MLDS Center
Maryland Longitudinal Data System

Better Data • Informed Choices • Improved Results

December 2020

2020 Annual Report on the Maryland Longitudinal Data System and Center

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Governing Board, Maryland Longitudinal Data System

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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.

- ❖ The Research Branch won a prestigious award from the American Educational Research Association (AERA) for their research on *Statistically Modeling Multiple Membership in the Real World: Lessons from Statewide Longitudinal Data in Maryland*. The research project was the first place winner for AERA 2020 Division H's Outstanding Publications Competition in Category 1: Advances in Methodology.

- ❖ The Center Added 97 new data elements to the *Data Inventory*, including four new data collections: Juvenile Delinquency Records, Course Information System, Student Registration, and Correctional Education.

- ❖ The Research Branch had three manuscripts based on MLDS research published in peer reviewed academic journals.

- ❖ The Center conducted two webinars to help inform key stakeholders about relevant findings in Center reports. One webinar was for the Governor's Workforce Development Board and the other was for Community Colleges.

- ❖ The Center produced important reporting on student financial aid, including a supplement to the Career Preparation Expansion Act* report and additional information in the financial aid dashboards to include college degree attainment by age 25.

- ❖ Established a comprehensive reporting table to drive production of dashboards and establish a common population for consistent reporting and analysis.

- ❖ Continued to improve the Center's cyber-security profile by implementing the recommendations of prior audits.

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 recommendation 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

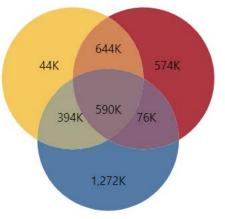## 1.1 System Implementation and Management

A. Records Count

As of December 2020, the MLDS contained records for 3,594,233 unique individuals. Table 1, below provides the number of individual records provided by each data partner agency.

Table 1: Number of Individual Records in the MLDS by Data Source

	Data Source	Count as of 11/8/2019
	MSDE	2,332,359
	MHEC	1,884,468
	Labor	1,671,501

Figure 1: Overview of Cross-Sector Data

Figure 1, shows the breakdown of cross-sector matches. Approximately to 590,000 individuals have records that can be linked across all sectors and 1.7 million have records in at least two sectors. The reason there is a high number (1.2 million) of Maryland State Department of Education (MSDE) records that are not matched to another sector is because more than half of MSDE data is K-8 students – a population generally not engaged in higher education or the workforce.

B. Match Rate

The Center calculates match rates based on the number of 12th grade students from Maryland public schools with a record in at least one other sector. The Center's match rate has remained at **94%** over time.[1]   The high match rate indicates strong data matching routines and provides confidence in the system. Table 2 provides a breakdown of the match rate for each cohort year.

Table 2. 12th Grade Cohort Cross-Sector Match Rate Analysis

Cohort Year	Total 12th Grade	K12 Only	K12 & College	K12 & Workforce	All 3 Sectors	% Matched ANY Sector	% Matched ALL 3 Sectors
2019	61,030	6,968	10,394	14,053	29,615	89%	49%
2018	61,808	4,879	7,409	14,152	35,368	92%	57%
2017	60,553	3,793	5,598	14,127	37,035	94%	61%
2016	60,356	3,236	4,916	13,091	39,113	95%	65%
2015	61,348	3,197	4,147	13,038	40,966	95%	67%
2014	60,482	2,752	3,611	12,199	41,920	95%	69%
2013	60,991	2,659	3,315	12,042	42,975	96%	70%
2012	60,525	2,512	3,249	11,767	42,997	96%	71%
2011	62,334	3,117	3,206	12,415	43,596	95%	70%
2010	61,963	2,784	3,259	11,717	44,203	96%	71%

C. System Security Audits

Implementation of Audit Recommendations

In 2019, the MLDS Center had two information systems security audits: one by the Department of Homeland Security's National Cybersecurity and Communications Integration Center (NCCIC); and one by the Office of Legislative Audits. This year MLDS Center IT staff did a 180-day follow-up with NCCIC auditors to review recommendations and discuss remediation steps taken to address the recommendations.   Some high-level examples include: Moving IT/cybersecurity discussions in Governing Board meetings to private closed sessions; implementing change management processes to track changes made to the system; and developing an approval path with the Maryland Department of Information Technology (DoIT) that clearly defines roles among system managers at MSDE, DoIT, and MLDSC; disabling automatic code execution for removable media, and establishing a process to monitor the information system. The DHS representative was very complimentary of the actions taken by the Center.

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[1] The match rate is an average of all years (2009 -2019). The match rate for any given year will change over time. For example, the 2019 match rate of 89% will likely increase over time as more students move into college and the workforce, or return to Maryland from an out-of-state college and join the Maryland workforce.

Planning for 2021 Audit
Center IT staff also began working with the Maryland Department of Information Technology on identifying an audit firm to conduct the Center's next cybersecurity audit.

D. Data Governance

New Data Collection Procedures
As the result of recent legislation and other initiatives, the Center has or is planning on receiving a variety of new data from its partner agencies. Staff have developed a set of policies and procedures to guide the collection process. The procedures include steps to ensure that the Center fully understands the purpose that the data serve, the scope and size of the data collection, and how the data are collected. The Center also works with the partner agency to understand the data elements included, how to load the data elements, and the limitations of or gaps in the data. Finally, the procedures include an opportunity to discuss the appropriate use of the data and possible research uses.

Data Governance Self-Assessment Tool
MLDS Center staff worked with the interstate *Data Governance and IT Collaboration Workgroup*. The workgroup is organized and facilitated by the U.S. Department of Education's SLDS State Support Team. The group is charged with leveraging states' experience to identify and develop products that help streamline collaboration between data governance and IT organizations. One of those products is a self-assessment tool designed to identify and quantify the current state of data governance within an agency and identify gaps in processes. Staff piloted the tool with the MLDS Center's Data Governance team and IT Governance team and provided feedback on the tool and its effectiveness. The tool demonstrated the strengths of the Center's data governance process and areas to improve the collaboration and communications between data governance and IT staff. The [final self-assessment tool](#) and three companion resources were published in September 2020.

Data Governance and IT SLDS Issue Brief
As part of the interstate *Data Governance and IT Collaboration Workgroup* MLDS Center staff also contributed to a [June 2020 SLDS Issue Brief](#) on tips for effective communication between data governance and IT. *The Data Governance and IT: Tips for Communicating About Education Data Requirements* product featured Maryland as an example of having good technical standards in place.

External Data Procedures
Center data are provided through ongoing data sharing agreements with partner agencies. These data are provided at regular intervals for all students and/or workers available in the data set. While the MLDS is very comprehensive and capable of supporting a wide range of research inquiries, in certain instances a data set external to the system may allow for a unique study or program evaluation of benefit to Maryland.

To facilitate the incorporation of external data, the Center developed, and the Governing Board approved, *External Data Procedures[2]* that:

- Outline the legal requirements that must be met prior to accepting external data;
- Establish a process for submitting requests for inclusion of external data;
- Provide a review process, and
- Describe how the Center will manage the external data.

Data Inquiry Process

The MLDS Center created a standardized process for notifying data sharing partner of potential data issues, asking questions for clarification, and obtaining a resolution. When data users at the MLDS Center discover inconsistencies within the data warehouse or they have a concern or question about the structure or nature of the data, the data user submits a data inquiry. A data inquiry, once created, starts a formal process that will find a resolution to the question raised by the inquiry. There are five steps to the data inquiry process: initial investigation, discussion with relevant data partner, review at internal MLDS Center meeting, review at MLDS Center advisory board meetings, and (if necessary) address any action items.

