use, led the task force through an exercise with using data from the Maryland State Report Card and the MLDS to facilitate the practice exercise. Task force members were encouraged to explore the information on the MLDS Center website in more detail. Task force members used the information available on the MLDS Center website regularly and placed two additional data requests to support the work of the task force.

Bridge project

At the request of MSDE, the Center's Research Branch is conducting an analysis on postsecondary outcomes for students who complete a Bridge project to meet their high school assessment graduation requirements.

PARCC Alignment Study

On behalf of MSDE, the Maryland Assessment Research Center at the University of Maryland, College Park, College of Education, is using Center data to conduct a study to explore the relationships between the PARCC test scores and postsecondary outcomes. This type of analysis helps determine whether the assessment tool accurately predicts success in postsecondary education.

Maryland Connections Summit

Several MLDS Center staff participated in the 2018 Maryland Connections Summit which was a conference hosted by the Maryland State Department of Education. The conference brought together education professionals from across Maryland to highlight the vital role data plays in education decision making.

Members of the research team gave two presentations. Dr. Henneberger presented on the use of causal inference methodologies for program evaluation with state data, using dual enrollment in Maryland as an example. Drs. Rose, Mushonga, and Henneberger presented on the use of eligibility for free and reduced price meals (FARMS) to measure student and school poverty in Maryland.

Ann Kellogg, MLDS Center Director of Reporting Services, co-presented with Barbara Schmertz, MHEC's Associate Director of Research and Policy, at the Maryland Connections Summit. The presentation focused on the MHEC-MLDS Center collaboration to produce the Student Outcome and Achievement Report (SOAR). This report is MHEC's response to the General Assembly's 1988 edict to "improve information on high schools and local school systems concerning the performance of their graduates at the college level." This is the first time that MLDS Center will be involved in the production of the SOAR.

3. Governor's Workforce Development Board

The Center has been working with the Governor's Workforce Development Board (GWDB) to develop the report required under the *Career Preparation Expansion Act*. Additional information on the final report can be found in Section 2.4

4. Department of Legislative Services

Senate Bill 317

The Center was asked by Department of Legislative Services (DLS) analysts for data to help them estimate the cost of administering the Community College Promise Program, established by SB 317, *Higher Education Degree and Job Certification Without Debt Act*. The program provides a grant to community college students who meet certain criteria. The Center provided data from a prior academic year on how many students met the eligibility requirements established by the bill. The Center also provided data on the amount of other grant assistance those students received. This information assisted DLS staff in making a more informed estimate of the costs of the program.

Commission on Innovation and Excellence in Education

Dr. Angela Henneberger, Director of the MLDS Center Research Branch and Dr. Bess Rose, Lead Statistician for the MLDS Center Research Branch gave a presentation to the *Commission on Innovation and Excellence in Education* at its July 13, 2018 meeting. The presentation was on the topic of the role of student and school level concentrated poverty on long-term outcomes. The findings presented include the fact that overall, school-level concentrated poverty has a negative association with long-term outcomes, above and beyond the role of individual level poverty, race, ethnicity, and school racial composition. Long-term outcomes examined include high school graduation, standardized test scores, college enrollment, and workforce wages.

As a result of questions received from the Commissioners, follow-up analyses were run and presented to the Commission a month later. Specifically, the researchers conducted the same analyses for each local school system, and found considerable variation across the state in the roles of student and school poverty. Researchers also conducted a threshold analysis in order to identify the school poverty concentrations at which school poverty most drastically affects outcomes. This analysis was requested in order to help provide information for school funding decisions being considered by the Commission.

This line of research began as a request from State Senator Bill Ferguson. Leading up to the presentation to the Commission, input from staff at the Department of Legislative Services (DLS) and Title I staff from MSDE were received and used to help inform the research.

5. University System of Maryland

Health Care Workforce Workgroup – P-20 Writing Group

USM convened a writing group to analyze health care workforce disparities, issues of clinical placement needs across various health occupations, and whether P-20 partnerships are having an impact on the number of students enrolling in health science programs. At the request of the P-20 Writing Group, the Center analyzed college enrollment and employment outcomes for CTE completers (see Attachment C).

- Of the 7,684 CTE completers between 2008 and 2014, 5,351 enrolled in a Maryland college.
- Of those students, 2,179 either started in or changed to a health-related major.
- Of those students, 1,555 earned a health related degree, are still enrolled, or stopped out of their health-related degree program.
- Of degree earners, 383 are employed in the healthcare workforce.
- Of those who stopped out of a higher education program, 199 are employed in the healthcare field.

The analysis revealed wage differences, including the fact that those who earned a degree and entered the healthcare workforce earned an average of $43,873 in their first year whereas non-degree holders who had been in a health major and subsequently entered the healthcare workforce earned $21,870.

Regional Higher Education Centers

The MLDS provided data to USM to help them understand the Southern Maryland educational pipeline from high school to community college to four-year institutions. These data provided information about the educational needs including current academic program enrollment as well as insights about future demand for new academic program offerings at the regional higher education center in Southern Maryland. The information was used in response to a required report under the 2018 Joint Chairman's Report.

C. Data Requests

1. Overview

This past year, the number of data requests continued to increase from 35 in 2017 to 39 in 2018. Attachment D contains a complete list of each of the data requests.

2. Amazon Headquarters Proposal

The Center was asked to provide data for Montgomery County (one of 20 finalists under consideration by Amazon for the location of its second headquarters) to use in response to questions in the Request for Proposals. The Center provided a series of data sets on topics regarding postsecondary enrollment and higher education workforce outcomes. Center staff was able to fully respond to the request and various follow-up requests within two weeks.

D. Procedures for External Researcher and Grant Funded Projects

The MLDS Governing Board finalized the *MLDSC Policies and Procedures for External Researchers and Grant Funded Projects*. The MLDS Center has become a recognized resource for comprehensive longitudinal data. While the Center has its Research Branch that produces important research and analysis using the data, the output of research and analysis can be increased, at no additional cost, by allowing outside researchers to have access to the data for research purposes. Further, having access to the Center's data can also serve as an important component to a grant application. This also has benefits to the Center by providing additional research funding at no cost to the State.

Of course, there are important limitations on the use of the MLDS established in state law and required under the data sharing agreements the Center has with each of the partner agencies (MSDE, MHEC, and

DLLR). To ensure those obligations are being met, the procedures were created. The focus of the procedures are as follows.

1. The procedures specify that research must be conducted for the purpose of evaluating a state or federal education program and be in alignment with the Research Agenda established by the MLDS Governing Board. Practically speaking, for each proposal, the Center wants to ensure that the research provides a value to the State.
2. The procedures specify that the research must produce a product that is specifically for the Center. State law only permits staff of the Center to have access to unit record data. Accordingly, an external researcher must become staff of the Center prior to data access. Part of being staff of the Center is that the primary purpose of the work must be for the Center. Accordingly, each application for external research must include a description of the product to be provided to the Center. The product can include a research report, data tables or summary of findings, or a public presentation as part of the Center's Research Series.
3. The procedures also establish the right of the researcher to further develop the work developed for the Center. This includes writing a paper, journal article, or dissertation using the research conducted for the Center.
4. The procedures also lay out detailed application and review process. The review process includes an internal review, a review by the Center's Research and Policy Advisory Board, and ultimately approval of the Governing Board.

