MLDS Center
Maryland Longitudinal Data System

Better Data • Informed Choices • Improved Results

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2021 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.

- The Center added 151 new data elements to the Data Inventory, including data from MSDE to improve federal reporting, data from MSDE to expanded early learning and kindergarten readiness assessment data, and a new data collection from the non-credit workforce completer system from MHEC.

- Conducted a five-part *Lunch and Learn Series* for the General Assembly members and staff to provide succinct information on the work of the Center and how that work can provide actionable information to the General Assembly.

- The Research Branch hosted a symposium at the Society for Prevention Research that won a prestigious award from the Society.

- The Center continued to prioritize system security by engaging in a security assessment, penetration test and creating a new Cybersecurity Subcommittee to ensure full transparency and reporting on security issues.

- Established a research partnership with Morgan State University which will increase the Center's research capacity as well as the diversity of experience, backgrounds, and skill sets applied to MLDS Center research.

- The MLDS Center was part of the Maryland Team that was awarded a $2 million Workforce Data Quality Initiative Grant from the U.S. Department of Labor. The project will expand the capacity and utility of the MLDS by integrating additional workforce development data into the system.

- MLDS Center Research Branch members were awarded over $1.5 million in grant funding to pursue research projects using MLDS data. This work will expand research output on important Maryland topics at no cost to the state.

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 2021, the MLDS contained records for 3,752,475 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 12/2/2021
MSDE	2,414,097
MHEC	1,998,596
Labor	1,781,032

Approximately to 637,000 individuals have records that can be linked across all sectors and 1.16 million have records in at least two sectors. The reason there is a high number (1.2 million) of records with no match 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	12th Grade	K12 Only	K12 & College	K12 & Workforce	All Three	Matched Any	Matched All Three
2008	65,039	5,364	6,131	11,230	42,314	92%	65%
2009	61,760	3,083	3,448	11,356	43,873	95%	71%
2010	61,963	2,724	3,145	11,684	44,410	96%	72%
2011	62,334	3,032	3,080	12,389	43,833	95%	70%
2012	60,525	2,432	3,058	11,744	43,291	96%	72%
2013	60,991	2,551	3,074	11,997	43,369	96%	71%
2014	60,483	2,624	3,252	12,163	42,444	96%	70%
2015	61,348	3,003	3,522	13,080	41,743	95%	68%
2016	60,356	2,956	3,928	13,174	40,298	95%	67%
2017	60,553	3,435	4,581	14,204	38,333	94%	63%
2018	61,808	4,143	5,777	14,451	37,437	93%	61%
2019	61,029	5,078	7,744	14,324	33,883	92%	56%
2020	62,618	8,229	10,881	15,194	28,314	87%	45%

C. System Security Audits

Organization Security Assessment

The Maryland Department of Information Technology (DoIT), Office of Security Management (OSM) conducted a Security Assessment on the Center's Data System. The purpose of the assessment was to determine the Center's security maturity level and provide recommendations to identify areas of improvement to mature their overall posture. To do this OSM assessed the data system and personnel using the NIST Cybersecurity Framework (CSF), the Capabilities Maturity Model Integration (CMMI) and the DoIT Information Technology Security Manual version 1.2. DoIT's assessment concluded:

> *MLDSC exhibits a high degree of understanding of the importance of both the information they are tasked with protecting and the system that contains it. A Governing Board and a newly created Cybersecurity subcommittee are in place to provide the strategic planning, risk management and performance management all effective organizations need.*
>
> *These strengths will serve them well in addressing underlying weaknesses which revolve around the formalizing of processes; updating documentation to include testing and training of procedures; categorizing the system (as per FIPS-199) and implementing a Continuous Monitoring process (a process that requires a review of a select number of security controls on a regular basis).*

[1] The match rate is an average of all years (2008 -2020). 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.

Overall, the organization has a solid foundation from which to build upon and by implementing the recommendations from the report, will be on the road to a more mature security posture from an information security perspective.

NIST Cybersecurity Framework - The CSF uses industry best practices and standards to help organizations better manage cybersecurity risk by organizing information, enabling risk management decisions, addressing threats, and learning from previous activities. It consists of five (5) Functions each with specific categories. Each category has several sub-categories that outline the activities that an organization must do to meet the requirements of the category.

Identify	Protect	Detect	Respond	Recover
Asset Management	Identity Management & Access Control	Anomalies and Events	Response Planning	Recovery Planning
Business Environment	Awareness and Training	Security Continuous Monitoring	Communications	Improvements
Governance	Data Security	Detection Processes	Analysis	Communications
Risk Assessment	Information Protection Processes and Procedures		Mitigation	
Risk Management Strategy	Maintenance		Improvements	
Supply Chain Risk Management	Protective Technology			

The assessment resulted in a useful tool to guide the Center in making improvements towards increasing its security maturity. Action items have been developed and are being carried out.

Penetration Test

The other component of the DoIT Security Assessment was a penetration test. A penetration test is a security exercise where a cybersecurity expert attempts to find and exploit vulnerabilities in a computer system for the purpose of identifying security weaknesses in a systems' defenses. The test was carried out by CDT, a contractor hired by DoIT. The contractor concluded that the overall security posture of the MLDSC site appears strong. They could not gain access to the web application or user data and authentication was not able to be bypassed on any login pages. The test did recommended corrective actions which the Center has already implemented.

D. Cybersecurity Subcommittee

In March 2021, the Governing Board amended their bylaws to establish a Cybersecurity Subcommittee and designate the following membership for the subcommittee.

1. MLDSC – Chief Information Officer (Chair)
2. MLDS Center Executive Director
3. CIO or designee of MSDE
4. CIO or designee of MHEC
5. CIO or designee of Labor
6. CIO or designee of DJS
7. CIO or Designee of USM
8. CIO or Designee of MICUA
9. CIO or Designee of MACC
10. CISSO of the agencies listed above;
11. The member of the Governing Board designated to serve pursuant to Ed. Art., § 24-704(c)
12. Additional members of the Governing Board appointed by the Chairman
13. The State Chief Information Security Officer and Deputy Information Security Officer at DoIT

The purpose of the subcommittee is to ensure ongoing transparency and accountability to the MLDS Governing Board and the Center's data sharing partners. This is necessary for each group to fulfill their respective duties. Specifically, the MLDS Governing Board is generally responsible for oversight of system security and data privacy (see Ed. Art. §24-704). For the data sharing partners, each data sharing agreement with the MLDS Center authorizes the partner agency to audit or otherwise monitor or inspect the data compliance and security policies, procedures and systems of the MLDS Center to ensure compliance with State and federal laws. Accordingly, the Cybersecurity Subcommittee will receive in-depth information from the Center staff on MLDS cybersecurity initiatives, data privacy practices, and system infrastructure.

E. Data Center Hosting

The MLDS Center's data system is currently located in the Nancy S. Grasmick State Education Building (200 West Baltimore Street, Baltimore, MD) in the MSDE data center. The system is made up of four servers that were procured in 2010. The system hardware, networking, and security services are maintained at the MSDE data center by DoIT. The servers are no longer supported by Dell and are out of warranty. The Center has experienced inconsistent performance from the system resulting in work stoppage due to server failures. As a result the Center is in the process of upgrading to new servers within the next year.

The Center analyzed a variety of approaches to upgrade its data center. In FY 19 the Center engaged a system architecture consultant to study the Center's business, performance and security needs looking for a recommendation for the most suitable data center solution that would meet the Center's requirements. The consultant recommended that the Center procure new equipment and host the equipment in the DoIT enterprise data center, which is the approach the Center is currently implementing. To date, software and servers have been procured and the system move will be implemented in early spring. This move will accomplish the Center's goals to: (a) improve the security posture of the server hosting environment; (b) enable easier scalability of the environment with power,

rack and cooling of the environment; (c) stabilize the hosting platform with equipment that is under support; and (d) improve storage capacity.