1.2 Activities of the Center

A. COVID Response

MLDS Center staff began working remotely on March 13th and continues to do so as of the writing of this report. The Center's virtualized system design allowed the Center to change to an all-remote work environment seamlessly and without compromising system security. In preparation, the IT team worked to make sure all staff had updated computer equipment and were set up with secure virtual private network (VPN) connections. All of the required security measures were firmly in place and the IT team continues to monitor system traffic for any signs of malicious activity. Finally, additional computers were ordered through the Department of Information Technology, which allowed the Center to support staff who may be working on their own equipment or older office laptops. The Center has moved to all virtual meetings and other functions are continuing as normal. Output and productivity have not been compromised by these changes.

B. Stakeholder Engagement

Federal Reporting

The Center continues to assist partner agencies meet their federal reporting requirements that require cross-sector analysis:

- The Division of Workforce Development and Adult Education (DWDAL) is required to report to the Federal Department of Labor, Office of Career, Technical, and Adult Education (OCTAE) on common performance measures required under the Workforce Innovation and Opportunity Act (WIOA). One component of the report requires matching student outcomes with wage data. To

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[2] https://mldscenter.maryland.gov/ExternalDataPolicy.html

- accomplish this, the Center match students in a WIOA program with UI Wage data in the MLDS to obtain the students' post program employment information.
  - MSDE must report annually to the U.S. Department of Education, Office of Career, Technical, and Adult Education to meet the requirements of the Strengthening Career and Technical Education for the 21st Century Act (Perkins V) of 2018. The reporting includes the placement outcomes of secondary and postsecondary career and technical education students two quarters following their exit from the program. The MLDS Center supports MSDE with this reporting requirement.
  - Under the federal Individuals with Disabilities Education Act (IDEA), MSDE must report on education and workforce placement outcomes of secondary special education students for the year following their exit from secondary education. The MLDS Center also supports MSDE with this reporting requirement.

Maryland State Department of Education (MSDE)

The Research Branch was asked to conduct advanced statistical analyses to examine the effects of the Bridge program, which provides a process that ensures all students have the fair opportunity to demonstrate knowledge and skills, even after being unsuccessful on traditional high-stakes assessments Dr. Jane Lincove is working in partnership with MSDE to determine program outcomes and apply a statistical approach capable of inferring causal relationships between participation in the program and educational outcomes. These results will be presented to MSDE in Spring 2021.

Community Colleges

This year, the Center released a report entitled *Educational and Workforce Outcomes for Associate's Degree Graduates from Maryland's Community Colleges.*   The report analyzed the workforce outcomes of Associate's degree graduates five years after graduation.   The community colleges found the report useful and requested a report disaggregating the results by college. They also expressed interest in having the MLDS Center develop a dashboard that would allow each college to obtain workforce outcome information for their respective graduates. The Maryland Association of Community Colleges facilitated a workgroup to meet with MLDS Center staff to collaboratively define the dashboard contents.   The workgroup wants the MLDS Center to develop a dashboard that would be updated annually and would support the Performance Accountability (PAR) measures report and other reports completed by each community college. The workgroup agreed that the general methodology used for the Associate's degree report would be appropriate for the dashboard. The workgroup also requested the ability to customize the dashboard for college-specific reporting on key majors and employment sectors. Additional workgroup meetings are planned.

Traditional Program Annual Report (TPAR)

The Center fulfilled a request to provide data tables for twenty-two postsecondary institutions with teacher education programs. The data tables will support each institution's submission of the Traditional Program Annual Report (TPAR) to the Maryland State Department of Education. The tables report on post-program outcomes including the number of program completers teaching in Maryland public schools, teaching in Maryland public schools with special designations (low performing or high poverty), visible in Maryland wage data in the Education sector, or otherwise visible in Maryland wage data. The TPAR is an annual report and the data tables produced will become the baseline for the new teacher dashboards.

Maryland Center for Computing Education

The Maryland Center for Computing Education (MCCE) has partnered with the MLDS Center to develop a series of dashboards exploring the availability, participation, and postsecondary continuation of computing education for Maryland public high school students. This partnership is an expansion of the relationship that started with data requests three years ago. These dashboards will show computing education course participation, by various disaggregations in order to highlight participation of traditionally underrepresented student groups, and postsecondary transition into computing related majors of these students. Review and user acceptance testing is underway and public release is expected by early 2021.

Foster Care Tuition Waiver

Currently the Maryland Higher Education Commission (MHEC) provides the Department Human Services (DHS) with a data table on the number of postsecondary students who enroll in college with the Foster Care Tuition Waiver. After meeting with MHEC and DHS, the MLDS Center has agreed to produce this report. The Center will expand the existing financial aid dashboards to include high school graduates enrolling in college with the Foster Care Tuition Waiver. The new dashboard will be available later next year.

Regional Higher Education Centers (RHECs)

The University System of Maryland (USM) requested data from the Center to help them examine the dual role that Regional Higher Education Centers (RHECs) play in both increasing access to Bachelor's and Master's degrees in unserved and underserved regions in Maryland and offering programs that support the workforce needs of employers in the RHEC region. This analysis was needed to support a USM JCR reporting requirement.

Other Stakeholders

The Center continued its relationship with the Maryland Business Round Table (MBRT) and produced a data table on college enrollment, persistence and graduation for high school students that qualify as Maryland Scholars.

The Center completed the annual request from the Department of Legislative Services to provide data tables on Dual Enrollment and High School Pathways. The Dual Enrollment tables are similar to the Center's dashboard but focus exclusively on students who are dually enrolled during the high school academic year. The Pathway report looks at college enrollment, persistence and graduation for all public high school students that exit high school in 12th grade. This data table is incorporated into the DLS education overviews presented each legislative session.

C. Data Requests

Below is a brief synopsis of data requests the Center received this year. The number of data requests was less this year; likely a result of the shortened legislative session and policy makers' focus on short-term COVID-19 related issues.

January - March

1. *Wor-Wic Community College,* requested the number of nursing graduates employed in the first year after graduation, including their median wages. The information was to support a grant application. STATUS – completed.
2. *Baltimore Sun*, requested statewide data on the number of 2010 high school who graduated from high school, completed college by 2018, completed college by age 25. STATUS – completed.
3. *Department of Legislative Services*, requested data on the number of students with a IEP and 504 plan, disaggregated by local school system. STATUS – denied (single sector data request – referred to MSDE).
4. *Wall Street Journal*, requested data on high school graduates immediately college enrollment, including percentage of two-year and four-year college enrollment. Some portion of this request was resolved through publicly available reports and dashboards. STATUS – completed.
5. *Maryland Independent Colleges and Universities Association (MICUA),* requested data on a variety of factors regarding graduates with a Bachelor's degree in education, including whether they enrolled with intent to teach, loan amount, GPA, and their teaching employment outcomes. STATUS – completed.
6. *Prince George's County Public Schools,* number of financial aid applications submitted by students of a particular high school, the number of students accepted money, the average amount received. The Center's data was not responsive to the request. STATUS - cancelled.
7. *University of Maryland, Baltimore County*, requested student level records for students attending Maryland public colleges and universities, including financial aid information. Since the request was for individual level data, the Center was unable to fulfill the request. STATUS – cancelled.

April - June

8. *Doctoral Student,* requested data on Asian school administrators. This request was referred to the State Department of Education since the request was only for K-12 data. STATUS – cancelled.
9. *Morgan State University,* requested wage data by program and industry for the December 2018 and 2019 Bachelor's recipients. STATUS – completed.
10. *Salisbury University*, requested information on qualifications of teachers in specified counties in Maryland. This request was referred to the State Department of Education since the request was only for K-12 data. STATUS – cancelled.

July - September

11. *UMB School of Social Work (Promise Neighborhoods Project),* requested an update to a prior data request. The data supports federal grant project reporting requirements. The request seeks an update on the outcomes of students who graduated from Renaissance Academy.
12. *Maryland Higher Education Commission,* requested data on workforce outcomes for graduates of physician assistant programs. This data helped support a program evaluation conducted by MHEC. STATUS – completed.
13. *Towson University student,* requested unit record data on graduates, including their major, income, financial aid, and other data points. The Center could not fulfill this request because it was for unit record data and not aggregate data sets. STATUS – cancelled.