Grants

The *Procedures and Policies for External Researcher and Grant Funded Projects,* apply to all individuals, including staff of the Research Branch, seeking to use Center data in support of a grant funded project or an application for grant funding. Below is an update on all grants that received approval to use the Center in support of a grant application.

1. *How Do Postsecondary Workforce Readiness Indicators Relate to College Readiness Indicators?*

   Dr. Rachel Durham, an external researcher with Baltimore Education Research Consortium at the Johns Hopkins University applied for and received a Spencer Foundation Small Research Grant for just under $40,000 to develop indicators of readiness by simultaneously analyzing transitions into college and/or the workforce and identifying readiness factors in high school that relate to persistence in either or both destinations. The study will test whether the same student high school experience variables that indicate college readiness also relate to work readiness, and whether particular indicators are distinctly relevant to workforce readiness.

2. *Quantity, Quality, and Diversity in Teaching: Collaborations to Examine the Educator Pipeline in Maryland*

   This project seeks funding from the Institute for Education Sciences (U.S. Department of Education) for a Researcher-Practitioner Partnerships in Education Research grant. The project aims to increase quantity, quality, and diversity in the teacher workforce in Maryland by extending existing relationships between university-based researchers, and state and local practitioners and policymakers; and by leveraging two unique mechanisms – a rich statewide longitudinal data system

and a research apprenticeship model – to provide timely feedback on the success of innovative policies and programs.

3. *Long Term Effects of Poverty on Educational and Career Outcomes: Providing Evidence through Enhancements to Maryland's State Longitudinal Data System*
   This study will expand upon prior research in several key ways. First, if funded, it will enhance Maryland's state longitudinal data system to link extant data on neighborhood and school poverty from the U.S. Census Bureau, the National Center for Educational Statistics (NCES) School Attendance Boundary Survey (SABS) 2013-14 and 2015-16, and the Maryland State Department of Education (MSDE) for the entire population of Maryland public school students. Doing so will enable the Research Branch to examine trends in household, school and neighborhood poverty over an entire decade (2007-2008 through 2017-2018) for the entire population of Maryland public school students using multiple measurement approaches, providing information about the distinction between the three constructs. This research is particularly important for quantifying the bias that may exist in current measures of poverty after introduction of the Community Eligibility Program for Free or Reduced Price Meals, a problem faced by educational researchers across the nation. Second, it will expand upon current knowledge of the long-term effects of poverty by disentangling the roles of household, school, and neighborhood poverty on long-term educational and career outcomes over time and grade level.

4. *What are the School and Neighborhood Risk Factors Associated with the Long-Term Effects of Poverty on College and Career Outcomes?*
   This study will extend prior research by leveraging a unique and detailed state longitudinal data system in Maryland to examine the student, school, and neighborhood risk factors associated with college and career outcomes for students living in poverty. This study will provide new insights into how the school and neighborhood contexts affect long-term college and career outcomes for poor students and will inform the best mechanisms to target in intervention and policy to prevent the long-term negative effects of poverty.

5. *The Effect of Diversity on Long-Term Economic Opportunity: Evidence from Education and Workforce Data in Maryland*
   This grant project will examine how school- based diversity, defined by the racial, ethnic, and language composition within schools, predicts college enrollment and persistence, and wages. Over the last several decades, there has been a large shift in demographics of the U.S., particularly in urban communities, raising questions, that this project will help address, about the effects of increased diversity on both short-term schooling outcomes and long-term economic opportunity.

6. *A Model of Minority Teacher Supply: Increasing Educational Opportunity for Racial- and Ethnic-Minority Students*
   This grant project seeks to extend research on minority teacher-student matches and build an empirical model of minority teacher supply, with the goal of informing policies to increase teacher diversity; provide new opportunities for racial, ethnic, and language minority students to work with a teacher like them; and increasing educational and life outcomes of disadvantaged groups.

7. *Maryland STEM Production*

Nationally, there is focus on preparing students to enter middle and high skilled jobs, which offer higher wages and better benefits than low skilled jobs. The advancements in science, technology, engineering, and math (STEM) industries, research, and development, and subsequently the need for middle and high skilled STEM workers are a major driver in preparing students for college and career. Maryland is a strong performer in STEM secondary, postsecondary, and workforce production; however, competing states significantly out produce Maryland in terms of STEM graduates, STEM workforce development, and STEM-based economic development. Furthermore, there is an under-representation of minority and low income students in STEM fields. Examining the high school determinants of STEM college and career outcomes is critical for determining the best policies to implement to increase Maryland's STEM production. This proposed study will provide insight into how to improve pathways to STEM careers for all students by examining how high school resources influence these pathways.

8. *Promise Neighborhoods Grant FY 2017*

The U.S. Department of Education has awarded the University of Maryland School of Social Work's Promise Heights[3] initiative a 5-year $30 million grant to continue its effort to strengthen children and families in the West Baltimore neighborhood of Upton/Druid Heights. The grant award was announced by the U.S. Department of Education as part of the Promise Neighborhoods Implementation Grants Program. Promise Neighborhoods support schools in high-poverty communities to become vibrant centers of opportunity and excellence. The grant included funding for the MLDS Center to do analyses to evaluate education and workforce outcomes for students.

9. Exploring the Links Between Arts Education and Academic Outcomes Among International Baccalaureate Students

Dr. Kenneth Elpus, an external researcher with the University of Maryland School of Music applied for and received a $600,000 grant from the U.S. Department of Education, Institute for Education Sciences. The grant project aims to understand the potential association between elective IB arts study and academic outcomes by comparing IB students who did and did not elect to pursue an arts course on the following dimensions: (1) IB academic course exam scores earned during high school, especially those in English, Second Language Acquisition, Math, and Science; (2) IB Diploma passing status; (3) Postsecondary attendance; (4) Likelihood of pursuing a postsecondary major in the STEM and Arts subjects; (5) Postsecondary persistence; and (6) Postsecondary completion (i.e., degree attainment). Given that the form, content, and curricular delivery of secondary arts study can vary considerably from school to school, focusing on students in the IB arts courses helps ensure comparability of arts education experiences across schools.

[3] http://promiseheights.org/

E. Research Series

During the academic year, the Center holds a monthly Research Series open to the public that provides presentations on the Center's research or areas of interest. The presentation materials and additional information can be found on the MLDS website.[4]

1. *The Effect of High School Career and Technical Education (CTE) on Postsecondary Enrollment and Early Career Wages (February)*

   Heath Witzen, Research Fellow with the MLDS Center Research Branch Career presented his examination of the effect of CTE program completion during high school on postsecondary outcomes, including college enrollment and workforce wages. Using propensity score matching, Mr. Witzen's research used MLDS data to estimate a causal effect of CTE on postsecondary enrollment and wages up to six years after high school graduation.

2. *The Multidimensional Impact of Teachers on Students (April)*

   Dr. Nolan G. Pope, investigator with the MLDS Center Research Branch, presented his research using test-score and non-test-score measures of student achievement and behavior from over a million students in the Los Angeles Unified School District to estimate multiple dimensions of teacher quality. Results indicate that test-score and non- test-score measures of teacher quality are only weakly correlated, and that both measures of teacher quality affect students' performance in high school.

3. *The Relationship Between Poverty and Long-Term Student Outcomes: Disentangling the Effects of Individual and School Poverty (May)*

   Drs. Rose, Mushonga, and Henneberger presented their research examining the effects of school-level concentrated poverty and individual student poverty on outcomes such as high school graduation, entry and persistence in post-secondary education, entry into the workforce, and wages earned.