1.2 Activities of the Center

A. Stakeholder Engagement

(1) General Assembly

The Center presented a series of "*Lunch and Learn*" opportunities for legislators and staff. The presentations took place on five consecutive Wednesdays in October and November. The goal of the series was to provide succinct information on the work of the Center and how that work can provide actionable information to the General Assembly as it grapples with important education policy questions. The five sessions, described below, were all recorded and can be accessed on the Center's website.[2]

1. *MLDS 101* - This first session provided an overview of the organization, placement and governance of the MLDS, a review of available data in the MLDS, and an understanding of how data are used and secured. The session also provided examples of how the MLDS has been used to inform policy and decision making.
2. *Graduates Five Years Later* - The Career Preparation and Expansion Act requires the MLDS Center to annually produce a report that analyzes the outcomes of high school graduates five years after high school completion. Since that time, the MLDS Center has conducted similar analyses of Associate's Degree Graduates, GED/NEDP Completers, Apprenticeship Program Completers, and Bachelor's Degree Graduates. This session reviewed the findings of these reports and discussed policy implications.
3. *Teachers* - The MLDS Center is involved in research and reporting on various aspects of teachers, including analyzing the pipeline from college to employment, out-of-school employment trends among teachers, and various reporting on teacher placement, employment and attrition. This session focused on the findings from these various research and reporting outputs.
4. *Research Round-up* - The MLDS Research Branch provided a survey of several research reports and analyses conducted using Center data. The researchers presented their work and explained the findings, the implications for policymakers, and how the MLDS data allowed them to undertake novel analyses.
5. *Series Wrap-Up* - The final session provided an overview of how other key stakeholders have used the MLDS to support their research and analytic needs. The session also provided an overview of new data sources being added to the MLDS and how those data provide important avenues for research and analysis.

The Center also completed its two annual data requests for the Department of Legislative Services (DLS). The first request, Maryland High School Pathway, is used by DLS to prepare the annual Higher

[2] Mldscenter.maryland.gov/presentations.html – select *General Assembly Lunch and Learn Series*

Education Overview for the legislative session. The second request provides DLS with data on dual enrollment course-taking and credit accumulation

(2) Governor's Workforce Development Board

At the request of the Governor's Workforce Development Board (GWDB), the Center presented highlights from the Career Preparation Expansion Act Report (CPEA) at GWDB's January 20th meeting of Local Workforce Chairs and Vice-Chairs. The presentation provided highlights from the report with a focus on outcomes by race, ethnicity, and gender. The presentation also included highlights from the new CPEA supplement on the manufacturing sector.

(3) Maryland Department of Labor

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 accomplish this, the Center matches students in a WIOA program with UI Wage data in the MLDS to obtain the students' post program employment information.

(4) Maryland Higher Education Commission

The Center fulfilled data requests for the Maryland Higher Education Commission (MHEC) needed for the development of the *2021-2025 Maryland State Plan for Postsecondary Education*. Data tables on outcomes for Bachelor's degree graduates, high school graduates in career and technical education programs, and apprenticeship programs were provided to MHEC.

The Center also provided data tables needed by MHEC to produce its final Student Outcome and Achievement Report (SOAR). SOAR reports on outcomes of Maryland public high school graduates. MHEC will no longer produce SOAR as the MLDS Center is better positioned to report on postsecondary outcomes of Maryland public high school graduates.

(5) Maryland State Department of Education

The Center provided requested data to the State Department of Education (MSDE) needed to complete federal reporting requirements. The first report is the Strengthening Career and Technical Education for the 21st Century Act (Perkins V) of 2018, required the U.S. Department of Education, Office of Career, Technical, and Adult Education. The data provided includes the placement outcomes of secondary and postsecondary career and technical education students two quarters following their exit from the program. The second report is a requirement of the federal Individuals with Disabilities Education Act (IDEA). The data provided includes education and workforce placement outcomes of secondary special education students for the year following their exit from secondary education. Both these data collections were formally added to the 2021-2022 Collection Calendar.

The Center also provided data and system access to MSDE research partners at the Maryland Assessment Research Center (MARC) at the University of Maryland, College of Education. MARC is conducting an

analysis for MSDE on mapping Advanced Placement scores to College success, which is defined in terms of the first-year college GPA.

Dr. Jane Lincove from the Research Branch presented her research on the effects of the bridge program on student outcomes to staff at the Maryland State Department of Education, including subject area experts who oversee the four exit exams and Bridge assessments

(6) Community Colleges

All public colleges and universities submit a Performance Accountability Report (PAR) to the Maryland Higher Education Commission annually. Community colleges collaborate to establish common reporting metrics for all sixteen institutions. The Center took part in a community college workgroup meeting on February 10, 2021 that focused on developing new measures for the PAR. The workgroup settled on two measures related to employment outcomes for Certificate and Associate's graduates and worked with the Center to write specifications for a data report on those measures. The PAR has been submitted annually for twenty-four years, this will be the first year it includes MLDS data.

(7) Teaching Colleges

The Center was asked to produce a series of data tables to support institutional reporting on teacher education graduates to the Council for the Accreditation of Educator Preparation (CAEP). Twenty-two higher education institutions are required to report on graduate outcomes each year to CAEP. The CAEP report is required each April; however, some of the data required to fulfill the CAEP report are not available until August. Accordingly, the Center produced a preliminary set of data tables using available data and re-ran the request in September to produce final tables. In addition, the Center also provided data tables to the same institutions to assist them in submitting the Traditional Program Annual Report (TPAR) to MSDE.

(8) Maryland Center for Computing Education

One important, but poorly understood part of the computing education to career pipeline is the role of industry certifications. To address that gap, the Maryland Center for Computing Education (MCCE) has been leading an effort to establish agreements with industry certifiers to provide their data to the Center. Meetings have taken place with Microsoft and its testing service Certiport to review available data and discuss a data sharing agreement that would provide the Center with certification testing results of Maryland students. MCCE has also identified other IT industry certifiers with which to establish data sharing agreements and is seeking grant funding to support this work.

C. Data Requests

Below is a brief synopsis of data requests the Center received this year that were fulfilled. The number is less than prior years. This may be the result of the fact that more data are available on the Center's website in the form of dashboards and reports. There were fourteen requests that could not be

fulfilled. Generally data requests are denied if the requester is seeking individual student data, data not included in the MLDS, or non-longitudinal data.[3]

1. *Wor-Wic Community College,* request for high school graduates who enroll in public colleges within 16 months following graduation. STATUS – completed.
2. *UMCP College of Education* – request for outcomes of graduates who completed programs and accepted a teaching position. STATUS – completed.
3. *EdStrategy.org – request for data CTE concentrators, including technical skills attainment and completion of high school, postsecondary skills attainment, credentials and degrees, and workforce outcomes.* STATUS – completed.
4. *Anne Arundel County Community College, School of Health Science* – request for employment and salary data of graduates of students in the School of Health Science programs. STATUS – completed.
5. *Morgan State University* – request for data on the workforce outcomes of Morgan graduates in the second quarter after graduation. STATUS – completed.
6. *Salisbury University* – request for data on the workforce outcomes of graduates from the teaching program (specifically whether they are engaged in teaching) – STATUS – completed.
7. *Anne Arundel County Community College* – request for an update to a prior request to include disaggregation by race, ethnicity and gender. STATUS – completed.
8. *Morgan State University* – request for data on full-time undergraduates who are concurrently engaged in the Maryland workforce. STATUS – completed.
9. *University of Maryland, School of Social Work,* requested workforce outcomes for three groups of graduates from the School of Social Work: UMBC Bachelor's Recipients, UMB Master's in Social Work recipients, and UMB Master's in Social Work and a Master's in Public Health. STATUS – completed.
10. *Frederick and Anne Arundel Community Colleges* – requested data on student outcomes in support of their applications for the 2023 Aspen Prize for Community College Excellence. STATUS – completed.
11. *Central Baltimore Partnership (CBP)* – request for data on the rates of graduation, absenteeism, and employment in schools in central Baltimore. STATUS – under review.