October – December

14. *Towson University, RESI,* requested data on the number graduates from a select list of Maryland high school. The Center could not fulfill the data request because it was not cross sector and requested information on private school graduates. STATUS – cancelled.

15. *Towson University,* requested data on the number of Bachelor's and Master's degree graduates who complete initial teacher licensure at Towson in 2017, 2018 and 2019 are still teaching in Maryland public schools in 2020. STATUS – completed.

C. External Researcher and Grant Funded Projects

In addition to the Center's regularly planned research and output, the Center also works with researchers seeking MLDS data for a grant supported project or external researchers seeking Center data for a particular research project. These initiatives are important because they add research capacity without cost to the State. The projects are subject to a rigorous review procedure that ultimately requires Governing Board approval. Below is a list of all external researcher and grant funded projects reviewed and approved this year.

1. *Dr. David Blazar, From Early Childhood to the Workforce: Expanding the Capacity of Social, Behavioral, and Economic Sciences Research through Longitudinal and Cross-Sector Data Linkages.*
   Dr. Blazar, along with researchers from the University of Maryland, College Park (UMCP; prime) and Baltimore (UMB; subcontract) campuses collaborated with the Maryland Longitudinal Data System (MLDS) Center on a Human Networks and Data Science: Infrastructure project submitted to the National Science Foundation ($4 million over 3 years). The grant would have provided funds for data infrastructure extensions that would more than double the length of the panel, covering individual person records for as many as 30 years for some students. Funds would also have been available to support the work of connecting the education and workforce records to juvenile service records from DJS and DHS (if approved by the Maryland General Assembly in 2020). This submission did not result in the award of a grant.

2. *Dr. Mathew Uretsky and Dr. Angela Henneberger – Pathways and Patterns of Education and Workforce Participation in Maryland.*
   The overall research objective is to describe and summarize the patterns of academic and workforce participation among Maryland adolescents and young adults. The central hypothesis is that there are distinct identifiable patterns of student academic participation and workforce participation during high school that relate to the odds of remaining engaged in school and continuing to participate in the Maryland workforce. This hypothesis is based on the findings from three preliminary studies, which examined student persistence and achievement into, through, and beyond their fourth year of high school. Grant funding for this project, in the amount of $25,000, was applied for and received from the *Institute for Research and Poverty* at the University of Wisconsin.

3. *Dr. Angela Henneberger – Long-Term Effects of PBISplus: A Randomized Controlled Trial in Maryland Public Elementary Schools.*
   Dr. Henneberger, University of Maryland, Baltimore (UMB) in collaboration with researchers from the University of Virginia and Johns Hopkins University planned to submit a grant to the Institute of Education Sciences for an efficacy follow-up study. If funded, the project would have examined the long-term effects of PBISplus implementation, including effects on high school graduation and dropout, college enrollment, college persistence and degree attainment, workforce participation and wages, and juvenile justice involvement. The study would have leveraged linked administrative

records over at least ten years (academic years 2007-2008 through 2017-2018) to examine school wide and student-level outcomes. The results would provide policymakers, educators, and researchers with a better understanding of the long-term cost benefit of implementing the PBIS prevention framework in Maryland public schools. The IES grant was not forwarded for peer review, and the research team is currently examining additional funding opportunities for this project.

4. *Dr. Jane Lincove, University of Maryland, Baltimore County – Effects of COVID-19 on Black Youth*
Dr. Lincove collaborated with Dr. David Blazar to submit a grant proposal to the Spencer Foundation (https://www.spencer.org/) COVID-19 request for proposals. The maximum award is $50,000 over 2 years. The purpose of this study is to examine the effects of COVID-19 on Black youth, who have been identified as a particularly vulnerable and highly impacted community amidst the pandemic. They will examine the effect of the pandemic at two key educational transition points: (i) the very start of formal schooling, and (ii) the end of high school and the transition into college or the workforce. Focusing on both extremes of the K-12 educational experience will provide insight to the effects of COVID-19 across developmental trajectories and, in turn, inform policy moving forward. This submission was not selected for funding by the Spencer Foundation.

5. *Dr. Marc Stein, Johns Hopkins University – Postsecondary and Labor Market Effects of Career and Technical Education in Baltimore City Public Schools*
Dr. Stein is collaborating with Dr. Rachel Durham (External Collaborator at MLDS, Johns Hopkins University) and Jay Plasman (Ohio State University) to re-submit a grant to the Institute of Education Science for an Exploration study about Career and Technical Education (CTE). The project is for up to four years with a maximum award of $1.7 million. If funded, the project would leverage the centralized enrollment assignment process used by Baltimore City Schools as part of its universal high school choice process to determine the mechanisms and effects of CTE on several outcomes using a fuzzy regression discontinuity design method. Outcomes of interest include: on-time graduation from high school. A funding decision is still pending for this project.

6. *Dr. Faith Connolly, McREL International, Understanding the Early Steps on a Program of Study*
This proposed study is to conduct an exploratory study of career and technical education (CTE) that examines CTE course failures among students participating in the CTE program of study and how they may alter later pathway completion, CTE dropout, and graduation. Using the Maryland Longitudinal Data System (MLDS), this study will identify four cohorts of ninth graders and conduct a transcript analysis that will describe how often course failure happens and to whom, as well as identify what factors influence the ability to recover. Primary data will also be collected to understand the context and to supplement findings from the state administrative data from MLDS. A funding decision is still pending for this project.

7. *Morgan State University, Training Research Personnel*
Morgan State researchers submitted a grant to the Institute of Education Sciences, U.S. Department of Education, that would add research personnel through the ASPIRE training program. The goal is to expose under-represented advanced undergraduate students to rigorous research experiences in education science. The program would include the use of the MLDS as a research training

opportunity for under-represented students. The team is currently examining additional opportunities for collaborations between Morgan State and the MLDS Center.

8. *Dr. Terry Shaw, Homeless Youth in Maryland*

   Dr. Shaw Associate applied for a grant from the Housing and Urban Development (HUD) to estimate the prevalence and outcomes of homeless youth in Maryland. This research grant aims to fill knowledge gaps around how to accurately identify youth experiencing homelessness in the State and would use the MLDS to examine postsecondary outcomes for homeless youth in the State. This project was not selected for funding.

9. *Dr. Jane Lincove, University of Maryland, Baltimore County, The Effects of State and Local PK-12 Discipline Policies on Suspensions, Juvenile Arrests, and Educational Outcomes*

   Dr. Lincove is applying for a $1.6 million IES Research Grant to will link student discipline data with attendance, juvenile arrests, educational outcomes, and post-secondary college and workforce outcomes to identify how school suspensions influence students' performance, attainment, and human capital. The project will also examine the relationship between recent local and state policy changes regarding school discipline to identify strategies the role of policy in influencing student and school behavior and reducing racial, gender, and income disparities in the use of suspension and its negative consequences. A funding decision is still pending.

10. *Dr. Wade Jacobsen, University of Maryland, College Park, School Discipline, Disproportionality, and the Transition to Adulthood in Maryland*

    Dr. Jacobsen is proposing a project to examine the consequences of school discipline for emerging adulthood sectors, such as college enrollment and workforce participation. This project will extend prior research by testing whether these exclusionary forms of discipline also interfere with the transition to emerging adulthood. There is an urgent need to understand the consequences of exclusionary discipline in Maryland, particularly among racial minorities, because recent declines in suspension and expulsion rates in the state have mainly benefited white students. This research will advance current knowledge by examining consequences of such discipline in young adulthood and the mechanisms of these consequences. Grant funding will be sought from the University of Maryland College Park and external federal and foundation funders.