4. *Problem, Research, Action: Poverty Measurement Transition in Baltimore City Public Schools (October)*

   Researchers from Baltimore City Public Schools presented their longitudinal and historical poverty analysis and subsequent school-level and student subgroup analyses using data from Baltimore City Public Schools. The presentation also covered how the Office of Achievement and Accountability (OAA) in Baltimore City Public Schools assessed the impact of the change in the poverty measurement process on school-level poverty rates using a multivariate prediction model.

[4] Research Series presentation materials available at: https://mldscenter.maryland.gov/ResearchSeries.html

5. *Remedial Coursework in Maryland Community Colleges: Disentangling Student and High School Level Predictors. (November)*

   Drs. Uretsky and Henneberger, presented their research that used data from the Maryland Longitudinal Data System (MLDS) to examine the individual- and high school-level characteristics that predict the need for remediation in Maryland community colleges. The results can help policy makers and practitioners identify at-risk students before they arrive at college in order to help better prepare them for college-level coursework and reduce the need for remediation among recent high school graduates.

6. *Using Longitudinal Data to Assess Long-Term Outcomes Associated with Poverty in Maryland Students (December)*

   Dr. Mushonga presented research that explores the multifaceted role of poverty using data from the Maryland Longitudinal Data System (MLDS) to examine the relationship between student-level poverty and race and school-level poverty and racial composition to predict students' long-term educational and career outcomes. This presentation provided an update on findings presented in July to the Commission on Innovation and Excellence in Education.

F. Presentations

The Center provided over 14 presentations throughout the year at various conferences and to various groups of stakeholders. In addition to generating awareness about the Center and informing people about the Center's research, the presentations were also used to get input on different projects. The Center has created a page on its website[5] to provide information about presentations and copies of the presentation slides and handouts.

G. Synthetic Data Project (SDP)

The Synthetic Data Project, which completed its second full year, is funded by the *2015 State Longitudinal Data System Grant* from the U.S. Department of Education, Institute for Education Science.[6] The project seeks to use the Center's real data to produce artificial data that are similar but not identical to the real data. Synthetic data will have the same statistical properties as the real data so they can be studied and analyzed like the real data and conclusions can be drawn from the synthetic data that should mirror the conclusions from real data. If successful, the Center would be able to allow non-Center staff to have access to the synthetic data for research purposes without the possibility of inadvertently disclosing any student information.

This past year the researchers focused on establishing "gold standard data datasets" (GSDS), which are a subset of MLDS data that will be used for testing and synthetization. Work includes determining which variables will be included, how those variables will be coded, and how to develop a simpler table structure for those variables. The following three GSDS will be created and synthesized: (a) High school to workforce; (b) High school to postsecondary; and (c) Postsecondary to workforce. The researchers also convened an international expert panel to help inform the synthetization procedures that the team will

[5] https://mldscenter.maryland.gov/Presentations.html

[6] The Center was one of several agencies to partner with MSDE in applying for the 2015 Statewide Longitudinal Data Systems Program Grant. In total, MSDE was awarded $6.9 million over four years, $2.6 million of which is for the Center's project.

use for this project. Finally, the researchers worked with a technical project manager to design a data warehouse for the synthetic data.

The research team added a new member this year to take the lead in testing the research utility of analyses run on the synthetic data as compared to the actual data in the MLDS. This is a critical step in this project, which will determine how close analyses on the synthetic data mimic the same analyses on the real data. The other important step is to determine how safe the synthetic data are with respect to disclosure risk to the individuals represented in the real data.

Finally, the researchers have been submitting papers to journals and taking part in international conferences to present their work and to obtain input and feedback about the project.

Section 2. List of all studies performed by the Center

2.1 Research Reports

Effects of Dual Enrollment on College and Workforce Outcomes

Dual enrollment, where high school students enroll in college coursework, is implemented in Maryland with the goal of improving college and career outcomes for students. Prior research on dual enrollment finds a positive relationship between participation in dual enrollment programs and college outcomes, including college enrollment and degree attainment. However, few studies have used causal designs that can determine the causal effect of dual enrollment on long-term college outcomes, and there have been no studies to date that causally link dual enrollment program participation with long-term workforce wages. This study used data from the Maryland Longitudinal Data System (MLDS) to examine the causal effect of dual enrollment participation in high school on college enrollment, persistence, degree attainment, and wages six years after the 12th grade for two academic cohorts of Maryland public high school students. Findings indicated that dually enrolled students were more likely to enroll in college, persist in college, and earn a college degree, including associate, bachelor's, and certificate degrees, when compared to similar students who were not dually enrolled. Additionally, dually enrolled students earned significantly higher wages (+$2,100) six years after the 12th grade when compared to similar students who were not dually enrolled. Dual enrollment had stronger effects for students who are traditionally under-represented in the college population (e.g., Black and Hispanic students and students eligible for free and reduced price meals [FARMS]). This report discusses policy implications and directions for future research on dual enrollment in Maryland.

Brain Drain in Maryland: Exploring Student Movement from High School to Postsecondary Education and the Workforce

This study finds that Brain Drain does exist. Specifically, Maryland high school graduates who attended out-of-state colleges were less likely to return to the Maryland workforce when compared to students who attended in-state colleges. This study uses data from the Maryland Longitudinal Data System (MLDS) to link student high school records to college and employment information in order to determine the extent of brain drain in Maryland.

Remedial coursework in Maryland community colleges: Disentangling individual and high school level predictors

Remedial courses at community colleges are designed to develop the skills of students who are underprepared for the academic rigor of college courses. A significant portion of students in Maryland and nationwide are assessed to need remedial coursework each year. In order to better prepare students for college courses and prevent the need for remediation, it is important to identify at-risk students before they arrive at college. This study used data from the Maryland Longitudinal Data System (MLDS) to examine the individual- and high school-level characteristics that predict the need for remediation in Maryland community colleges. The results indicate that after controlling for other characteristics, female students, Hispanic students, students in Special Education, and students who were eligible for free and reduced price meals (FARMS) were more

likely to need remedial coursework in math or English at Maryland community colleges. After controlling for other characteristics, students who had a GPA of 3.0 or greater and students who took 2 or more courses with a grade of B or higher in high school were less likely to need remedial coursework in math and English. At the school level, after controlling for student-level characteristics, students who graduated from high schools with a higher percentage of students who were eligible for FARMS were more likely to need remedial coursework in math and English, whereas graduates from high schools with higher percentages of fifth-year graduates were less likely to need remedial coursework for math only. Policy implications and directions for future research are discussed.

Healthcare Career and Technology Education Report

HOLD

2.2 Dashboards and other Web Content[7]

The Center added 10 new dashboards to the website this year and updated 14 existing dashboards with more recent data. In addition to the dashboards, the Center has developed new products for the website to help users better understand and utilize Center information. One of the products is *Information Briefs* that highlight important data points from MLDS Center dashboards and reports. The other product is *Research Spotlights* that contain a synopsis of the results of research or analysis completed by the MLDS Center Research Branch. This year two *Information Briefs* and one *Research Spotlight* were created.

The combination of new dashboards and web content, plus outreach through an email subscription service, has led to a significant increase in web traffic. In FY 18, the Center had a total of 25,587 page views – a 180% increase from FY 17.

2.3 Dual Enrollment Report

The Center is required to report annually on the number of students who are dually enrolled and the courses in which students dually enroll. This report, required under the *College and Career Readiness and College Completion Act of 2013* (see Education Article § 24-703.1, Annotated Code of Maryland), is the fifth MLDS Center Report.