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. Jessaca Spybrook, Professor of Evaluation, Measurement and Research, Western Michigan University – Best Practices for Modeling the Multilevel STEM Learning Environment.*

[3] COMAR 14.36.04.07 requires the Center to deny a request for a non-longitudinal data set. A data set is non-longitudinal if it contains data provided by a single State agency. A non-longitudinal data set must be referred to the appropriate agency.

The STEM learning environment is complex and multilevel in nature. That is, students are nested within teachers, teachers are nested within schools, and schools are nested within local school systems. It is important to understand the role of students, teachers, schools, and local school systems as they relate to math and science student achievement. Past research has largely ignored the teacher level therefore potentially incorrectly attributing variance in STEM student achievement at the teacher level to the school or student level. The proposed study seeks to directly model the teacher level by using MLDS data, which links students, teachers, and schools, in order to estimate:

- What portion of the variance in math and science student achievement (e.g., test scores) is at the student, teacher, school, and local school system level,
- What portion of the variance in whether or not a student enrolls in remedial coursework in math is at the student, teacher, school, and local school system level, and
- How much of the variance at each level can be explained by student, teacher, school, and local school system characteristics.

This is a methodological study. However, Dr. Spybrook plans to use the statistical models developed through this research to further analyze a prior Research Branch report on *Remedial Coursework in Maryland Community Colleges: Disentangling Individual and High School Level Predictors*. Working closely with the Research Branch and other stakeholders, Dr. Spybrook will build on this research in several key ways. First, adding the teacher level will allow for an examination of whether incorporating the teacher level into statistical models improves those models. Further, it will provide a better understanding of the ways that teacher characteristics contribute to the need for remedial coursework. Second, adding the local school system level will provide a better understanding of how the demographic characteristics of the local school systems are related to the need for remedial coursework. Third, examining STEM outcomes across students, teachers, schools, and local school systems and characteristics that explain variability in outcomes in the K-12 context will contribute to a greater understanding of the STEM educational landscape leading up to college. Dr. Spybrook applied for and received a National Science Foundation grant for $1,328,108 to complete this project.

2. *Ms. Miriam Wiglesworth, Associate Professor, Harford Community College – The Impact of Dual Enrollment on Maryland Colleges*

   Using data from the MLDS, this research project plans to analyze the number of Maryland high school students who pass dual enrollment classes during the 12th grade year. This information will be disaggregated by gender, race, ethnicity, economic status and county. The research will also explore the number of students who matriculate to Maryland institutions after high school. This information will be subdivided by the type of institution the student attends after high school graduation to include MD two-year colleges, MD four-year colleges, and out-of-state four-year colleges.

3. *Dr. Ting Zhang, Associate Professor, Department of Accounting, Finance, and Economics, University of Baltimore and Associate Director Jacob France Institute – The Role of Digital Literacy Depth and Breadth in Relation to Workforce Outcomes in Maryland*

In Maryland public schools, computing education was declared as a priority by the Governor in 2017 and introduced into legislation (HB281), signed by the Governor on May 8, 2018 (MSDE, 2018). Effective on June 1, 2018, the new legislation requires county boards to require public high schools to offer at least one high-quality computer science course beginning in the 2021-2022 school year and establishes the Maryland Center for Computing Education to identify ways to expand access to high-quality computer science education, strengthen the skills of educators, and increase the number of computer science teachers (Maryland General Assembly, 2018). Subsequently, with rising popularity and a policy push, prior MCCE research shows that in 2018, 89% of high schools and 23% of high school graduates had computing courses, and most were admitted thereafter full-time in colleges (Garvin and Koerner, 2021). The current study builds on the prior MCCE examination of computing courses by further examining the depth and breadth of coursework and linking to future workforce outcomes in Maryland.

4. *Dr. Megean Garvin, Director of Research and Assessment, Maryland Center for Computing Education, University of Maryland, Baltimore County – Computing Education and Certification Outcomes in Maryland*

   This project seeks to increase the ability of the Center and Maryland Center for Computing Education to examine computing industry certificates and their impact on education and workforce outcomes. The computing industry certificate data is a critical missing component in understanding how industry credential achievement impacts various aspects of workforce outcomes. Including this data will enable Maryland to be the first state to examine these outcomes longitudinally. A key component of this project is to obtain data on individuals who have received computing industry certificates as authorized by the *Career Preparation and Expansion Act*. The goal is to identify industry certifiers, establish agreements for the collection of Maryland student-level certificate data, and then integrate the computing industry certificate data into the MLDS. Examples of industry certifiers include Microsoft/Certiport (with which an agreement has already been established), CompTIA, and Oracle. The grant will fund additional staffing at MLDS to speed up the planning and implementation of these new data from industry partners. The new data will be used to develop research and analysis, such as general inquiries into developing a better understanding of when students achieve industry certificates, what additional education precedes the certificate attainment, and how the certificate impacts education and workforce outcomes, including time to first job and wages. Grant funding is being sought to support this project.

Grant Awards - Several prior year projects that sought grant funding received notice of awards.

1. Research Branch Member Dr. David Blazar's project *Examining Recruitment Programs and Pathways to Diversify the Teacher Workforce* was awarded $577,000 from the Institute of Education Sciences, U.S. Department of Education.
2. Research Branch Member Dr. Blazar's project on *Education and Experience: Do teacher qualifications in career-focused STEM courses make a difference?* was awarded $450,000 by the National Science Foundation.
3. Research Branch Director Dr. Angela Henneberger's project on Longer-Term Effects of Positive Behavioral Interventions and Supports was awarded $35,000 by the AERA/NSF.

4. External Researchers Dr. Rachel Durham and Dr. Marc Stein's project on Postsecondary and Labor Market Effects of Career and Technical Education in Baltimore City Public Schools was awarded $500,000 from the Institute of Education Sciences, U.S. Department of Education.

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.[4]

1. *The Expanding Presence of Law Enforcement in Florida Schools (February)*

   The presence of law enforcement in public schools has been a common security practice in the state of Florida for several decades. Following the tragic 2018 school shooting in Parkland, FL, the state passed a law requiring all public schools to either have law enforcement or other armed personnel present. Dr. Chris Curran, Director of the Education Policy Research Center at the University of Florida, presented his research examining the relationship between law enforcement in schools and a number of outcomes including reports of behavioral incidents to the state, incidents reported to law enforcement, school arrests, and exclusionary discipline. This analysis used statistical techniques that controlled for both observable characteristics of districts and schools as well as unobserved characteristics that were fixed over time. Findings suggest that the 2018 Marjory Stoneman Douglas High School Public Safety Act significantly increased the presence of law enforcement in schools, particularly in elementary schools. The presence of law enforcement in schools was related to increases in the number of behavioral incidents reported to the state, the number of such incidents reported to law enforcement, and student arrests. The results suggest a need to reconsider whether law enforcement should be present in schools, and, if they are, how they can be implemented in a way that minimizes unnecessary exposure of students to law enforcement and arrests. (Note: This project did not use MLDS data, but can inform future MLDS research.)