D. Research Series

During the academic year, the Center's Research Branch hosts a monthly Research Series open to the public. The Research Series presents the Center's research and other areas of interest and provides attendees the opportunity to provide feedback and input to the Center. The presentation materials and additional information can be found on the MLDS website.[3]

1. *Maryland Center for Computing Education: State Case Study of Computing Education (February)*

   Dr. Megean Garvin, Director of Research and Assessment at the Maryland Center for Computing Education, University System of Maryland, presented a case study conducted by the Maryland Center

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

for Computing Education that examines how the State began broadening participation in computing for public school students from 2010 through 2016. Using data from the MLDS, the research examines the different policy initiatives at various governance levels and reveals the successes achieved and the persistent barriers to democratizing computing education.

2. *The Power of University – Agency Partnerships – Examples in Juvenile Services and Child Welfare (March)*
   Dr. Jill Farrell and Dr. Terry Shaw, both professors at the University of Maryland, School of Social Work, provided background and examples of their research partnerships between the School of Social Work and the Departments of Juveniles Services and Human Services. These partnerships offer mutually beneficial opportunities to leverage the research infrastructure and resources of the university to generate information agencies can use to improve overall policy and practice. The University of Maryland, School of Social Work has a long history of collaborating with state and local agencies in Maryland and nationally.

3. *The MLDS Synthetic Data Project: Evaluation of Research Utility and Disclosure Risk (May)*
   Dr. Mark Lachowicz, postdoctoral research associate at the University of Maryland, College Park and Dr. Terry Shaw, Associate Professor at the University of Maryland, School of Social Work, presented an overview of synthetic data, and an evaluation of the research validity and disclosure risk associated with the synthetic datasets created. The evaluation of research validity of the synthetic data includes efforts to assess the general utility (e.g., comparisons of variable distributions between the real and synthetic data) and specific utility (e.g., comparisons of parameter estimates from statistical analyses between the real and synthetic data). Drs. Lachowicz and Shaw also presented a vital step in the synthetic data project: the assessment of disclosure risk, which is required to ensure compliance with laws governing the confidentiality of state held data. Finally, the presenters discussed the benefits of the synthetic data for researchers who do not have access to the real data.

4. *Student and School Predictors of Career and College Persistence among Baltimore City Schools Graduates: Research in Progress to Identify Differences between Career and College Readiness (June)*
   Dr. Rachel E. Durham, Associate Research Scientist at the Baltimore Education Research Consortium, presented her in-progress research that investigates whether the same high school factors (e.g., grades, assessments, CTE) can predict both college persistence and workforce persistence over the first four years after graduation. Data for three consecutive cohorts of graduates from Baltimore City Public Schools progressing to both college and the workforce are examined, as well as students' academic profiles from high school and their high schools' characteristics. Several differences between factors that predict college persistence relative to workforce persistence are found. The relative importance of different factors for each pathway and their implications for policy were discussed.

5. *Maryland Public School Teachers Working Secondary Jobs: Predicting Wages and Attrition from the Teaching Profession (October)*
   Dr. Tracy Sweet, Professor at the University of Maryland College Park and Ms. Brennan Register, graduate research assistant, presented their study examining characteristics of public-school teachers who seek out-of-school employment and the relationship between out-of-school employment and teacher attrition. The presentation explored the teachers' secondary employment, identifying the common industries in which teachers seek out-of-school employment, as well as examining the additional wages earned in secondary employment. It also examined the individual teacher characteristics and the school characteristics of teachers who work outside of Maryland public schools. Finally, there was a discussion on how wages relate to out-of-school employment and whether out-of-school employment subsequently relates to future teacher attrition.

6. *Understanding Persistence in High School: An Epidemiological and Latent Class Analysis of Student Academic and Labor Participation (November)*
Dr. Urtetsky, Professor at Portland State University, presented his study that applied two statistical methods (an epidemiological approach and a latent class analysis) and used 10 years of data from the Maryland Longitudinal Data System (MLDS) to investigate whether and how persisters (non-graduates—persisters—who continue their enrollment into and through their fourth year of high school without earning a diploma) differ from dropouts and on-time graduates in terms of demographic characteristics and academic and workforce participation and outcomes. Understanding and documenting such differences are central for developing and targeting preventive interventions to improve students' academic and workforce outcomes.

7. *Projecting the Potential Impact of COVID-19 School Closures on Academic Achievement*
Dr. Jing Liu, Assistant Professor at the University of Maryland College Park, presented his study that used national data and produced a series of projections of COVID-19-related learning loss based on (a) estimates from absenteeism literature and (b) analyses of summer learning patterns of 5 million students. Based on the projections, returning students are expected to start fall 2020 with approximately 63 to 68% of the learning gains in reading and 37 to 50% of the learning gains in mathematics relative to a typical school year. However, losing ground during the school closures was not universal, with the top third of students potentially making gains in reading. Implications for cross sector research on the impacts of COVID-19 were discussed.

E. Presentations

The Center delivered numerous presentations throughout the year at various conferences and to different 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[4] to provide information about presentations and copies of the presentation slides and handouts.

Education Commission on the States

Ross Goldstein was invited to the 2019 Winter Commissioners Meeting of the Education Commission of the States to provide a State Spotlight session focused on Maryland's use of data to improve student outcomes. The spotlight session was designed to provide an overview of how Maryland governs its longitudinal data system and uses the data to help inform policy makers. Specific examples provided included the Career Preparation Expansion Act, the student poverty research conducted by the Research Branch, the student pathway analyses, and the use of data to help inform fiscal analyses during the legislative session.

Governor's Workforce Development Board

Dr. Ann Kellogg conducted a webinar to present highlights from the 2019 Career Preparation Expansion Act Report to the Governor's Workforce Development Board (GWDB). This was the Center's first webinar

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

and proved to be a successful format for this type of presentation. The webinar was recorded and is available on Center's website.[5]

Governor's Advisors Retreat

Dr. Henneberger presented at the Hunt Institute's 2020 Governor's Advisors Retreat in Coral Gables, Florida. She presented on a panel entitled Workforce Trends. The panel focused on using research from state longitudinal data systems to help inform decision making. Maryland was highlighted as an exemplar state during the conference and was recognized as having made great progress toward using the state longitudinal data system.

House Ways and Means Education Subcommittee

The House Ways and Means Education Subcommittee held a virtual briefing on August 6th. The briefing focused on Equity and Discipline in Education. In addition to presentations by MSDE and Strong Schools Maryland, Mr. Ross Goldstein and Dr. Angela Henneberger were invited to provide an overview of Center data related to the topic and upcoming research on equity and discipline that the Research Branch has planned for the year ahead.

P20 Data Linking Workshop

Maryland was asked to present at the P20 Data Linking Workshop sponsored by the federal SLDS State Support team. Ms. Molly Abend gave an overview of the MLDS Center's linking and identity resolution strategy as well as ways to ensure a high quality linking process.

Hunt Institute Informed Decision Making Collaborative

Dr. Henneberger presented at the *Informed Decision Making Collaborative* in Raleigh, NC. The group of stakeholders from Governor Cooper's office and other state agencies was convened to facilitate discussions around North Carolina's longitudinal data system. Dr. Henneberger presented on the research agenda for the Maryland Longitudinal Data System Center and consulted on the NC agenda.

Maryland Department of Health – Health Equity Conference 2020

Dr. Henneberger and Dr. Rose presented for the Maryland Department of Health's Health Equity Conference on December 3, 2020. The presentation focused on academic and workforce inequities by race and poverty. Findings indicated that students who experienced household poverty for longer and experienced school concentrations of poverty had the worst educational outcomes. Black-white gaps in standardized test scores and wages persisted regardless of poverty, whereas black-white gaps in high school graduation and postsecondary enrollment reversed when controlling for poverty and school composition. Additionally, race played a larger role in wage outcomes than did poverty experiences.

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[5] https://mldscenter.maryland.gov/CenterReports.html, select Career Preparation Expansion Act Reports from the menu and then the 2019 webinar.

Focus on Education Policy 2020: The Kirwan Commission Panel Discussion
Dr. Henneberger was an invited panelist at the University of Maryland Baltimore County, along with the Honorable Gail Bates. Dr. Henneberger's comments focused on the process of working with the Kirwan Commission to formulate and conduct research that helped to inform their decision making on concentrated poverty in Maryland.