A total of 11,843 Maryland public high school students were dually enrolled in the 2016-2017 academic year. This is a 15% increase from the prior year. Maryland Community Colleges were the most common location for students accessing dual enrollment opportunities. Dually enrolled students more closely reflected the demographics of the Maryland college-going population than the Maryland public high school population. The majority of dually enrolled Maryland public high school students were female, white, and not economically disadvantaged (as measured by non-eligibility for free/reduced price meals),

[7] https://mldscenter.maryland.gov/CenterOutput.html

although there were increases in participation amongst economically disadvantaged students, and African American, Hispanic, and Asian students.

Course information is reported from Maryland public high schools. The MLDS does not currently receive college course information. Students accessed courses in a variety of subject areas. The highest numbers of courses with dual enrollment were in the subjects of English language and literature, and mathematics.

Dual enrollment participation varied widely across the state. This is a reflection of the unique and varied opportunities for dual enrollment in each school system. The data presented in this report identifies trends in dual enrollment that policymakers and other stakeholders can evaluate to understand the impact of CCR-CCA on dual enrollment in Maryland. Supplemental information on dually enrolled Maryland public high school students including Statewide Dual Enrollment Trends and County Dual Enrollment Trends are available on the MLDS Center website[8] as a series of dashboards. The MLDS Center Research Branch recently completed a report studying the causal impacts of dual enrollment on postsecondary and workforce outcomes. That report, Effects of Dual Enrollment on College and Workforce, is available on the MLDS Center website under Research Reports.

2.4 Career Preparation Expansion Act

The Career Preparation Expansion Act directs the Center and the Governor's Workforce Development Board to produce a report on the workforce outcomes of high school graduates five years after graduation. Specifically, the report must include their wages earned, the hours worked and the industry in which they are employed.

This report seeks to understand this population (high school graduates, class of 2012) and their workforce outcomes within the context of the other critical factor in the lives of recent high school graduates: postsecondary education. The first five years after high school is traditionally the time when high school graduates engage in college; and that is certainly the case with the cohort analyzed for this report. Notably, 79% of the high school graduates had or continue to have some involvement with college during the first five years after high school. The impact of college on workforce outcomes is of critical importance and highlighted throughout this report.

The report groups the cohort of high school graduates based on whether the high school graduates entered college and received degrees, attempted college but exited without a degree, are still in college, or bypassed college altogether and went straight into the workforce. Not surprisingly, each pathway yields different workforce outcomes. Those high school graduates with no college degree had a median wage in the 20th quarter (five years) after high school ranging from $5,300 to $6,000, which is $2,000 to $2,600 below the estimated living wage in Maryland. Those high school graduates who earned a college degree had median 20th quarter wages that ranged from $7,000 to $12,000, which is $40 below to $4,262 above the living wage.

[8] See https://mldscenter.maryland.gov/Dashboards.html - for the dashboard series on Dual Enrollment Trends.

Several important observations can be gleaned from the wage earnings data. First, there is no immediate return on the investment (both time and money) in college unless a degree is earned. Students who attempted college but did not earn a degree have a lower 20th quarter median wage than those students who directly enter the workforce. And, unlike students who earned a degree, they do not have the financial reward of higher wages to help offset any costs incurred with going to college. Second, the value of any postsecondary degree is significant. While those without a degree are on pace to earn $1million in their lifetime, those with a degree are on pace to earn $1.5 to $2 million in their lifetime. Finally, while all postsecondary degree earners have improved workforce outcomes over non-degree earners, bachelor's degree earners have a median 20th quarter wage that is approximately $1,000 to $2,000 higher than associate and certificate degree earners, respectively.

The report requirement to provide information on the hours worked cannot be directly addressed with MLDS data since the source of wage data only includes the total wage earned per quarter. One reason that hours worked is important is it helps paint a picture of the high school graduates' level of engagement in the workforce. Another approach to understanding the level of engagement in the workforce is to analyze the number of quarters during the five year period in which the high school graduates are reported as having wages. The results show that 86% of the cohort had at least one wage record during the five year period after high school, with 28% having wages in almost every quarter and 20% having wages in as few as one to five quarters. The range of workforce participation is once again impacted by college going. For example, bachelor's degree recipients have a high rate of irregular wage visibility, which may be explained by the fact that actively pursuing and completing a four year degree leaves little time for work within five years. Further, the pattern and timing of when they are engaged in work corresponds with summer periods when they are less likely to be fully involved in college. However, the workforce participation patterns of certificate and associate degree earners indicates that they are more likely to have continuous or frequent wages during the five year period. This pattern may reflect their shorter time to degree as only one to two years of full-time enrollment are required to complete their degrees, leaving a longer period to be fully engaged in employment after college. Finally, high school graduates with no college attendance make up 37% of those students with no wage records. It is possible that those students left the state for employment or joined the military. However, the no college group also has a range of wages that are less than continuous, indicating that a portion of this group has remained in Maryland. This sporadic employment may be due to under-employment; possibly due to lack of jobs for individuals with no postsecondary credential.

The final requirement of the report is to identify the industry sector in which the high school graduates are employed. Generally, five years after high school, the sector with the largest percentage of high school graduates is *Wholesale and Retail*, followed by *Healthcare and Social Assistance*, and then *Accommodation and Food Services*. Once again, educational attainment has an impact on sector and wage outcomes. *Wholesale and Retail* sector was the largest employer of high school graduates who never went to college, had some college but no degree, students still in college, and associate's degree earners. In each case, the median earnings in this sector for these groups was below the living wage. For the remaining education groups, the largest sectors were *Public Administration* for certificate degree earners,

Professional, Scientific and Technical Services for bachelor's degree earners and *Educational Services* for the other degree earners. In each case, median quarter earnings were above the living wage.

Finally, the report discusses and utilizes new methodologies for analyzing wages, reviews the gaps in the wage data and how those gaps impact the analysis, and discusses the implications of the report and direction for future research.

2.6 Planned Research and Reporting

A. Overview

The MLDS Center staff developed and provided to the Governing Board a *Research and Output Plan* that identifies the required reports and other research and output priorities that the Center plans to address in the current fiscal year. A *Research and Output Plan* was not developed in past years. However, now that the Center is fully staffed and more experienced with the data system and creating output, annual planning is possible and necessary (especially given the increased demands on the Center's time and resources). To develop this plan, staff received input from the Research and Policy Advisory Board, reviewed various state policy and planning documents, and reviewed past data requests and topics of interest to identify research and output priorities. Realistically, not all of the output priorities will be fully completed in the next fiscal year. Some priority areas will require extended time to complete. Other priority areas may be deferred if critical data requests are received from key stakeholders or other unforeseen priorities arise.

B. Reporting Services

- Priority 1: Investigate the high school to workforce, college to workforce, and high school to college to workforce pipelines for critical workforce areas in teaching, allied health, and STEM.
- Priority 2: Define and standardize key metrics in measuring earnings for high school and college graduates.
- Priority 3: MLDSC and MHEC will continue to collaborate on completing SOAR statewide reporting requirements as well as developing school-specific reporting requirements.
- Priority 4: Explore the number of students who exit Maryland public schools without graduating and earn a GED and their employment outcomes.