2. *A Bridge to Graduation: Post-Secondary Outcomes for Students Who Fail Maryland's High School Exit Exams (March)*

   Dr. Jane Arnold Lincove (MLDS Research Branch and UMBC), Ms. Catherine Mata (MLDS Center Graduate Research Assistant and UMBC), and Dr. Kalena Cortes (Texas A&M University) presented their research on the effects of Maryland's alternative graduation policy known as Bridge. While exit exams are meant to improve and standardize the quality of public high schools and to ensure that students graduate with a set of basic skills and knowledge, evidence suggests that a common negative effect of exams is increased dropout of students who have difficulty passing tests, with a disproportionately large effect on students of color. To mitigate this, while also maintaining a high standard for high school achievement, several states have implemented alternative pathways to graduation where students can show evidence of achievement through measures other than a test. At the request of the Maryland State Department of Education, this study investigated the effects of Maryland's alternative graduation policy known as Bridge. The Bridge program allows students who have failed an exit after two or more attempts to graduate through district-supervised projects, portfolios, and other evidence of mastery of the curricula. Depending on the rigor of requirements, these students might graduate with equivalent human capital to students who pass exams, or they

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

might lack skills and knowledge needed for future success. This study used data from the MLDS to estimate college and workforce outcomes for four high school cohorts that were required to take exit exams in algebra, biology, and English. Those who failed twice could opt to retest or to pass via Bridge. Because those who are eligible for Bridge are likely at an academic disadvantage in other ways, the analysis used fixed effects and propensity score matching to compare similar students. A discussion will focus on implications for policy and practice in Maryland.

3. *Professional Staff Diversity and Student Outcomes: Extending Our Understanding of Race/Ethnicity-Matching in Education (April)*

   A large body of research shows that access to same-race/ethnicity teachers have substantively meaningful impacts on students' test score performance, suspensions and expulsions, absences, and longer-run outcomes in college. Theory suggests that a primary lever for these effects is role modeling, meaning that students of color benefit from seeing individuals like them in positions of power, particularly those who exemplify academic success. If role modeling is a main mechanism through which effects of same-race/ethnicity teachers occur, then similar effects should be seen from other role models in the school, including administrators, nurses and health professionals, guidance counselors, and other teachers that students do not work with directly. Dr. David Blazar (MLDS Research Branch and UMCP) and Francisco Lagos (MLDS Graduate Research Assistant and UMCP) presented their research on this hypothesis using linked, longitudinal data from the Maryland Longitudinal Data System. To account for non-random sorting of students to schools and to teachers, we specify models that include student, school, year, and principal fixed effects. The findings from this study show benefits of access to same-race/ethnicity teachers and professional staff to student outcomes, and results differ by student race/ethnicity. Overall, the findings provide justification for the role modeling hypothesis, and point to a need to hire and support diverse school-based staff, not just amongst teachers, but also amongst professionals who contribute to student success.

4. *The Value of a Higher ACT Exam Score (June)*

   Dr. Nolan Pope (MLDS Research Branch and UMCP) presented his research that used discontinuities in ACT exam scores to identify the causal effect of being rounded up to a higher score. Using data for over 3 million test takers, the study estimated that "randomly" receiving one extra point on the ACT leads to a 1.17 percentage point increase in the probability of attending a 4-year college. These results have implications for understanding the importance of entrance exams in the admissions process, the value of test preparation and retaking, and the inequities that can be created by unequal access to test prep resources.

5. *The Effect of a Dual Enrollment Tuition Subsidy for Students Eligible for Free/Reduced Price Meals: Evidence from CCR-CCA in Maryland (October)*

   The College and Career Readiness and College Completion Act (CCR-CCA) of 2013 (Chapter 533, Senate Bill 740, 2013) passed the Maryland General Assembly in 2013 with the goal of improving college and career outcomes for Maryland students. One policy included in the legislation was a tuition cost reduction for select high school students who dually enroll in college courses. Dr. Angela Henneberger, Principal Investigator and Research Branch Director, presented the findings of a study that used data from the Maryland Longitudinal Data System (MLDS) to examine the effect of the cost reduction in tuition for dual enrollment on dual enrollment uptake. The study had a particular

focus on low-income students who were eligible for free/reduced-price meals (FARMS), as these students are under-represented in the dual enrollment population in Maryland. A difference-in-differences (DD) approach was used and, overall, dual enrollment increased over this period for all subgroups of students. Among students who were likely eligible for dual enrollment (i.e., students who graduated with a 3.0 or higher GPA), FARMS-eligible students, who saw larger tuition decreases after CCR-CCA, had larger increases in the rates of any dual enrollment (11th or 12th grades) and dual enrollment in 11th grade. Policy implications and directions for future research were discussed.

6. *Expanding the Understanding of High School Non-Graduates Through a Comparison of High School Dropouts and Persisters in Maryland (November)*
   Most research and policy efforts related to high school non-graduates are focused on preventing or recovering dropouts, but recent studies have identified a second group of non-graduates—persisters—who continue their enrollment into and through their fourth year of high school without earning a diploma. Dr. Uretsky (Research Branch at Portland State University) and Dr. Henneberger presented their study, which used MLDS data, to examine the differences in demographic and academic characteristics between persisters and dropouts. Postsecondary and workforce outcomes were also compared.

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[5] to provide information about presentations and copies of the presentation slides and handouts.

1. *Advance CTE 2021 Spring Meeting* – Ms. Molly Abend, Data Governance Coordinator for the Center was invited to lead a session during the Advance CTE 2021 Spring Meeting on policies and practices around data collection and usage. She was joined by Dr. Nicassia Belton from MSDE. The session focused on Data-Driven Decision Making and offered suggested practices for strengthening data systems, improving public reporting, and building capacity for data-driven decision making at the state and local level.
2. *Society for Prevention Research* - Dr. Henneberger organized a symposium for the Society for Prevention Research (SPR) on Innovations with Administrative Data Linkage. This project is an extension of the MLDS synthetic data project, and the symposium won the abstract of distinction award from the Society. Drs. Mike Woolley, Bess Rose, and Laura Stapleton are co-authors on one of the presentations in the symposium.
3. *Stats DC* – MLDS Center Research Branch gave two presentations at Stats DC, a national conference hosted by the National Center for Education Statistics in the U.S. Department of Education. The first presentation was on *Building a Bridge to Graduation,* which reviewed the results and policy implications for the joint research between the MLDS Center and MSDE. The second presentation was entitled, *Handling Student Mobility in Educational Research*, which provided rates of mobility and statistical applications for handling mobility in statewide data.

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

4. *SLDS Best Practices* – MLDS Center Research Branch gave two presentations at the SLDS Best practices conference in November. The first presentation was on Identifying Persisting Students as a Unique Group of Non-Graduates in Maryland. The second presentation was on Handling Student Mobility in State Longitudinal Data Systems: Applications from Maryland.
5. *Society for Research on Educational Effectiveness* - Dr. Jane Lincove presented research on the effects of the high school bridge program in Maryland on college and career outcomes at the Society for Research on Educational Effectiveness (SREE) annual conference. SREE is dedicated to advancing research relevant to practice, from early childhood through post-secondary education. The session focused on alternative preparations for high school graduation and college access.
6. *Association for Education Finance and Policy* - Research branch members presented at the annual meeting of the Association for Education Finance and Policy (AEFP), an organization devoted to examining educational finance and policy issues. MLDS research branch staff members led two presentations. The first was on K-12 staff and student demographic matches and student outcomes in Maryland. The second was on the effects of completing high school via the bridge in Maryland.
7. *D.C. Policy Center* - Dr. Henneberger was invited to join a panel on Measuring Early Career Outcomes in D.C. The panel focused on leveraging administrative data to examine career outcomes. The panel was hosted by the D.C. Policy Center.

F. Census Data Workgroup

Pursuant to Education Article §24–703.3, Annotated Code of Maryland, the MLDS Center is required to develop a protocol for geocoding K-12 student data. Geolocation data on students will allow the Center to associate each student within a Census block and tract and utilize detailed demographic information about the Census block and tract contained in the American Community Survey produced by the U.S. Census Bureau. This will provide policymakers with more in-depth information on students' socioeconomic status. The MLDS Center is required to develop a protocol for county boards to convert a student's home address and geolocation information into Census tract and block numbers.

The MLDS Center, in collaboration with the MSDE, convened the Census Tract and Block Data Workgroup to fulfill the requirements of the law in August 2020. The Workgroup consisted of staff from four local school systems: Anne Arundel County Public Schools, Baltimore City Public Schools, Caroline County Public Schools, and Frederick County Schools. The local school system staff provided expertise in the collection and maintenance of student data.