Associate's Degree Graduates Webinar
Dr. Ann Kellogg presented highlights from the *Educational and Workforce Outcomes for Associate's Degree Graduates from Maryland's Community Colleges Report*. The webinar included two discussants, Dr. Emily A.A. Dow and Dr. Brad Phillips, who discussed the policy implications suggested by the outcomes from this report. The recording of the webinar is available on the Center's website. A supplemental analysis was done on the data used for the report to examine wage outcomes by college. The analysis was provided to Dr. Phillips and Dr. Dow and will serve as the basis for convening a stakeholder group in September to develop a new report on outcomes for Maryland's community colleges that supports Performance Accountability (PAR) measures and other reporting needs for community colleges.

State Longitudinal Data Systems Webinar
Drs. Laura Stapleton and Angela Henneberger were invited to speak for the SLDS webinar on research projects that support sustainability. The presentation outlined the synthetic data project conducted with the MLDS Center and offered guidance for other States thinking about using synthetic data for their state longitudinal data system projects.

Research Conferences
Dr. Bess Rose presented research at the Institute for Children, Poverty, & Homelessness (ICPH) Beyond Housing Conference. ICPH is a New York City-based policy research organization focused on child and family homelessness in the United States. Beyond Housing welcomes a diverse group of service providers and big-picture thinkers from across the country to explore new and innovative methods to prevent or mitigate the impact of homelessness on children. Dr. Rose presented MLDS data looking at homelessness as an extreme form of poverty in relation to long-term educational and career outcomes.

F. Publications in Peer Reviewed Journals
Henneberger, A.K., Witzen, H., & Preston, A. (2020). A longitudinal study examining dual enrollment as a strategy for easing the transition to college and career for emerging adults. ***Published in*** *Emerging Adulthood*

Uretsky, M.C., & Henneberger, A.K. (2020). Fifth year persisters: High School, college, and early career outcomes for persisting non-graduates. ***Published in*** *Children and Youth Services Review*.

Bloomfield, A., Rose, B.A., Preston, A.M., & Henneberger, A.K. (2020). Brain drain in Maryland: Exploring student movement from high school to postsecondary and the workforce. ***Published in*** *AIR Professional File.*

G. Synthetic Data Project (SDP)

The MLDS Center's Research Branch completed its work on the development of synthetic data, a project funded by a grant from the U.S. Department of Education, Institute of Education Science. The four-year project (2016-2020) involved evaluating the feasibility of developing synthetic data from the Center's actual data. Access to the MLDS data is restricted, and therefore synthetic data, which statistically mimic the statewide longitudinal data system, are a promising solution to providing access while maintaining confidentiality. This study was the first effort to synthesize data from statewide longitudinal data systems. The MLDS Center received $2.6 million for this project from the Institute of Education Sciences.

The project had five core project aims:
1) Design and create three gold standard data sets (GSDS) from the longitudinal data housed in the data system;
2) Create innovative synthetic versions of those GSDS, by the application of well-established data imputation algorithms used to replace missing values in data to create entirely imputed versions of real data sets;
3) Assess those synthetic data sets for research utility to determine whether those data substantially reflect analyses with the raw data they were imputed;
4) Assess the disclosure risk of those synthetic data sets to determine if they sufficiently protect the confidentiality of protected information about the real individuals whose data were synthesized; and
5) Explore the feasibility of creating Cluster-specific synthetic versions of the MLDS data. This report provides an overview of the completion of tasks for each aim of the project.

The project successfully completed each component. The fully synthesized data that was created was shown to have research utility and not create any disclosure risk. The project resulted in numerous publications and conference presentations.

H. Comptroller

During the 2019 Legislative Session, the General Assembly passed House Bill 1206 (Chapter 729, Laws of 2019), which required the MLDS Center and the Comptroller to develop a protocol for the Center to send student information to the Comptroller and for the Comptroller to match the student information to tax information. The tax information will allow the Center to gain a more complete understanding of student earnings from their engagement in the workforce. The current source of workforce data, unemployment insurance wage data, does not include important segments of the workforce including federal employees and self-employed individuals. Tax records will include earnings information for all workers, regardless of whether they are working for the federal government or self-employed.

To implement this process an inter-agency agreement was signed and a set of procedures were established to manage the process and ensure the highest level of security. The Center sends the student name, Social Security Number, and date of birth to the Comptroller who uses the data for the purposes of providing aggregate tax information for groups of students. The Comptroller is required to delete the data provided by the Center within 14 days after reporting the summary tax information

to the Center. The Center transmits the data via an approved file transfer system that encrypts the data in flight and at rest. The Comptroller stores and processes the information in such a manner that restricts access to authorized persons only and keeps MLDSC student data encrypted at all times except if decryption is necessary to match the data. Finally, both the Comptroller and the Center agree to fully comply with all applicable federal and state laws and regulations on student privacy, taxpayer privacy, and management and security of personally identifiable data.

The first data exchange took place in November and the results are being analyzed.

I. Census Data

Recent legislation (Chapter 729, 2019) requires local school systems to convert student home address into a Census tract or block number pursuant to a protocol established by the MLDS Center. The Census tract and block numbers can be linked to the Census Bureau's American Community Survey which has detailed demographic information at the block and tract level. This information can enhance the Center's understanding of student socioeconomic backgrounds.

To implement this new data collection, the MLDS Center and the Maryland State Department of Education (MSDE) formed a workgroup with representatives from four local school systems. The *Census Tract and Block Data Workgroup* has had two meetings to discuss data availability, potential barriers, and supports for local school systems.

J. Longitudinal Data Collaborative

The *Eastern States Longitudinal Data Collaborative* (ESLDC), led by New Jersey, held is first meeting on December 9th and 10th, 2020, which included an informal group of representatives from the eastern United States (New York, New Jersey, Pennsylvania Maryland, Virginia, Washington D.C., territories, and other jurisdictions) with student or workforce longitudinal data systems to coordinate on ideal practices for managing these data systems. The purpose of the ESLDC is to collaboratively develop solutions to address challenges in analyzing education and workforce agency data and to pool resources so data analysis may create products that inform public policy. The ESLDC will work to jointly conduct research, develop data models, and create dashboards that will be beneficial for the group.

K. Research Award

The MLDS Center Research Branch won a prestigious award from the American Educational Research Association (AERA) for their joint research with the synthetic data project team: *Statistically Modeling Multiple Membership in the Real World: Lessons from Statewide Longitudinal Data in Maryland*. The research project was the first place winner for AERA 2020 Division H's Outstanding Publications Competition in Category 1: Advances in Methodology.

Section 2. List of all studies performed by the Center

2.1 Research Reports

Research Branch

Expanding MLDS Data Access and Research Capacity with Synthetic Data Sets. This report provides an overview of the four year research project conducted by the MLDS Center Research Branch that evaluated the feasibility of developing synthetic data from the Center's actual data.[6]

The Effects of a Dual Enrollment Subsidy on Dual Enrollment for Students in Maryland. This report examined the effects of CCRCCA on dual enrollment for students who were eligible for free/reduced price meals. This report used a difference in difference approach to estimate the effect of changes in dual enrollment tuition. Students who were eligible for FARMS and dual enrollment had larger increases in the rates of any dual enrollment after CCR-CCA, when compared to students who were not eligible for FARMS.

Maryland Public School Teachers Working Secondary Jobs: Predicting Wages and Attrition from the Teaching Profession. Retaining Maryland public school teachers is of key policy interest across the state. This report examines characteristics of public-school teachers who seek out-of-school employment and the relationship between out-of-school employment and teacher attrition in Maryland.