C. Research Priorities

- Priority 1: Complete and publish in-progress research reports. This includes:
    - A study examining the causal effects of dual enrollment program participation on long-term college and workforce outcomes.
    - A study examining the causal effects of career and technical education (CTE) participation on long-term college and workforce outcomes.
    - A study examining the causal effects of receipt of the Educational Assistance (EA) grant on long-term college and workforce outcomes.
    - A study examining the relationship between student and school-level poverty and long-term college and workforce outcomes.
    - A study examining the relationship between student and school-level demographic and academic characteristics and need for remedial coursework in community colleges.

  - A study examining the causal effect of attending a 4-year college on long-term college and workforce outcomes.
- Priority 2: Complete in-depth statistical analyses, able to support causal inferences where appropriate, on the following topics:
  - Studies that support causal inferences about the effects of different pathways from high school into college and the workforce, including examination of the Bridge Plan for Academic Validation (research request by MSDE) and additional focus on dual enrollment and early college initiatives.
  - Studies that further examine and disentangle the role of student and school-level poverty on long-term college and workforce outcomes.
  - Studies that examine the relationship between characteristics of teacher preparation programs and/or individual teachers and long-term college and workforce outcomes.
  - Studies that examine the relationship between student characteristics and workforce outcomes in critical workforce areas.
  - Studies that explore statistical methods and best practices for incorporating wage data when data are missing not at random (e.g., for federal employees).
- Priority 3: Develop technical documentation to guide staff on the use of the System, data, appropriate methods, and best practices.

D. Additional Requirements and Planned Tasks

- Produce the Dual Enrollment Report.
- Produce the Annual Report.
- Produce a report for the Career Preparation Expansion Act of 2018 (SB 978).
- Provide analyses to partner agencies and the Department of Legislative Services.
- Fulfill public information act requests.
- Updates to Existing Output.
- Update the dashboard series Maryland High School Graduates Initial College Enrollment to add additional years of data.
- Update the dashboard series Initial Postsecondary Enrollments - In-State vs. Out-of-State Enrollments to include maps for visual representations of enrollment patterns.
- The Maryland Public Schools Pathway will be updated to expand the timeframe for college enrollment and college graduation and to include wage data.
- Project Partnerships
  - Synthetic Data Project (SDP).
  - The PARCC alignment study conducted by the Maryland Assessment Research Center (MARC) at the University of Maryland, College of Education.
  - Support the Computer Science for All Initiative with the Maryland Center for Computing Education housed at the University System of Maryland.
- Support MSDE, Division of Career and College Readiness, Career Technology Education Branch in meeting their annual federal reporting requirements.

Section 3. Data Determined to be Unnecessary

Data elements identified by Center staff for removal from the System are presented to the Governing Board for approval. The following data element was approved for removal from the data inventory in the 2018 calendar year:

The Integrated Postsecondary Education Data System (IPEDS) is a system of interrelated surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). IPEDS gathers information from every college, university, and technical and vocational institution that participates in the federal student financial aid programs. Institutions report data on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid. These data are made publicly available to researchers through the IPEDS Data Center. The available data is aggregated at the institution level and FERPA compliant.

While IPEDS contains a great wealth of institutional data, there are annual changes to IPEDS collections that create inconsistencies with using IPEDS data longitudinally. There are other sources publically available that have normalized the IPEDS data, which are more user-friendly and consistent. Additionally, the current MLDS database schema is not structured to include this type of institutional data.

Section 4. Proposed or Planned Expansion of Data

1.1 Data Inventory

Md. Ed. Art. §24-701(f) defines the permissible types of student and workforce data that the MLDS may collect. Data that falls under that definition and are determined to be necessary to carry out the mission of the Center are presented to the Governing Board for approval to be included in the inventory. The Data Inventory represents the complete list of data that the MLDS Center collects.

The development of the Data Inventory is a collaborative process between DLLR, MSDE and MHEC, and the MLDS Data Advisory Group. The MLDS Data Advisory Group annually reviews the Data Inventory and identifies what data elements to propose for inclusion or removal from the System. All data must be relevant to answering one of the questions in the Research Agenda or generally identified as necessary for evaluating federal or State supported education programs. Data elements identified for inclusion or removal in the System are presented to the Governing Board for approval. Once approved, the requirements are developed with the agency and included in the data collection calendar.

The MLDS Data Inventory is available online through the MLDS Center website.[9] This change allows the inventory to be more dynamic, by presenting the inventory in a format that allows it to be organized according to the user's needs. A document listing the *Substantive Changes to the MLDS Data Inventory* has been created to catalogue the specific changes made each year.

1.2 Additions to the Data Inventory

The following additions to the data inventory are a result of a new collection by MSDE - the High School Data Collection (HSDC). The HSDC replaces the High School Status and Completers collection and includes various new data elements (1-16). In addition, MSDE has also added additional attendance information (17-24) in their Attendance data collection in order to comply with new accountability requirements. The new data elements are as follows:

1. Graduation Requirement Status
2. Graduation Requirement Type
3. Assessment Purpose
4. Career and Technical Education Concentrator
5. Technical Skills Assessment (TSA) Type
6. Advanced Placement Proficiency Status
7. International Baccalaureate Proficiency Status
8. Graduation Requirement Status
9. SAT Proficiency Status
10. ACT Proficiency Status
11. ASVAB Proficiency Status
12. Seal of Bi-literacy Status
13. Apprenticeship Status
14. Dual Enrollment Credit Status
15. Re-assessment - Math
16. Re-assessment - ELA
17. Days Not Belonging
18. Unlawful Days Absent
19. Title I Targeted Assistance Participation
20. Homeless Primary Nighttime Residence
21. Homeless Serviced Other
22. Homeless Unaccompanied Youth Status
23. Title III Immigrant Status
24. National School Lunch Program Direct Certification Indicator

[9] https://mldscenter.maryland.gov/DataInventory.html

Section 5. Recommendations Made by the Governing Board

Attachments

Attachment A

Maryland Community College Engineering Pipeline

Overview

Between 2011 and 2017[1], over 350,000 students were enrolled in an Associate's degree in a Maryland Community College[2]. Approximately 18,500 of these students (5%) were enrolled in an Engineering-related Associate's degree[3] at the time of matriculation.

Persistence and Graduation for the Engineering Pipeline[4]

Almost 1,300 students who matriculated in an Engineering-related Associate's degree have graduated with an Associate's degree from an Engineering-related program, while an additional 984 have graduated with an Associate's degree from another program. In addition, 506 students who matriculated in other programs have graduated with an Engineering-related Associate's degree. Currently, 3,957 students that began in an Engineering-related Associate's degree persist in that program while an additional 1,327 students persist in another program.

4-Year College Transfer Rates for the Engineering Pipeline[4]

Over 1,800 students have transferred from an Engineering-related Associate's degree to an Engineering-related Bachelor's degree[5]. The majority of those students (64%) transferred without first completing an Engineering-related Associate's degree at a community college. Of students who transferred, with or without completing an Engineering-related Associate's degree, 38% have graduated while 56% remain enrolled in an Engineering-related Bachelor's degree.

Employment for the Engineering Pipeline

The total pool of Engineering-related Associate's degree graduates from 2011 to 2017 was 1,803. The graduate pool is comprised of both students that originally matriculated in an Engineering-related program and those that originally matriculated in another program. Wage data[6] are available on 84% of graduates. Over one-third of the Engineering-related Associate's degree graduates have wage data in a NAICS[7] code related to the engineering field.