Workgroup members provided feedback on a draft protocol, tested the MLDS Center's utility, and conducted an accelerated pilot to provide data to the MSDE to meet reporting requirements under the Blueprint for Maryland's Future. Workgroup members also heard from the Texas Education Agency on their experience establishing geolocation data protocols.

The Workgroup met five times during the 2021 calendar year in January, March, May, August, and October. The Workgroup will conclude their work in 2022. The MLDS Center will continue to collaborate with the MSDE in the development of a statewide data collection of student geolocation information to begin in SY 2022-2023. This data will provide Maryland with an alternative and new way to measure students' socioeconomic status.

G. Workforce Data Quality Initiative Grant

The Maryland Department of Labor, Division of Workforce Development and Adult Education submitted a proposal for a Workforce Data Quality Initiative Grant. The proposal was developed in collaboration with the MLDS Center and MHEC. The grant was awarded for approximately two million dollars over a period of three years. The scope of the project is to expand the capacity and utility of the MLDS by integrating additional workforce development data into the system, including Enrollment and performance data from:

1. Workforce Innovation and Opportunity Act (WIOA) Title I: Adult, Dislocated Worker, and Youth;
2. WIOA Title III: Employment Services; and
3. MHEC's community college non-credit training programs.

Incorporating this additional workforce and non-credit education data will allow MLDS to review Maryland's comprehensive workforce system, leading to a more meaningful and in-depth analysis of the successes and challenges facing Maryland job seekers and businesses. Specifically, it will provide the capacity to house workforce and education data, as well as community college non-credit occupational training data, within the same database. Richer data will provide policymakers with a deeper understanding of the relationship between higher education and workforce development, as well as better information regarding employment outcomes tied to community college training completers. Project research efforts will focus on the inclusion of underserved and target populations within Maryland's workforce system. (Maryland Department of Labor will partner with Salisbury University as the research entity for this initiative). The project will accomplish the following:

1. Connect the workforce, unemployment, and education data contained in the MLDS;
2. Improve the quality and breadth of the data in the MLDS, including standardization of MHEC's non-credit data;
3. Use longitudinal data to assess the performance of Maryland's education and job training programs;
4. Provide user-friendly information and data on how the Maryland workforce system is collectively serving customers through the lens of the *Benchmarks of Success*; and
5. Integrate performance systems with the longitudinal administrative database.

H. Micro Internships

The MLDS Center is hosting two Goucher College virtual interns through the Micro-Internship Program. One student will draft recommendations on creating a Twitter account for the MLDS Center and another student will conduct comprehensive user experience testing of the MLDS Center website. These internships provide students an opportunity to gain work experience in fields of interest, demonstrate their current skills, and explore career options. The Center does not pay the students, but they will receive compensation from Goucher College upon completion of their projects at the end of January 2022.

I. Interstate Collaborations

Staff from the MLDS Center, MSDE, Labor, and MHEC attended a conference on *Connecting Education and Workforce Data: A Southern Regional Perspective.* The convening was organized by National

Association of State Workforce Agencies, the Coleridge Initiative, KYStats, and East Tennessee State University. The focus of the convening was to engage state teams in a conversation about the cross-agency and cross-state opportunities to develop high quality education and workforce data products. The convening addressed key questions such as: (1) What are the main educational and workflows of interest for policy-makers? (2) What data are available? (3) What kind of metrics would be of greatest use to stakeholders? The longer term goal is to identify common tools like a Multi-State Postsecondary Report and training programs that can be developed and reused across the South.

Another interstate collaboration opportunity was provided by the Coleridge Initiative, which conducted a data analytics training program. The Coleridge Initiative is a non-profit organization that provides training to support evidence-based policymaking and fosters collaboration in data sharing and reporting metrics across state lines. The five month training program was attended by the Center's director of Reporting Services, Dr. Ann Kellogg. The program was at no cost to the Center and covered coding (R and SQL), data visualization techniques, and techniques in analyzing big data. Dr. Kellogg worked as part of a small team with representatives from Louisiana, Tennessee and Texas to use education and workforce data from Tennessee to study a policy problem relevant to the State of Tennessee. The training class culminated in a final presentation and report provided to the Tennessee Board of Regents.

J. Morgan State University

This year the MLDS Center established a research partnership with Morgan State University. Through this collaboration, the Center will increase its research capacity as well as the diversity of experience, backgrounds, and skill sets applied to MLDS Center research, complementing the existing team. The advantages to Morgan State include access to the data system for research conducted by faculty, staff, and graduate students. The plan is to fully integrate researchers primarily from the School of Education and Urban Studies into the Research Branch. Research projects would receive full collaboration and support from the Center and the Research Branch. Morgan State researchers will also be available to provide their expertise on new and ongoing initiatives of the Center.

K. Recognition for the Center

The Maryland Department of Labor profiled the work of MLDS Center in its *Benchmarks of Success Issue 22, January 2021*. The newsletter highlighted the Career Preparation Expansion Act Report produced by the MLDS Center in conjunction with the Governor's Workforce Development Board (GWDB) each December.

The MLDS Center was selected to contribute to an SLDS Issue Brief, a publication of the Institute of Education Science, U.S. Department of Education. The brief highlighted three states, including Maryland, with mature processes for evaluating matching systems as well as how errors are detected and diagnosed.

Section 2. List of all studies performed by the Center

2.1 Research Reports

Research Branch[6]

The Effect of a Dual Enrollment Tuition Subsidy for Students Eligible for Free/Reduced Price Meals: Evidence from the CCR-CCA in Maryland

The College and Career Readiness and College Completion Act (CCR-CCA) of 2013 (Chapter 533, Senate Bill 740, 2013) passed the Maryland General Assembly in 2013 with the goal of improving college and career outcomes for Maryland students. One policy included in the legislation was a tuition cost reduction for select high school students who dually enroll in college courses. This study used data from the Maryland Longitudinal Data System (MLDS) to examine the effect of the cost reduction in tuition for dual enrollment on dual enrollment uptake, with a particular focus on low-income students who were eligible for free/reduced price meals (FARMS), as these students are under-represented in the dual enrollment population in Maryland. A difference-in-differences (DD) approach was used and, overall, dual enrollment increased over this period for all subgroups of students. Among students who were likely eligible for dual enrollment (i.e., students who graduated with a 3.0 or higher GPA), FARMS-eligible students, who saw larger tuition decreases after CCR-CCA, had larger increases in the rates of any dual enrollment (11th or 12th grades) and dual enrollment in 11th grade. Policy implications and directions for future research are discussed.

Distinguishing the Roles of Poverty and Homelessness in Long-Term Academic and Workforce Outcomes

The purpose of this study was to examine the role of homelessness above and beyond the role of poverty alone in contributing to academic and workforce outcomes. Linked longitudinal data from the Maryland Longitudinal Data System (MLDS) and multiple membership multilevel models (Chung & Beretvas, 2012) were used to help disentangle student and school factors to determine the relevant importance of each across a number of outcomes, including high school dropout and graduation, standardized test scores, college enrollment, and annual workforce wages. Academic outcomes for students experiencing homelessness were significantly worse than those for similar, stably housed students experiencing only poverty. Workforce outcomes in terms of total wages earned in the first year after on-time high school graduation were no different for students who had experienced homelessness compared to those who experienced poverty without homelessness. The current study expanded on prior research by distinguishing the roles of poverty and homelessness in relation to longer-term academic and career outcomes. This report also includes policy implications and directions for future research.

[6] Reports can be found at https://mldscenter.maryland.gov/ResearchReports.html.

Maryland Public School Teachers Working Secondary Jobs: Predicting Wages and Attrition from the Teaching Profession

This report used data from the Maryland Longitudinal Data System (MLDS) to better understand the characteristics of public school teachers prepared for the teaching profession in Maryland, their employment patterns, and the relationship between their employment patterns and attrition from teaching. This analysis offers a first step in identifying the types of teachers and the employment characteristics associated with attrition from teaching, so that initial levers for policy, prevention, and intervention can be identified to ultimately retain teachers in the profession and mitigate attrition.