External Researcher

Predictors of Career and College Persistence among Baltimore City Schools Graduates: Implications for Differences between Career and College Destinations. This report by Dr. Rachel Durham explores whether readiness for 'career' and 'college' is a singular construct.[7]

2.2 Dashboards[8]

Financial Aid

The MLDS Center updated and expanded its financial aid dashboard series. In addition to reporting on aid awarded during the first year of college and retention to the second year of college, the ten dashboards now include data on college degree attainment by age 25. The population for the dashboards was also reset to draw from the new comprehensive reporting table so that all dashboards on the high school to college pipeline use the same population definitions. This set of dashboards is also being expanded to include local school system and school-level reporting filters and wage data.

College Enrollment and Graduation

The MLDS Center launched its new dashboard series on college enrollment and college graduation for Maryland public high school graduates. The first fifteen dashboards explore college enrollment and

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[6] https://mldscenter.maryland.gov/ResearchReports.html

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

[8] MLDS Center Dashboards: https://mldscenter.maryland.gov/Dashboards.html

college graduation by age 25 for high school graduates who immediately enroll in college as well as for those who delay entry to college or start college in a part-time capacity. In addition to reporting statewide trends, each dashboard supports reporting at the local school system and school levels. The Center will continue to expand these dashboards to include data on wages, enrollment by college type, and other data points.

Interactive Reports

The Center released new interactive reports highlighting and expanding on work previously completed.

1. *Exploring Postsecondary Certificates and Earnings* - This report is a supplement to the More Jobs for Marylanders report the Center produced, in conjunction with the Governor's Workforce Development Board in 2017. The supplement provides data on the college majors/programs and industry as well as disaggregates the results by gender and race/ethnicity for Certificate graduates.
2. *Career Preparation Expansion Act Report Summary and Highlights.* This report provides key metrics and a short summary on the *Career Preparation Expansion Act Report*.
3. *Student Loan and Wages Supplement, Career Preparation Expansion Act.* This report summarizes the supplement in the *Career Preparation Expansion Act Report* that focused on high school graduates who continued on to college and either graduated with a degree or discontinued their education without graduating, have student loans and are fully engaged in the workforce five years after high school. The report looks at their median wages in comparison to the living wage requirements for Maryland and the estimated median loan repayment amount.
4. *Long-term Effects of Attending High-Poverty Schools.* This Research Spotlight is a summary of the MLDS Research Branch Report on *Student and School Concentrated Poverty in Maryland*. That 2019 report examined the roles of student and school level poverty and race/ethnicity on long-term educational and career outcomes.

2.3 Dual Enrollment Report

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

The data for this report comes from the Maryland Longitudinal Data System (MLDS). The MLDS is Maryland's central repository for student education and workforce data. Students were identified in the System as dually enrolled if they were enrolled in both a public high school and a college in Maryland, and had at least one overlapping day of enrollment in both institutions.

A total of 15,691 Maryland public high school students were dually enrolled in the 2018-2019 academic year. This is approximately a 15% increase from the prior year. Maryland community colleges were the most common location for students accessing dual enrollment opportunities. 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, Social Sciences and History, 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.

2.4 Career Preparation Expansion Act Report

The Career Preparation Expansion Act Report is submitted in fulfillment of the requirement in *The Career Preparation Expansion Act* (CPEA), Chapter 695 of 2017 (see Education Article § 21-205, Annotated Code of Maryland). The Maryland Longitudinal Data System (MLDS) Center and the Governor's Workforce Development Board (GWDB) are required to produce a report on high school graduates for the five-year period after graduation on:

1. Wages earned;
2. Hours worked per week; and
3. The industry in which the individuals are employed.

The requirements in the Career Preparation Expansion Act for this report are straightforward: analyze the wages earned, the hours worked per week, and the industry of employment for high school graduates five years after they graduate. The purpose of the report is also straightforward: it seeks to quantify how the recent graduates are doing during the early stages of their careers. However, these straightforward questions are complicated by the other significant factor in the lives of many 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, 77% of the high school graduates had or continue to have some involvement with college during the first five years after high school graduation. The impact of college on workforce outcomes is of critical importance and highlighted throughout this report.

Overall, 47% of the class of 2014 had full-quarter wages five years after high school, with median quarterly earnings of $6,160 – an amount that is approximately $1,500 below the quarterly living wage in Maryland for a single adult with no children. In comparison, the high school graduates who earned a Bachelor's degree had median quarterly wages that were almost $4,000 higher than the overall population and resulted in a quarterly wage that was $2,300 higher than the living wage. Certificate and Associate's degree earners also had median quarterly wages higher than the overall population by $1,700 and $960, respectively, which places the Certificate earners just over the Maryland living wage amount and the Associate's degree earners just under. Finally, the high school graduates with some college but no degree and those still in college had the lowest quarterly median wages, $5,500 and $4,900 respectively, which puts them both more than $2,000 below the Maryland living wage. This finding may not be surprising for the high school graduates who are still in college, since attending college may limit their options and level of engagement in a career track position. However, the high school graduates with some college demonstrate that there is no immediate return on the investment (both time and money) in college unless a degree is earned. And, unlike students who earned a degree, they do not have the financial reward of higher wages to offset any costs incurred with going to college.

The report also analyzes wages to determine the number of high school graduates that fall into each of the following wage bands: (1) at or below minimum wage, (2) between minimum wage and living wage, (3) between living wage and the state's median quarterly earnings, and (4) at or above the state median quarterly earnings. This analysis shows that the only group with a majority (65%) of high school graduates making a living wage or higher (bands 3 and 4) are the high school graduates with a Bachelor's degree. A majority high school graduates in all other groups had wages below the living wage (bands 1 and 2). Notably, 32% of high school graduates with some college had wages at or below minimum wage and 41% had wages between minimum wage and the living wage. This once again reinforces both the value of a college degree and the negative impact of attempting college, but not completing.

The requirement to report on the hours worked cannot be directly addressed with MLDS data since the source of wage data only includes the total wages earned per quarter. In the two prior reports, wage data were analyzed for each fiscal quarter after high school graduation to determine the number of graduates with wage data in each fiscal quarter. This analysis provided insights into workforce patterns of the different educational attainment groups. In this year's report, a slightly different approach was used. This report focuses on the wage progression (i.e. wages at one year, three years, and five years after high school) for two groups of high school graduates: those with *No College* and those with *Some College* but no college degree. For both groups, the wages at one year post high school are below the minimum wage but show an increase at years three and five. However, only *No College* high school graduates who have steady wages for all five years had a living wage at year five. This may indicate that after high school they immediately entered a career track with an employer or in a particular field. Given the relatively low number of these high school graduates (less than 2,000 or 10% of all high school graduates without any college engagement), it also may suggest that these opportunities are limited.

The final reporting requirement 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 *Trade, Transportation, & Utilities*, followed by *Leisure & Hospitality*. Once again, educational attainment has an impact on sector and wage outcomes. The *Trade, Transportation, & Utilities* sector was the largest employer of high school graduates for all educational attainment groups, except Bachelor's, for which the *Professional & Business Services* sector was the largest employer. Across all educational attainment groups, high school graduates in the *Goods-Producing* sector had the highest wages and those in the *Leisure & Hospitality* sector had the lowest wages.

This year's report contains two supplemental sections. The first explores the impact of race, ethnicity, and household economic status on the workforce outcomes of these high school graduates. The supplement shows variation in the industries selected and, within industries, variations in wages earned based on race, ethnicity, and economic status. Generally, the median quarterly wages were higher for high school graduates who are Male, White, or not economically disadvantaged.

The second supplemental section further explores high school graduates who earned a Bachelor's degree, are Still in College, or had Some College but no degree; focusing on the number of institutions attended, the duration of attendance, the types of institutions attended and the academic pathway to their current college status. As previously discussed, attending some college has negative implications for wages.

When including duration of enrollment in the analysis it shows that high school graduates enrolled for two years or less had higher median quarterly wages as compared to those enrolled for three or more years suggesting there may be a small return to Some College at shorter durations. For Bachelor's degree recipients, the report shows that very few (6%) begin at community college. However, for those that do, there does not appear to be negative impact on wages. Both the four-year college only path and the community college path to the Bachelor's degree resulted in nearly identical median quarterly wages, both of which were well above the living wage and just shy of the median wages for all Marylanders. For those Still in College, the report shows that three-quarters of this group earned one college degree and were actively pursuing a second. This is an important finding as it means that those still in college, five years after high school, are not slowly progressing toward a first degree, but rather building on an existing credential.