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[1] From the 2008-09 to 2012-13 academic years the Maryland Higher Education Commission only collect enrollment data on students that were enrolled in the fall.

[2] Students were counted as enrolled if they were enrolled in an Associate's degree program between 2011 and 2017 at any Maryland Community College.

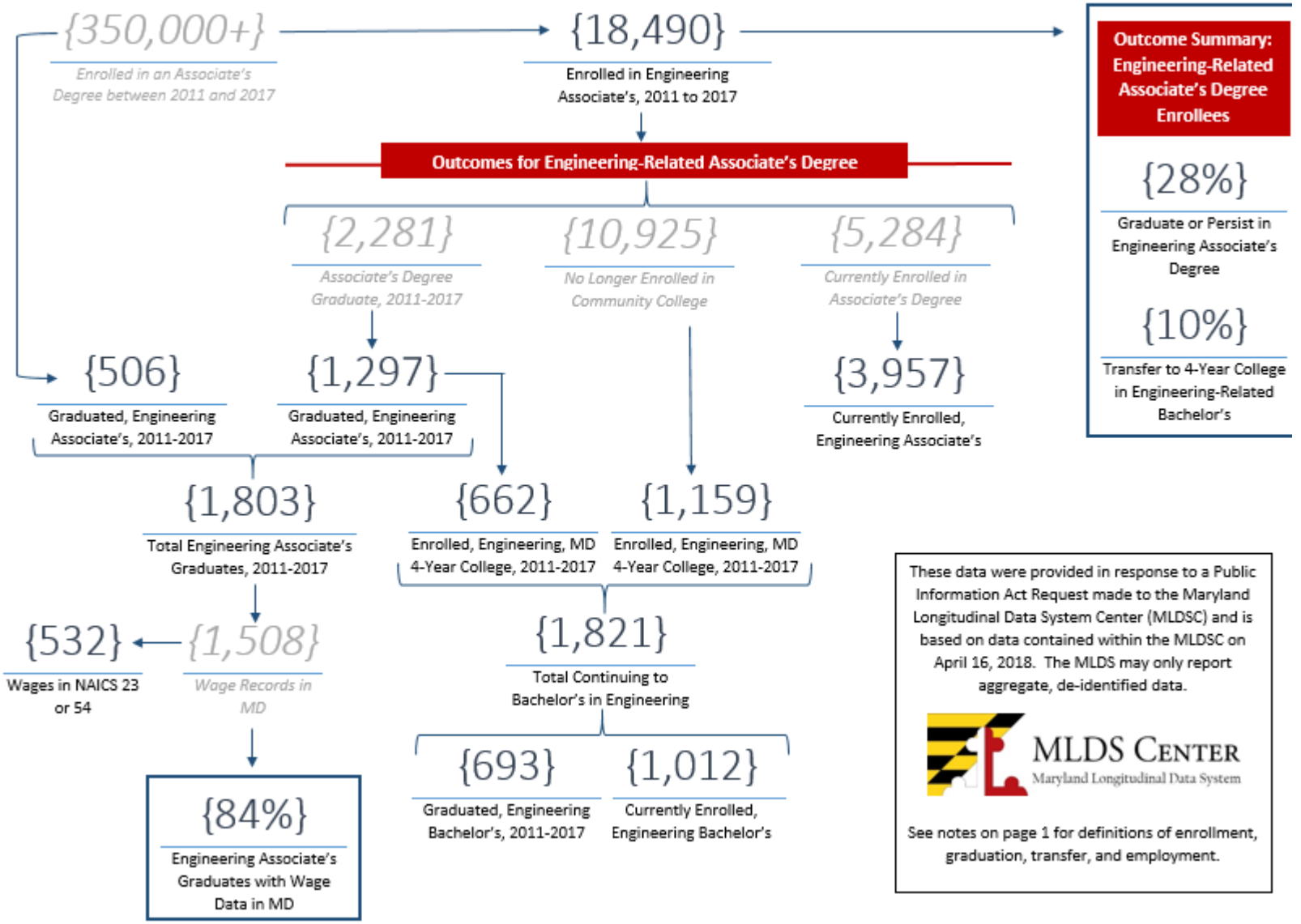
[3] Students were counted as enrolled if they were enrolled at any Maryland Community College between 2011 and 2017 in HEGIS Codes: 4940 to 4949 and 5300 to 5399.

[4] Graduation data are effective through June 2017. Enrollment data are effective through December 2017.

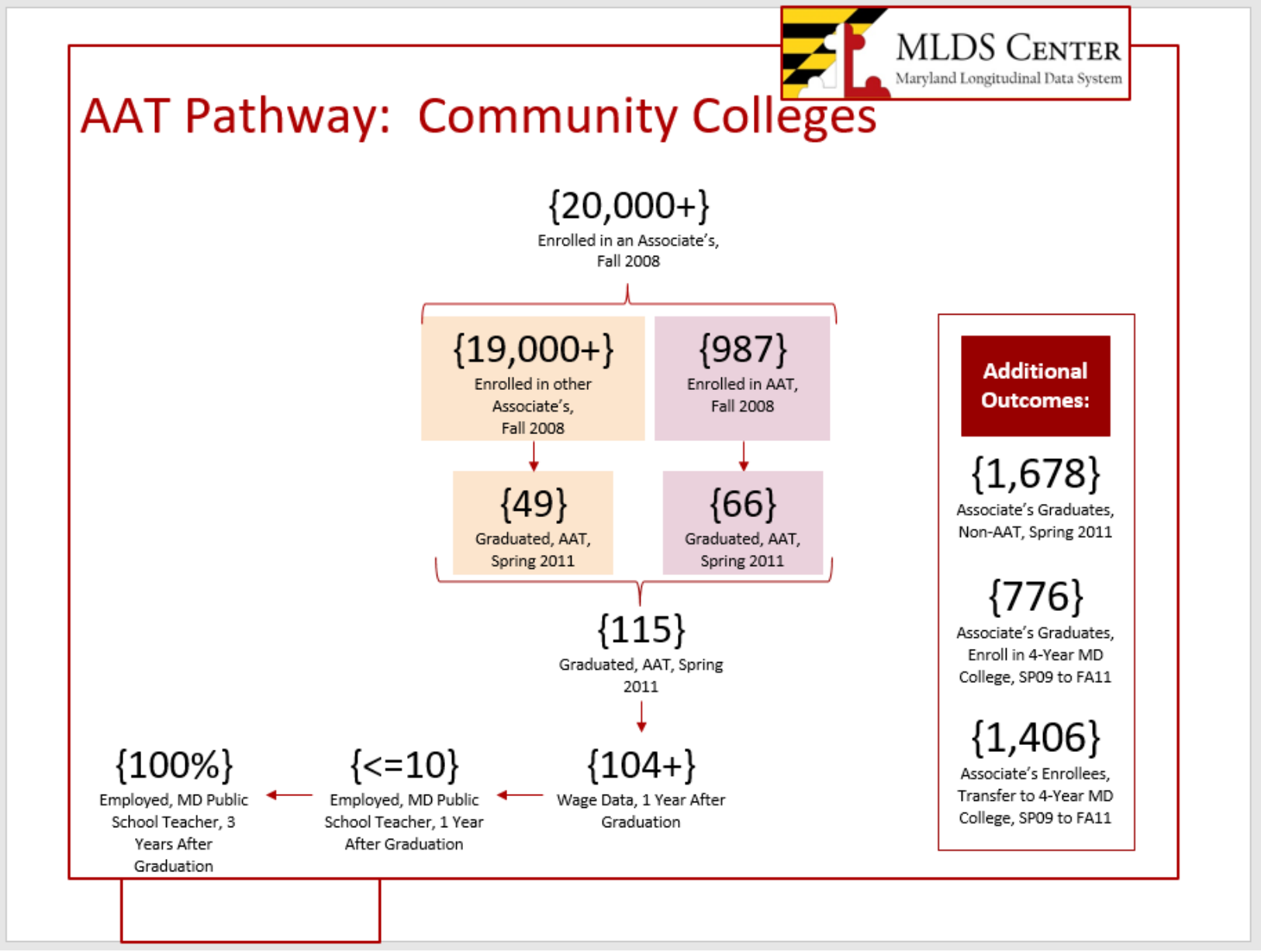
[5] Students were counted as enrolled if they were enrolled in a Bachelor's degree program between 2011 and 2017 at a Maryland 4-Year Public or State-Aided Independent institution in HEGIS Codes: 0700 to 0799 and 0900 to 0999.