External Researcher

Participation in Computing Education Courses and Post-Graduation Outcomes of Maryland Public High School Students

Each Year, Maryland has an average of 20,000 computing job openings, which is projected to increase over the next five years. While the number of college graduates with computer science (CS) related degrees has increased steadily, with approximately 2,500 graduate degrees, 4,800 bachelor's degrees, and 1,700 lower level awards conferred in 2018-2019, these numbers still fall short of the projected workforce needs. Efforts to strategically increase diversity at each education level has the potential to increase the number of students who pursue computing careers. These dashboards explore the changes in computing course enrollment by Maryland public high school students and their initial college enrollment, highlighting student declaration of a computer science or a computing related major in college. Data is presented at the state and local school system level with further disaggregation by student group as well as summary information at the school level. These dashboards were created as a special project of the Maryland Center for Computing Education (MCCE) with the use of data from the Maryland Longitudinal Data System Center.

2.2 Dashboards and Interactive Reports[7]

Financial Aid Dashboards

The existing financial aid dashboards which report on college enrollment, retention and degree attainment were expanded to include median quarterly wages at age 25 for Maryland public high school graduates who enroll in college in Maryland and receive financial aid. Data are provided at the state, local school system and school levels for those who earn a college degree and those who do not. There are five dashboards in this series. The dashboards include those who received loans, were awarded grants, and whose families are not expected to make a financial contribution to their educational costs.

Data Downloads

The Center expanded its reporting capacity to include aggregated de-identified data tables. One set of tables was produced at the request of the Department of Legislative Services (DLS). This set of tables provides statewide and local school system data on the course-taking and credit accumulation of Maryland public high school students who dually enroll. A second set of tables was completed at the request of the Maryland Business Roundtable (MBRT). This set of tables provides statewide data on

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

college-going patterns for high school graduates classified by MBRT as Maryland Scholars. Three sets of tables were produced to complement the Center's dashboard series on *College Enrollment and College Graduation Patterns of Maryland Public High School Students.* This set of data down loads provides state, local school system and school level data college-going patterns of Maryland public high school graduates and whether they obtain a college degree by age 25.

Department of Legislative Services

The Center completed its annual report, *Maryland High School Pathways,* for the Department of Legislative Services (DLS). This report is used by DLS to prepare the annual *Higher Education Overview* for the legislative session.

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

Two supplements to this statewide report were released. The first supplement explores educational and workforce outcomes for the 2012-2013 cohort of graduates for each community college. The second supplement explores educational and workforce outcomes by degree type and major.

Exploring Workforce Outcomes of Maryland Apprenticeship and Training Program Completers

The Center released its fourth five-year out report. This report looked at the workforce outcomes for the 2012-2013 cohort of completers of Maryland's Registered Apprenticeship program five years after completing an apprenticeship program.

CyberWarrior Report

The MLDS Reporting Services team completed its analysis on the CyberWarrior data set, providing the Maryland Higher Education Commission (MHEC) with a data table on wage outcomes for the CyberWarrior population and for high school graduates who completed similar CompTIA training as part of their career and technical education (CTE) high school curriculum. MHEC will use the data tables to complete a report to be filed with the Governor.

Exploratory Data Analysis

The data team reviewed new Maryland Higher Education Commission data collection on NonCredit Workforce Completers. Specifically, the Center was asked to evaluate the data to determine: (a) is the data quality sufficient for establishing and reconciling identities with the MLDS; and (b) what is the rate at which the new data can be matched to data sources already included in the MLDS system? The MLDS Center reported back that the data quality was high, with around 60% or more of the individuals included in the data matched to an existing identity in the system. The MLDS Center also reported that the data will be highly usable, with match rates to existing data sources ranging between 30% to 50%. Lower match rates were seen with certain data collections, such as Juvenile Services or Maryland public school students, as those data do not go back far enough in time to link to the population of NWCS records, who are typically older (over age 25).

Traditional Program Annual Report (TPAR)

The Center provided data tables to the twenty-two higher education institutions that are required to submit the Traditional Program Annual Report (TPAR) to the Maryland State Department of Education. The tables report on post-program outcomes of completers of teacher education programs. The tables include data on the number of program completers:

1. In teaching positions and administrative positions within Maryland public schools;
2. Teaching in Maryland public schools with special designations (low performing or high poverty); and
3. Visible in Maryland wage data in the Education sector, or otherwise visible in Maryland wage data.

2.3 Dual Enrollment Report

The MLDS Center is required to produce an Annual Dual Enrollment Report (see Ed. Art., 24-703). The report must include the number of students who are dually enrolled and the number and name of the courses in which they are dually enrolled. In prior years, the above requirement was fulfilled by a 10-12 page report with data tables, charts and narrative content. However, recent legislation changed that requirement from a report to "easy-to-understand graphic data dashboards." Accordingly, this year the Center is debuting a set of graphic data dashboards in fulfillment of this new requirement. The dashboards can be found on the Center's website as follow: https://mldscenter.maryland.gov/CenterReports.html - select *Dual Enrollment Reports* and then *2021 Dual Enrollment Report*.

2.4 Career Preparation Expansion Act Report

Pursuant to the Career Preparation Expansion Act (Education Article, § 21-205, Annotated Code of Maryland), the MLDS Center and the Governor's Workforce Development Board (GWDB) are required to produce a report on the following workforce outcomes of high school graduates for the five-year period after graduation:

1. Wages earned;
2. Hours worked per week; and
3. The industry of employment.

The cohort for the 2021 Report is the high school graduating class of 2015. For that cohort, five years after graduation coincides with the onset of the COVID-19 economic shut down in Maryland. The impact on wage visibility is drastic; almost thirty percentage points lower than prior years. And, this reduction was nearly uniform across all educational attainment groups. However, for those in the 2015 cohort with full-quarter wages, results were consistent with prior reporting. The majority of the 2021 CPEA Report focuses on the students with workforce outcomes and addresses the required reporting components.

Additional time is needed to collect and analyze data to understand the long-term impact of COVID-19. The Center plans to produce additional supplements to this report that will explore the impact of COVID-19 on the 2015 cohort of high school graduates by labor sector, race, ethnicity, gender and demographic group to obtain a better understanding of how different groups and labor sectors were impacted by the economic shut down.

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.

<u>Reporting Services</u>

1. New Data Collections Exploration
    a. Apprenticeship
    b. Child Welfare
    c. Juvenile Delinquency
2. Five-Year Out Reports
    a. Bachelor's Degrees
    b. Apprenticeship
    c. Required Annual Output
3. Required Annual Output
    a. Reports
        i. Career Preparation Expansion Act Report
        ii. Dual Enrollment Report
        iii. Child Welfare Report
        iv. Financial Aid Outreach
    b. Data Tables
        i. MHEC/Postsecondary - Cyber Warriors Report, PAR, Managing for Results, Morgan, and NWCS
        ii. Department of Legislative Services – Dual Enrollment and Pathway Report
        iii. Maryland Business Roundtable for Education – Scholars Program Outcomes
        iv. Data Requests
4. Dashboards
    a. Teacher Dashboards
    b. Associate's Degrees
    c. Apprenticeship
    d. Bachelor's Degree
    e. High School to College Series
    f. Juvenile Delinquency
    g. Dashboard Refresh

<u>Research Branch</u>

1. Overview
    a. In collaboration with MLDS Center stakeholders and with a commitment to social justice and equity, conduct advanced statistical analyses to inform decision making in Maryland in order to optimize public education and workforce systems that serve Maryland children, youth, adults, and families.

   b. Build capacity to conduct rigorous research through providing technical and methodological documentation.
   c. Establish and maintain diverse and inclusive research partnerships by promoting equitable access to data and resources.
   d. Support the above goals through pursuit of additional funding opportunities.
2. In-Depth Statistical Analyses to Inform Policy
   a. Pathways from high school to workforce
   b. Concentrated Poverty
   c. School Staff Demographics
   d. Early elementary predictors of outcomes
   e. K-12 Discipline and DJS overlap and outcomes
   f. Effects of attending a 4-year college (15 to finish)
   g. Critical workforce areas (e.g. teaching)
   h. Production of students to meet workforce demands
   i. Update dual enrollment reports
   j. Update remedial course taking report
   k. School resource officers (SROs) and student outcomes
3. Methodological Documentation
   a. Use of Data Science
   b. Student Mobility
   c. Missing Wages
4. Establish Partnerships
   a. Morgan State University collaboration
   b. External Researchers work with and promote external research that benefits Maryland policy makers.
5. Seek External Funding – grants received from the National Science Foundation and U.S. Department of Education.