2.5 Educational and Workforce Outcomes for Associate's Degree Graduates from Maryland's Community Colleges

This report is the third in a series of reports that began with the Career Preparation Expansion Act (CPEA) Report. The CPEA Report focused on the workforce outcomes of high school graduates five years after graduation. The second report in the series provided an analysis of the workforce outcomes of GED® and NEDP® diploma earners five years after receiving their diplomas. Now, this report analyzes the workforce outcomes of Associate's degree graduates five years after graduation. All of these reports provide important clues about the value of the respective degrees and how that value is impacted by subsequent educational attainment and industry of employment. The population under consideration for this report are the 12,609 students who graduated from a Maryland Community College with an Associate's degree during the 2013 Academic Year (July 2012 through June 2013). Unlike the high school graduate population, this cohort varies in age from 18 to 65 and over, with 50% between the ages of 18 to 24 and another 29% between the ages of 25 to 34. The varying ages undoubtedly has an impact on outcomes. For example, an older Associate's degree graduate may have had prior work experience or a prior degree that may impact his or her subsequent earnings. Due to data limitations, the analysis cannot account for factors prior to graduation. However, the data clearly show that age has an impact on the decision to seek further education. Of the Associate's degree graduates who continued their education, nearly 60% were between the ages of 18 to 24. As in the prior reports, this report groups the Associate's degree graduates based on their educational attainment, i.e. whether they continued college and received additional degrees, attempted college but exited without another degree, are still in college, or bypassed college altogether and went straight into the workforce. While each pathway yielded different workforce outcomes, those outcomes did not have the same degree of variation as found in the other reports. For example in the CPEA Report, high school graduates who went on to earn a bachelor's degree had a median quarterly income that was nearly $4,000 more than the median wages for all high school graduates. In this report, the variation between the median quarterly wages for bachelor's degree earners was only $280 more than the median quarterly wage for all Associate degree earners. One reason that there is so little variation in wages is that this entire population has a postsecondary degree, something that translates to higher wages for all types of degrees. In fact, with the exception of the graduates who were still in college or attempted college but did not complete another degree, the graduates earned a median quarterly wage that was above the living wage and above the median earnings for all Maryland workers (as reported

in the American Community Survey 5-year estimates, see page 10 below). While those who went directly to the workforce and those who were still in college or attempted college but exited without a subsequent degree were not above the ACS median wage, their wages were still approximately $2,000 above the living wage. Another distinct finding of this report compared to the other two reports is that the Associate's degree graduates have increased visibility in the wage data. On average, 62% of all Associate's degree graduates were visible in the wage data in any one quarter over the five year period - with a low of 58% 4 and a high of 63%. In comparison, the CPEA Report showed that for high school graduates, on average, only 50% were visible in the wage data in any quarter, with a low of 37% and a high of 57%. One reason for this difference may be due to the fact that 27% of high school graduates leave the state to attend college. Another reason may be that the Associate's degree may make these students more employable in sectors that are subject to unemployment insurance filings and therefore more likely to be visible in the wage data. Finally, the Associate's degree conferred by a Maryland Community College may be more transferable in state, resulting in students not leaving the state to further their education and therefore they remain a part of the Maryland workforce even after completing another college degree. In addition to wages, the report also explores the industry of employment of the Associate's degree earners five years after graduating. For this analysis, in order to be counted as employed in a sector, the graduate has to be working for the same employer for three consecutive quarters (quarter 20 - five years after graduation - and quarters 19 and 21). The Education and Health Services sector employs the most graduates, which is true regardless of educational attainment category. Similarly the second largest sector, Professional and Business Services, and the third largest sector, Trade, Transportation, and Utilities, are also the same regardless of educational attainment. Notably, over 75% of all graduates employed in the Education and Health Services and Professional and Business Services sectors had a median quarterly wage at or above the living wage. This is a significant and positive finding considering that these two sectors employ 59% of all graduates with the same employer. The third largest sector, Trade, Transportation, and Utilities, had more mixed results. For example, graduates who were still in college and those with some college had median quarterly wages below the living wage. In general, the still in college and with some college groups have lower wages, likely due to their delaying their career-track employment to prioritize education. The impact on the some college group may be significant since they will not have the benefit of another degree to offset the lower pay and delayed entry into career-track employment. 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

Research and Reporting Priorities
Each year, the MLDS Center staff develop, with input from stakeholders, a Research and Reporting Plan. The plan, which is reviewed by the Governing Board, is provided below

Research Priority 1: Complete in-depth statistical analyses, able to support causal inferences where appropriate, on the following topics:
- Pathways from high school into college and the workforce
- Disentangling the roles of student and school poverty

- Teacher preparation/characteristics (e.g., demographic match to student) and student outcomes
- Critical workforce areas
- Incorporating wage data when missing not at random
- Causal effect of attending a 4 year college
- Early elementary predictors of long-term outcomes
- K-12 discipline and DJS overlap
- Production of high school and college students that meet workforce demands

Research Priority 2: Develop technical documentation to guide staff on the use of the System, data, appropriate methods, and best practices.

Research Priority 3: Applications for external funding to support priorities 1-2.

Reporting Priority Area
- Critical Workforce Sectors – Nursing, Teaching, and Computer Science
- Earnings for graduates – High School, Associate's Degrees, and Bachelor's Degrees

Reporting Required Output
- Reports – Dual Enrollment, Annual, Career Preparation Expansion Act, and Cyber Warriors
- Other Requirements – DLS – Dual Enrollment and Pathway Analysis for DLS, Maryland Scholars Report for MBRT, LACES reporting, CTE and Special Education Reporting, and Data Requests

Reporting - Other Output
- Teacher Dashboards
- Nursing Dashboards
- Apprenticeship – Preliminary Analysis
- Bachelor's Degree
- Associate's Degrees – Transfer vs. Career Degree
- High School to College Series – include wages, some and still college analysis, in-state/out-of-state/online, and four-year, community college and state aided

Ongoing Research Projects

Relationships Between Teachers, School Staff, and Student Outcomes - The AERA Research Grant program, with funding from the National Science Foundation, is funding a research project to examine the relationship between teachers and school-based staff, and student outcomes. The project was proposed by and is being implemented by the Research Branch of the MLDSC. The principal investigator is MLDSC staff member, Dr. David Blazar, a faculty member at the University of Maryland College Park, College of Education. The project began in July 2019 and runs through June 2021. The central purpose of the research project is to identify the characteristics of teachers and school-based staff that most benefits student outcomes and provide guidance on decisions related to hiring and retention of staff in the state. The project builds from the recent "teacher like me" literature to examine specifically whether access to teachers and school-based staff of the same race or ethnicity of students improves short and longer-term

outcomes. Researchers will conduct advanced statistical analyses using data from the MLDS, including workforce data on teachers and school staff, and enrollment and outcome data on students.

The Promise Heights Initiative began in 2009 and aims to improve the educational outcomes of students in West Baltimore (see http://promiseheights.org/ for more information). In 2012, Promise Heights was awarded a U.S. Department of Education Promise Neighborhood planning grant to establish integrated and comprehensive services to support students' success in high school, college, and career. Promise Heights currently partners with five Baltimore City Public Schools, providing community school coordination in each school. The University of Maryland, School of Social Work was awarded a $30 million grant from the United States Department of Education, Office of Innovation and Improvement (Promise Neighborhood Implementation Grant; PI: Bronwyn Mayden). The five-year project includes a partnership with the MLDS Center to examine the high school, juvenile justice, postsecondary, and workforce outcomes associated with program participation. The evaluation team will conduct a rigorous comparison of outcomes between program participants and matched non-participants. The findings will have direct implications for students, schools, and programs that benefit at-risk students in the State.