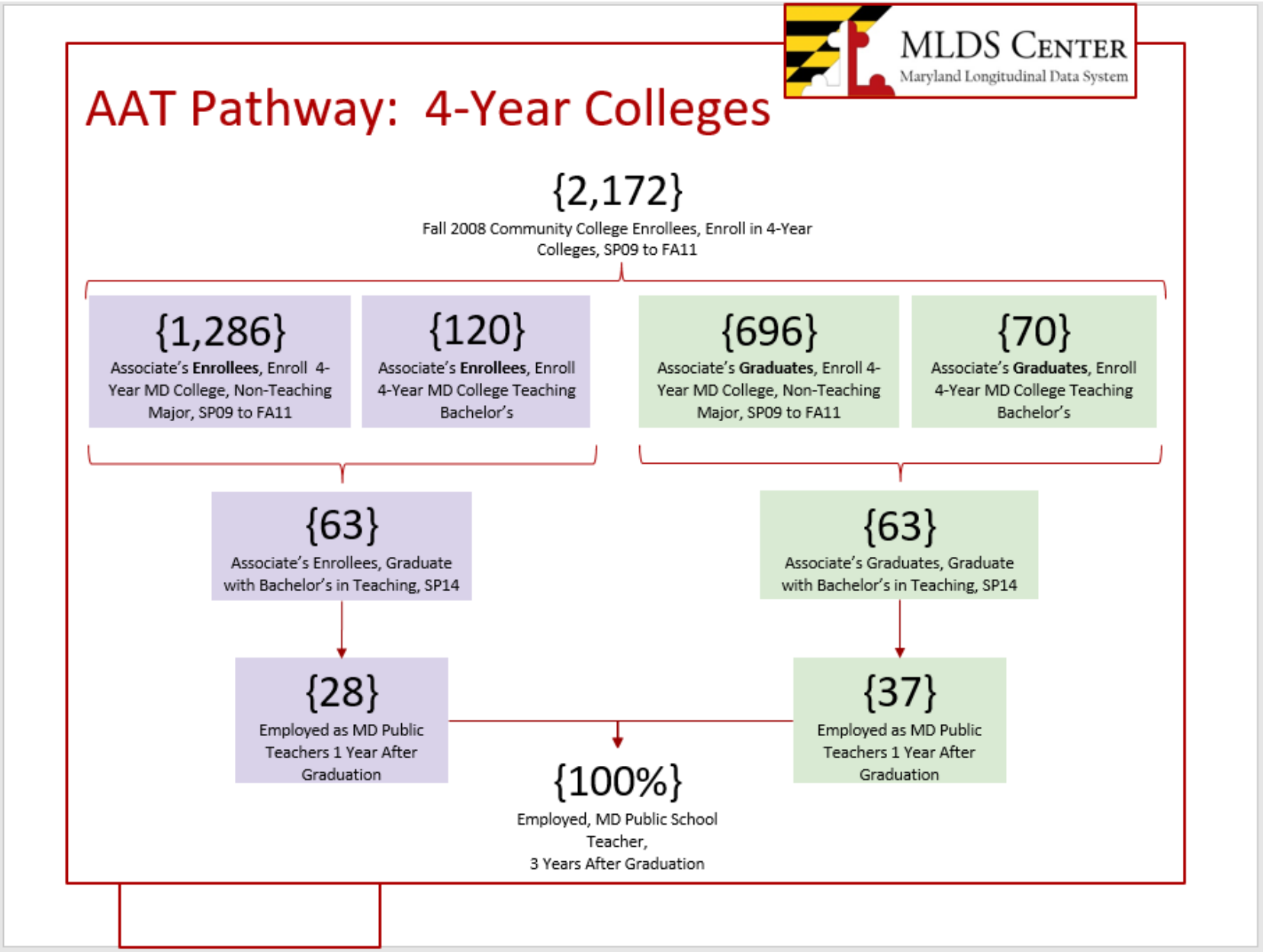
[6] Graduates were counted as employed if they had at least one quarter of wage data at any point after graduation. MLDSC data do not include information on military service, apprenticeships, self-employment, out-of-state employment or Federal Government employment therefore it is incorrect to assume that graduates not counted as "employed" are unemployed.

[7] NAICS is the North American Industry Classification System. This system classifies business by sector rather than identifies specific jobs within businesses.


{350,000+}
Enrolled in an Associate's Degree between 2011 and 2017
{18,490}
Enrolled in Engineering Associate's, 2011 to 2017
Outcomes for Engineering-Related Associate's Degree
{2,281}
Associate's Degree Graduate, 2011-2017
{10,925}
No Longer Enrolled in Community College
{5,284}
Currently Enrolled in Associate's Degree
{506}
Graduated, Engineering Associate's, 2011-2017
{1,297}
Graduated, Engineering Associate's, 2011-2017
{3,957}
Currently Enrolled, Engineering Associate's
{1,803}
Total Engineering Associate's Graduates, 2011-2017
{662}
Enrolled, Engineering, MD 4-Year College, 2011-2017
{1,159}
Enrolled, Engineering, MD 4-Year College, 2011-2017
{532}
Wages in NAICS 23 or 54
{1,508}
Wage Records in MD
{84%}
Engineering Associate's Graduates with Wage Data in MD
{1,821}
Total Continuing to Bachelor's in Engineering
{693}
Graduated, Engineering Bachelor's, 2011-2017
{1,012}
Currently Enrolled, Engineering Bachelor's
Outcome Summary: Engineering-Related Associate's Degree Enrollees
{28%}
Graduate or Persist in Engineering Associate's Degree
{10%}
Transfer to 4-Year College in Engineering-Related Bachelor's
These data were provided in response to a Public Information Act Request made to the Maryland Longitudinal Data System Center (MLDSC) and is based on data contained within the MLDSC on April 16, 2018. The MLDS may only report aggregate, de-identified data.
MLDS Center
Maryland Longitudinal Data System
See notes on page 1 for definitions of enrollment, graduation, transfer, and employment.