Ongoing Research Projects

Dr. Tracy Sweet and her graduate student created a presentation applying data science methods to evaluate the 15 to Finish incentive in Maryland, which encourages Bachelor's seeking students to register for 15 credits each semester. This topic was requested by the Maryland Higher Education Commission (MHEC). The goal is to explore the following types of questions: are the students more likely to persist to the second year; and are the students more likely to graduate within 5 years? Researchers created an analytic data file and determined the characteristics of students that take 15 or more credits in college to determine whether they are systematically different from students who do not take 15 or more credits. The preliminary sample was isolated to first-year, 4-year students attending Maryland public colleges in 2016 (Fall). Preliminary analyses focused on exploration of MHEC's credit variables and were presented to the MLDS Center output meeting group.

Dr. Henneberger is collaborating with analysts from the UMB Pharmaceutical Research Center to create analytic data files that will expand upon the poverty study to examine peer composition related to

eligibility for FARMS, academic variables, behavioral variables, and demographic variables. The study will link early peer composition at the school and grade levels to high school graduation, college enrollment, and workforce outcomes.

Dr. Wade Jacobsen started examining preliminary descriptive statistics on cumulative discipline rates in Maryland over time. This project will focus on cumulative discipline across grade levels, rather than on discipline rates each year, which has been the focus of traditional studies on school discipline.

In a project funded by the AERA, Dr. Blazar and doctoral students are examining the extent to which representation by race and ethnicity of teachers and school-based professional staff (e.g., administrators, nurses, counselors, social workers) relates to students' test scores, absences, and suspensions. Extant literature identifies the importance of working directly with a same-race teacher, but has not explored in depth the extent to which representation amongst a broader set of staff in a school matters. Preliminary findings identify several patterns: First, the analyses replicate the relations of teacher-student race-matching for Black students in Maryland, on academic performance, absences, and suspensions. Second, outcomes of Hispanic students benefit from having teachers of color (i.e., non-White teachers) generally, rather than same-ethnicity teachers. (For Black students, it is Black teachers that matter.) Third, diversity amongst school-based professional staff can help reduce chronic absenteeism and suspensions for both Black and Hispanic students. There is not a clear link between diverse school staff and student test scores, which makes sense given that schools' professional staff are more removed from delivery of content.

The Promise Neighborhoods research team is further refining the measures and population that will be used for the evaluation, including expanding the population for the KRA and high school assessments, graduation, workforce, and college enrollment outcomes to include any student who attended a Promise Neighborhoods school at any point in time for any length of time. Additionally, the team is working through the procedure for selecting comparison schools that are similar to the Promise Neighborhoods schools.

Dr. Ken Elpus is exploring possible links between academic outcomes and arts education in the International Baccalaureate (IB) Diploma Program (IBDP). The main analyses have used internal data from the IB which we linked with data from the National Student Clearinghouse to understand postsecondary enrollment, persistence, and degree attainment differences between IB students who did and did not elect an arts course as part of their IBDP. IB data have a large *N* but relatively few observable covariates. The team was approved to use MLDS data to replicate our analyses for IB students who pursued the IBDP at Maryland IB world schools and use the richer set of covariates to more completely model selection into IB arts classes.

Dr. Mathew Uretsky is further examining the timing and measurement of variables that examine alternative routes to high school graduation and the relation with long-term college and workforce outcomes. His focus is on students who persist, dropout, get a diploma via GED, and graduate from high school.

Section 3. Data Determined to be Unnecessary

The following data elements were determined to be unnecessary and were removed from the MLDS during the past year.

In June 2016, multiple Kindergarten Readiness Assessment data elements were approved in the Data Inventory. These elements were never collected during the actual administration of the assessment and never provided to the MLDS Center. Therefore, the data elements proposed for removal in the Data Inventory are listed below.

1. KRA Exempt Flag
2. KRA Exempt Reason
3. KRA Subtest Proficiency Level
4. KRA Subtest Title
5. Early Learning - Other Prior Care

In addition to the above data elements, the MLDS Governing Board approved the addition of data elements into the Data Inventory on a temporary basis to support a one-time report. Specifically, in 2018 the General Assembly established the Cyber Warriors Diversity Program. That legislation also required the Maryland Higher Education Commission to provide a report to the Governor and the General Assembly on the wages and earnings of students who participated in this program. MHEC requested assistance from the MLDS Center in merging Cyber Warrior System data with UI Wage data to fulfill the reporting obligation. Since the Cyber Warrior Diversity Program was not a permanent collection for MHEC and was limited in scope to only four Maryland Institutions of Higher Education, this data was determined to be temporary. Accordingly the Governing Board approved the addition of the data at its June 10, 2021 meeting until August 31, 2021. The postsecondary data elements that were added to and then removed from the Data Inventory are listed below.

1. Collection Term
2. Collection Year
3. OPEID (FICE+2)
4. Identification Number (SSN)
5. Identification Number Type
6. Local Campus Student ID
7. State Assigned Student Identifier
8. Last Name
9. First Name
10. Middle Name
11. Gender
12. Birthdate
13. Current Zip Code
14. Residency
15. US Citizenship
16. Hispanic/Latino
17. White
18. Black
19. Asian
20. American Indian / Native Alaskan
21. Native Hawaiian / Pacific Islander
22. Entry Term
23. Entry Year
24. CompTIA Program
25. CompTIA Program Completion Date

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.[8]

4.2 Additions to the Data Inventory

In 2021, the MLDS Center added

A. Early Learning Data from MSDE, Division of Early Childhood

As of 2019-2020 the Predominant Prior Care data element was changed to distinct prior care elements that identify whether the care was half day or full day. The Early Learning data elements proposed for inclusion in the Data Inventory are listed below.

1. Prior Care - Informal Care
2. Prior Care - Head Start
3. Prior Care - PK Public School
4. Prior Care - Child Care Center
5. Prior Care - Family Child Care
6. Prior Care - Nonpublic Nursery School
7. Prior Care - Kindergarten Repeated

B. Kindergarten Readiness Assessment (KRA) Data from MSDE, Division of Early Childhood

The Division of Early Childhood of the Maryland State Department of Education collects data from the Kindergarten Readiness Assessment (KRA), one component of Ready for Kindergarten (R4K): Maryland's Early Childhood Comprehensive Assessment System. The KRA is administered in the Fall to incoming public-school kindergarteners each school year and completed by mid-October. The KRA measures skills in the following four learning domains: Language and Literacy, Mathematics, Social Foundations, and Physical Well-Being and Motor Development. Previously approved data elements include: KRA

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

Overall Proficiency Level, KRA Overall Score, and KRA Subtest Score. The data elements proposed for inclusion in the Data Inventory are listed below.