Institute for Research on Poverty - The overall research objective is to describe and summarize the patterns of academic and workforce participation among Maryland adolescents and young adults. Dr. Mathew Uretsky, Research Team member and Dr. Angela Henneberger, Research Director, are collaborating on the project. The central hypothesis is that there are distinct identifiable patterns of student academic participation and workforce participation during high school that relate to the odds of remaining engaged in school and continuing to participate in the Maryland workforce. This hypothesis is based on the findings from three preliminary studies, which examined student persistence and achievement into, through, and beyond their fourth year of high school.

Research Requests

School Resource Officers - The MLDS Center Research Branch has started assembling a team of researchers to begin work on a research request to examine school resource officers (SROs) and their impact on student suspension and arrest outcomes. The team is in the early stages of reaching out to relevant stakeholders and assessing data in the MLDS that could be used to fulfill this request and data that is not part of the MLDS, but that may be available from partner agencies.

Machine Learning - Members of the Research Branch from University of Maryland, College Park, have been examining machine learning methods at the request of several stakeholders. Dr. Sweet and Ms. Register are researching these methods to determine their applicability to MLDS data and to guide ethical use for future research using MLDS data.

Section 3. Data Determined to be Unnecessary

There were no data elements identified for removal from the System.

Section 4. Proposed or Planned Expansion of Data

4.1 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 Labor, MSDE, MHEC, DJS, and the MLDS Data Governance Advisory Board. The MLDS Data Governance Advisory Board annually reviews the Data Inventory and identifies what data elements to propose for inclusion or remove 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 in the Data Inventory 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]

4.2 Additions to the Data Inventory

Postsecondary: Maryland Approved Program Completer System

The Maryland Higher Education Commission (MHEC) added three new data fields to the 2020 Maryland Approved Program Completer System (MAPCS) data collection. First Name and Last Name were added to aid in the identification of students. The Capstone Location Code captures the county (if in Maryland) or state (if outside of Maryland) where the student completed their state required pedagogy assessment (edTPA, PPAT, PLT) and/or final internship to fulfill requirements for the MAPCS program code being reported.

> 1. Last Name
> 2. First Name
> 3. Capstone Location

Postsecondary: Student Registration System and Course Information System

The MHEC collects data on the courses completed by undergraduate students at Maryland's public institutions of higher education. Course data is transmitted to the MLDSC through two separate collections, but the data should be treated as a single collection. The Student Registration System (SRS) provides unit record data on student-specific course attempts, and the corresponding outcomes of those attempts. Attempts are only reported for students who remain registered in courses beyond an institution's add/drop period. The Course Information System (CIS) supplements the SRS by providing additional course details related to instructor attributes and course modality.

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

Student Registration System

1. Collection Term
2. Collection Year
3. OPEID (FICE +2)
4. Sub-Campus Code
5. Identification Number (SSN)
6. Identification Number Type
7. Local Campus Student ID
8. State Assigned Student Identifier
9. Course Subject

10. Course Number
11. Course Session
12. Section Number
13. Course Hours
14. Course Hours Type Flag
15. Entry-Level Credit Bearing Math
16. Entry-Level Credit Bearing English
17. Course Outcome

Course Information System

1. Collection Term
2. Collection Year
3. OPEID (FICE +2)
4. Sub-Campus Code
5. Course Subject
6. Course Number
7. Section Number
8. Course Session
9. Full-time or Part-time Status Instructor
10. Date of Initial Employment of Instructor

11. Principal Occupational Assignment of Instructor
12. Academic Tenure Status of Instructor
13. Highest Degree Attained by Instructor
14. Appointment Status of Instructor
15. Remedial Math
16. Remedial English
17. Remedial Reading
18. Instruction Type
19. Instructional Location

Adult Education: Apprenticeship

Apprenticeship data comes from the Division of Workforce Development and Adult Learning (DWDAL) in the Department of Labor. Over 40 Apprenticeship data elements were approved at the June MLDS Governing Board meeting. MLDS Center staff became aware of three additional elements DWDAL could provide. These three data elements for inclusion in the Data Inventory are below.

1. Sponsor Name
2. Type of Sponsor
3. Employer ID

Adult Education: Correctional Education

Staff from the Department of Labor's Division of Workforce Development and Adult Learning contacted the MLDS Center about providing correctional education data for grant and reporting needs. The nine data elements for inclusion in the Data Inventory are detailed in the table below.

1. Race/Ethnicity
2. Date of Birth
3. First Name
4. Gender
5. Last Name
6. Middle Name
7. Social Security Number (SSN)
8. Test Component Name (Subject/Module)
9. Certificate/GED Date

Juvenile Delinquency Records

House Bill 704 - *Maryland Longitudinal Data System - Student Data and Governing Board* was passed in the 2019 legislative session and removes the restriction against including juvenile delinquency records as "student data" in the MLDS. The Department of Juvenile Services (DJS) captures administrative data on youth who are involved in the Maryland juvenile justice system. MLDS Center staff are working with DJS staff to identify data elements needed for identity resolution purposes and data elements deemed used for research purposes. The data elements proposed for inclusion in the Data Inventory are listed below.

Identity Data Elements

1. Youth's ASSIST ID	6. Sex
2. First Name	7. Race/Ethnicity
3. Middle Name	8. Social Security Number
4. Last Name	9. Address Type
5. Date of Birth	10. County of Residence

Program Data Elements

1. Generational Suffix	20. Adjudicated Decision Code
2. Region of Residence	21. Disposition Date
3. Region of Jurisdiction	22. Disposition Code
4. County of Jurisdiction	23. Disposition Category
5. Complaint ID	24. Supervision Folder ID
6. ~~Alleged Offense Code~~[10]	25. Supervision Folder Type
7. Alleged Offense Category	26. Supervision Folder Open Date
8. Alleged Offense Date	27. Supervision Folder Close Date
9. Arrest Date	28. Supervision Folder Status
10. Complaint Date	29. Supervision Folder Close Reason Code
11. Complaint Source Type	30. Placement Case ID
12. Complaint Source Agency	31. Placement Admission Date
13. Intake Decision Date	32. Placement Release Date
14. Intake Decision Code	33. Placement Organization ID
15. Petition ID	34. Placement Name[12]
16. Adjudication Date	35. Placement Type Code
17. ~~Adjudicated Offense Code~~[11]	36. Placement Subtype Code
18. Adjudicated Offense Category	37. Placement Admission Reason Code
19. Adjudication Finding Code	38. Placement Release Reason Code

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[10] Alleged Offense Code data element was proposed by DJS, but the Governing Board voted not to include that element in the Data Inventory.

[11] Adjudicated Offense Code data element was proposed by DJS, but the Governing Board voted not to include that element in the Data Inventory.

[12] Placement data includes individual names of group home providers (foster parents). DJS and MLDS have agreed that those individual names will be removed. The data will indicate a provider type, but will not include a name.

Section 5. Recommendations to the Governing Board

1. The Governing Board recognizes the importance of the following two new data collections being implemented by the Maryland Higher Education Commission (MHEC): non-credit data from community colleges and enrollment and degree data from private colleges and private career schools. These data collections will support important research in currently unstudied components of the workforce development pipeline. The Governing Board directs the Center staff to consult with MHEC in the design, development and review of these data collections.

2. The Governing Board directs the MLDS Center staff to explore the feasibility of collecting data on applicants for teacher certification, including applicant demographic information, the type of certification, all subject areas in which the applicant is certified to teach, certification testing completed, highest degree of the applicant, college attended, and prior teaching experience. The feasibility study should determine the available sources of the data, the challenges or barriers to collecting the data, legal constraints, and the cost and resources required to collect the data.

3. The Governing Board directs the MLDS Center staff to explore the education and workforce policy issues related to COVID-19 and the available data at the State and local levels to help address policy concerns with a special lens towards disproportionalities.