Attachment B




MLDS Center
Maryland Longitudinal Data System
AAT Pathway: 4-Year Colleges
{2,172}
Fall 2008 Community College Enrollees, Enroll in 4-Year Colleges, SP09 to FA11
{1,286}
Associate's Enrollees, Enroll 4-Year MD College, Non-Teaching Major, SP09 to FA11
{120}
Associate's Enrollees, Enroll 4-Year MD College Teaching Bachelor's
{696}
Associate's Graduates, Enroll 4-Year MD College, Non-Teaching Major, SP09 to FA11
{70}
Associate's Graduates, Enroll 4-Year MD College Teaching Bachelor's
{63}
Associate's Enrollees, Graduate with Bachelor's in Teaching, SP14
{63}
Associate's Graduates, Graduate with Bachelor's in Teaching, SP14
{28}
Employed as MD Public Teachers 1 Year After Graduation
{37}
Employed as MD Public Teachers 1 Year After Graduation
{100%}
Employed, MD Public School Teacher, 3 Years After Graduation

MLDS Center
Maryland Longitudinal Data System

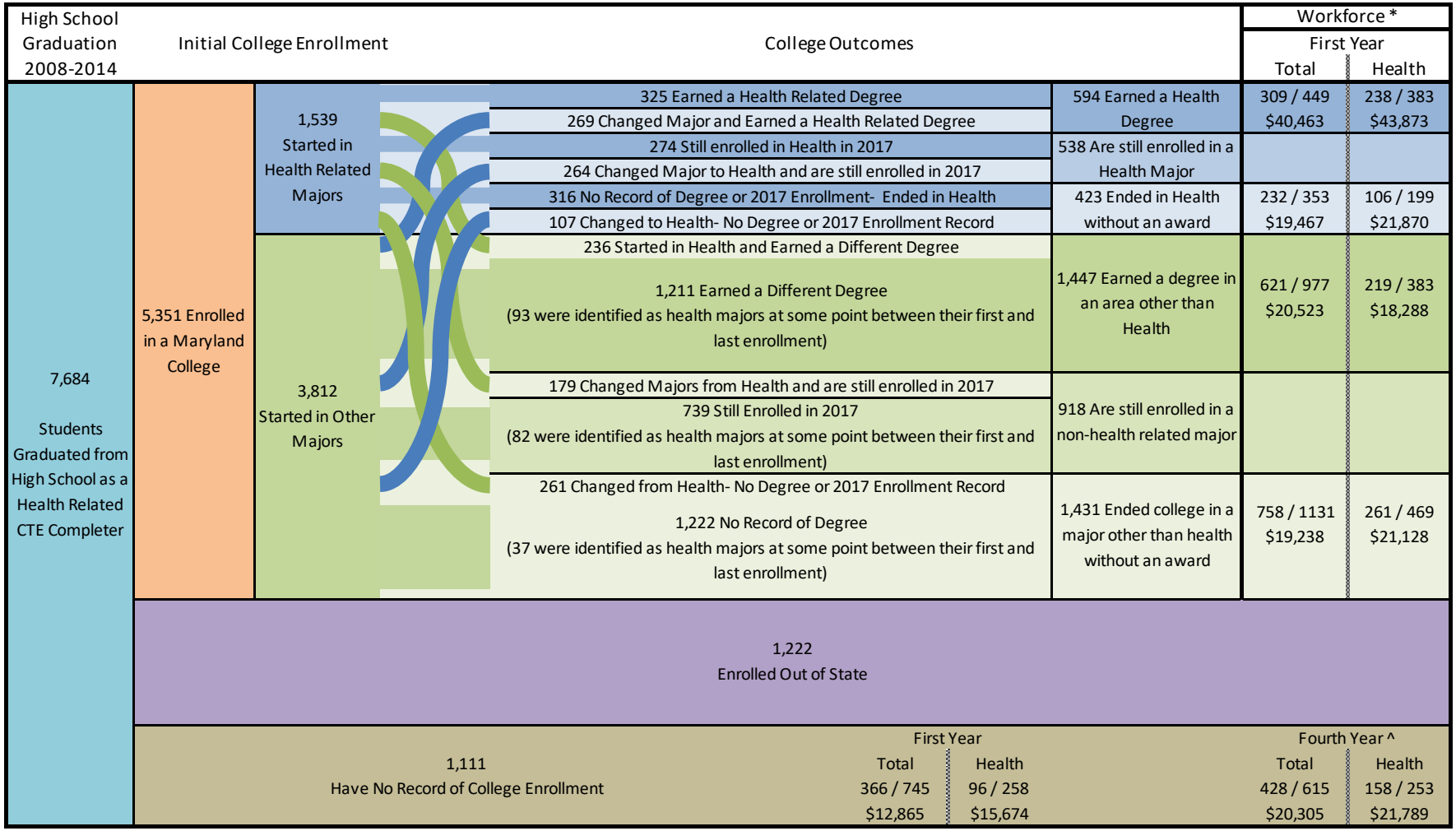
Notes

- From the 2008-09 to 2012-13 academic years the Maryland Higher Education Commission only collected enrollment data on students that were enrolled in the fall.
- Students were counted as enrolled in an Associate's degree program if their degree sought was an Associate's degree and they were enrolled in Fall 2008 at any Maryland Community College.
- Students were counted as enrolled in an AAT program if they were enrolled in Fall 2008 at any Maryland Community College in HEGIS Codes: 4960-09 to 4960-34.
- Students were counted as graduated from an Associate's degree program if they graduated on or before Spring 2011 from a Maryland Community College with a degree sought of Associate's.
- Students were counted as graduated from an AAT if they graduated on or before Spring 2011 from a Maryland Community College with a HEGIS Codes: 4960-09 to 4960-34.
- Students were counted as enrolled in a Bachelor's program if they graduated from a Maryland Community College and enrolled between Spring 2009 and Fall 2011 in Maryland 4-Year Public or State-Aided Independent institution.
- Students were counted as enrolled in a Bachelor's Teaching program if they graduated from a Maryland Community College and enrolled between Spring 2009 and Fall 2011 in Maryland 4-Year Public or State-Aided Independent institution in CIP Codes: 13.10, 13.12, 13.13, or 13.14.
- Students were counted as a transfer to a Bachelor's program if they enrolled in but did not graduate from a Maryland Community College and transferred between Spring 2009 and Fall 2011 to Maryland 4-Year Public or State-Aided Independent institution.
- Students were counted as a transfer to a Bachelor's Teaching program if they enrolled in but did not graduate from Maryland Community College and transferred between Spring 2009 and Fall 2011 to Maryland 4-Year Public or State-Aided Independent institution in CIP Codes: 13.10, 13.12, 13.13, or 13.14.
- Students were counted as a graduated from a Bachelor's Teaching program if they graduated by Spring 2014 from a Maryland 4-Year Public or State-Aided Independent institution in CIP Codes: 13.10, 13.12, 13.13, or 13.14.
- Graduates were counted as employed if they had at least one quarter of wage data at any point one year after graduation. MLDSC data do not include information on military service, apprenticeships, self-employment, out-of-state employment or Federal Government employment therefore it is incorrect to assume that graduates not counted as "employed" are unemployed.

These data were provided in response to a Public Information Act Request made to the Maryland Longitudinal Data System Center (MLDSC) and is based on data contained within the MLDSC on March 8, 2018. The MLDS may only report aggregate, de-identified data.

Attachment C.

College Enrollment and Outcomes for Health Related CTE Completers
2008- 2014 High School Graduates



* The provided workforce data is displayed as- The number employed in all four quarters / the number employed at anytime in the year. The wages are an average total wages for those employed in all four quarters.

^ Fourth Year employment numbers only include graduates from 2008- 2013 graduating classes (891 students that have no record of college enrollment)

Attachment D.

Data Requests for 2018