1. Academic Year
2. LEA Number
3. School Number
4. Statewide Identifier
5. Local School Identifier
6. Last Name
7. First Name
8. Middle Name
9. Generational Code or Suffix
10. Preferred Name (Optional)
11. Date of Birth
12. Grade
13. Gender
14. Ethnicity
15. Race
16. Homeless
17. Title I Indicator
18. FARMS
19. Free Reduced
20. Migrant Status
21. Special Education Indicator
22. Special Education End Date
23. Special Education Certificate Status
24. EL Student
25. EL Entry date into US
26. EL Begin Date
27. EL End Date
28. Foster Care Status
29. Military Connected Indicator
30. Direct Certification
31. Gifted and Talented
32. KRA IEP Status
33. KRA Disability Status
34. KRA FARMS
35. KRA EL
36. Test Sample LEA
37. Test Sample School
38. KRA Test Status
39. Sample Flag
40. Sampling Weight
41. Selection Probability
42. KRA ECODIS

C. IDEA Reporting from MSDE

Under the federal accountability requirements of the *Individuals with Disabilities Education Act (IDEA)*, the Division of Early Intervention and Special Education Services (DEI/SES) of the Maryland State Department of Education (MSDE) must report annually to the U.S. Department of Education - Office of Special Education Programs (OSEP) the placement outcomes of secondary special education students for the year following their exit from secondary education. State level and other administrative reporting requirements necessitate certain disaggregation not mandated by federal accountability. This required cross-sector analysis of program performance led to the initiation of the partnership between MSDE-DEI/SES and the Maryland Longitudinal Data System Center (MLDSC) to support this federal reporting. The K-12 data elements for inclusion in the Data Inventory are listed below.

1. SASID
2. LEA Number
3. School Number
4. Exit Year
5. Last Name
6. First Name
7. Middle Name
8. Generational Code or Suffix
9. Date of Birth
10. Grade
11. Gender
12. Ethnicity
13. Race
14. Other Placement Indicator

D. Perkins V Reporting - Secondary from MSDE

Under the federal accountability requirements of the *Strengthening Career and Technical Education for the 21st Century Act of 2018* (Perkins V), the Division of Career and College Readiness (DCCR) of the Maryland State Department of Education (MSDE) must report annually to the U.S. Department of Education - Office of Career, Technical, and Adult Education (OCTAE) the placement outcomes of secondary and postsecondary career and technical education (CTE) students two quarters following their exit from the program. State level and other administrative reporting requirements necessitate certain disaggregation not mandated by federal accountability. This required cross-sector analysis of program performance led to the initiation of the partnership between MSDE-DCCR and the Maryland Longitudinal Data System Center (MLDS Center) to support this federal reporting. The K-12 data elements for inclusion in the Data Inventory are listed below.

1. SASID
2. LEA Number
3. School Number
4. School Year
5. Last Name
6. First Name
7. Middle Name
8. Generational Code or Suffix
9. Date of Birth
10. Grade
11. Gender
12. Ethnicity
13. Race
14. Special Education Indicator
15. EL Indicator
16. FARMS Indicator
17. Migrant Indicator
18. Homeless Served - McKinney
19. Foster Care Status
20. Military Connected Indicator
21. Out-of-Workforce
22. Single Parent
23. Concentrator
24. CIP

E. Perkins V Reporting - Postsecondary from MSDE

Under the federal accountability requirements of the *Strengthening Career and Technical Education for the 21st Century Act of 2018* (Perkins V), the Division of Career and College Readiness (DCCR) of the Maryland State Department of Education (MSDE) must report annually to the U.S. Department of Education - Office of Career, Technical, and Adult Education (OCTAE) the placement outcomes of secondary and postsecondary career and technical education (CTE) students two quarters following their exit from the program. State level and other administrative reporting requirements necessitate certain disaggregation not mandated by federal accountability. This required cross-sector analysis of program performance leads to the initiation of the partnership between MSDE-DCCR and the Maryland Longitudinal Data System Center (MLDS Center) to support this federal reporting. The postsecondary data elements for inclusion in the Data Inventory are listed below.

1. SSN
2. College SIC Code
3. School Year
4. Term Number
5. Last Name
6. First Name
7. Middle Name
8. Generational Code or Suffix
9. Date of Birth
10. Grade
11. Gender
12. Ethnicity
13. Race
14. Special Education Indicator
15. ELL Indicator
16. Economically Disadvantaged
17. Out-of-Workforce
18. Single Parent
19. Concentrator
20. CIP

F. NonCredit Workforce Completer System from MHEC

Unit record data on students taking non-credit courses are being piloted by 7 of the 16 colleges for preliminary evaluation. MHEC seeks feedback from the MLDS Center on the usability of these pilot data, such as the matching ability to other data sources in different sectors. The current timeline is to finalize the collection for the 2022-2023 collection year. At that time, the pilot data would be removed from the MLDS. The postsecondary data elements for inclusion in the Data Inventory are listed below.

1. Collection Term
2. Collection Year
3. OPEID (FICE+2)
4. Identification Number (SSN)
5. Identification Number Type
6. Local Campus Student ID
7. Last Name
8. First Name
9. Middle Name
10. Gender
11. Birthdate
12. Current Zip Code
13. Residency Code
14. Citizenship Indicator
15. Hispanic/Latino Ethnicity
16. White
17. Black
18. Asian
19. American Indian / Native Alaskan
20. Native Hawaiian / Pacific Islander
21. Course or Sequence Name
22. Subject Area
23. Course or Sequence Start Date
24. Course or Sequence Date Completed
25. Date Conferred
26. Instructional Hours
27. Hours Type
28. Licensure or Certification
29. Course or Sequence Type

G. Postsecondary

The Maryland Higher Education Commission (MHEC) is adding 11 demographic data elements to the End-of-Term System (EOTS) data collection beginning with the 2021 Summer/Fall EOTS submission. These elements will be optional in 2021-2022 and required in 2022-2023. The Postsecondary data elements proposed for inclusion in the Data Inventory are listed below.

1. Last Name
2. First Name
3. Middle Name
4. Gender
5. Birthdate
6. Hispanic/Latino Ethnicity
7. White
8. Black/African American
9. Asian
10. American Indian/Native Alaskan
11. Native Hawaiian/Pacific Islander

MHEC has added the CIP (Classification of Instructional Program) Code to both the Degree Information System (DIS) and the Enrollment Information System (EIS) data collections. CIP is a taxonomy system developed by the US Department of Education and is a national standard for organizing and reporting on enrollments and completion for areas of study. CIP Codes are six-digit codes that more granularly identify instructional programs within the two-digit CIP series. For both data collections, the six-digit CIP Code field is optional for 2021-2022 and required for 2022-2023 and onward. The Postsecondary data elements proposed for inclusion in the Data Inventory are listed below.

1. CIP Code (DIS)
2. CIP Code (EIS)

H. Maryland Motor Vehicle Administration

The Maryland Motor Vehicle Administration (MVA) is implementing a new data system in December 2021. The new system will not impact the MLDS Center. However a new data element was added as a result of the updates.

1. Mailing County

I. Juvenile Delinquency

The Department of Juvenile Services (DJS) captures administrative data on youth who are involved in the Maryland juvenile justice system. Over 46 Juvenile Delinquency data elements were approved at the June and September 2020 MLDS Governing Board meetings. MLDS Center staff became aware of one additional element DJS could provide that would be useful in establishing the correct admission and release dates for a DJS placement. The one data element for inclusion in the Data Inventory is below.

1. Placement Summary Key

Section 5. Recommendations to the Governing Board

The MLDS Center's *Research Agenda* was developed by the Governor's P20W Development Council over 10 years ago. While minor changes have been made, there has not been a comprehensive review of the *Research Agenda*, such as:

1. What purpose should the Research Agenda serve;
2. Are the current questions/topics sufficient to address the Center's added scope of work as a result of legislative changes and new data sources; and
3. How can the agenda address questions of social equity?

Accordingly the Governing Board directs the MLDS Center staff, in consultation with Governing Board designees and other stakeholders, to undertake a comprehensive review of the current Research Agenda and provide conclusions and any proposed changes for the Board's consideration later next year.