



MLDS CENTER

Maryland Longitudinal Data System

Address 550 West Baltimore Street
Baltimore, MD 21201
Phone 410-706-2085
Email mlds.center@maryland.gov
Website mldscenter.maryland.gov

Memorandum

TO: MLDS Governing Board

FROM: Mr. Ross Goldstein, Executive Director

DATE: June 5, 2026

SUBJECT: Project Approvals and Updates

Purpose

This agenda item is to update the Board on:

1. Projects that have been reviewed and approved by the Executive Director under *Project Approval and Management Procedures*;
2. When necessary, projects that have been reviewed and require Governing Board approval; and
3. Updates on ongoing projects.

Please note that in addition to the information presented for each new project, this memorandum also includes the complete project abstract submitted by the researcher for your further information and review.

Approved Projects

ERA # 132	Leading by Example: The Impact of Principal–Student Demographic Matching on Student Outcomes
Researcher	Ms. Shuting He University of Maryland College Park
Research Questions	1. How does exposure to a demographically matched school principal—by race and gender—affect students’ academic, behavioral (as measured by disciplinary incidents), and long-term educational outcomes? 2. Do principals generate different impacts for demographically matched versus unmatched students? 3. Through what mechanisms (e.g., teacher composition and retention) do any differences arise?
RPB Review	The RPB was supportive of the project.
Exec. Dir. Determination	Approved. The subject of this project is responsive to the Research Agenda, provides information about student performance that can be used to improve the

	state's education system, requires the use of longitudinal cross sector data, and is being conducted by a qualified researcher.
Board Action	Informational

ERA # 133	Maryland National Board-Certified Teacher Incentives Equity Analysis
Researcher	Dr. Lucy Sorenson Learning Policy Institute
Research Questions	1. How does student exposure to National Board Certified Teachers (NBCTs) vary by student race/ethnicity, socioeconomic status, disability status, and English learner status? 2. How has the number of NBC teachers and candidates in Maryland changed over time? a. By district b. By teacher demographics 3. How does the demographic composition of teachers vary by NBC candidates, NBC completers, and all teachers, statewide and by LEA? 4. To what extent have the NBC salary incentives increased the proportion of teachers (or proportion of eligible teachers) who are NBC candidates and NBCTs in Low Performing Schools (LPS)? a. Through changes in teacher mobility to or from LPS? b. Through changes in teachers seeking certification in LPS? c. Through changes in teacher retention in LPS?
RPB Review	The RPB was supportive of the project. Additionally, this project was discussed with MSDE and MSDE was supportive of the research.
Exec. Dir. Determination	Approved. The subject of this project is responsive to the Research Agenda, provides information about student performance that can be used to improve the state's education system, requires the use of longitudinal cross sector data, and is being conducted by a qualified researcher.
Board Action	Informational

ERA # 137	From Homelessness to Education and Employment Systems: A Cross-Agency Data Match Study of Unaccompanied Youth in Maryland
Researcher	Dr. Terry Shaw, University of Maryland, School of Social Work Ms. Suzanne Korff, Maryland Department of Housing and Community Development
Research Questions	• What is the degree of record match between youth identified in HMIS and the MLDS? • What percentage of unaccompanied young adults (age 25 and under) and children in the HMIS data system have history in the juvenile justice system? • What percentage of unaccompanied young adults (age 25 and under) and children in the HMIS data system have history in the child welfare system? • How does the data in the HMIS system compare to data already known in the MLDSC system (homeless indicators)? • To what extent do youth in HMIS also receive services in the education sector (such as free and reduced-meals, special education, and English language services) and how does this compare with the population of Maryland as a whole? • What is the average education level obtained by unaccompanied homeless young adults (age 25 and under) and children in HMIS? • What percentage of young adults (age 25 and under) and children who are eligible graduate high school on time? What percentage get a GED? And What percentage go on to higher education? • What percentage of young adults (age 25 and under) and children who are eligible and are part of the HMIS system access the tuition waiver programs? • What is the college uptake and employment outcomes of young adults (age 25 and under) and children that are part of the HMIS system? Of the young adults (age 25 and under) and children in the HMIS system who do enroll in higher education, do they persist through completion of a degree (what type of degree)? • How many young adults (age 25 and under) and children identified in the HMIS system enroll in higher education and what is the timing of that enrollment (using the five college-going patterns: Complete, immediate, non-traditional, within one year, within two years – *defined below from the MLDSC data dashboard)? • What are the educational and workforce outcomes of youth in HMIS (such as high school graduation, GED attainment, and college enrollment, persistence, and degree attainment)? • To what extent are youth in HMIS also identified as homeless based on McKinney-Vento?
RPB Review	The RPB was supportive of the project, and there was great enthusiasm about the

	potential for this partnership.
Exec. Dir. Determination	Approved. The subject of this project is responsive to the Research Agenda, provides information about student performance that can be used to improve the state's education system, requires the use of longitudinal cross sector data, and is being conducted by a qualified researcher.
Board Action	Informational

ERA # 143	Effects of Baltimore Workforce Training Programs on Employment, Earnings, and Recidivism in Maryland
Researcher	Dr. Rachel Durham, Notre Dame of Maryland University
Research Questions	1. As compared to program non-completers and a statistically matched comparison group, what are the impacts of the occupational training programs supported by the BWFC on participants' employment entry, job retention, apprenticeship, and workforce training programs, wages, and criminal recidivism*? 2. How do the impacts of program completion on each outcome vary by participant demographic characteristics, i.e., gender, race, and age? 3. How do the impacts of program completion vary across specific training programs?
RPB Review	The RPB was supportive of the project.
Exec. Dir. Determination	Approved. The subject of this project is responsive to the Research Agenda, provides information about student performance that can be used to improve the state's education system, requires the use of longitudinal cross sector data, and is being conducted by a qualified researcher.
Board Action	Informational

ERA # 104	From School to Workforce: A Data-Driven Journey to Understanding Participation Disparities in Computer Science
Researcher	Ms. Xiaoxue Zhou, University of Maryland College Park
Research Questions	RQ1: Who is underrepresented in CS participation across the pathway from grade 6 through workforce entry? RQ1a: What disparities exist in CS participation and outcomes among demographic groups (gender, race/ethnicity, socioeconomic status, language proficiency, and receipt of special education services) at each stage of the educational pipeline through early workforce entry? RQ1b: Which intersectional groups (such as Black females, low socioeconomic status female Hispanic students) experience the highest disparities in CS participation? RQ2. When do disparities in 6–12 CS participation emerge, widen, or narrow? RQ2a: At which grade-to-grade progressions (e.g., 6→7, 7→8, 8→9, 9→10, 10→11, 11→12) do gaps first appear or intensify? RQ2b: How do cumulative participation rates differ by group across grades (6-12)and transitions, and what do these patterns reveal about critical “leakage points” in the K-12 CS pathway? RQ3. How is Grades 6–12 CS participation associated with observed Maryland postsecondary and early workforce CS outcomes? RQ3a (Postsecondary). To what extent are the timing, persistence, and rigor of Grades 6–12 CS participation associated with postsecondary CS engagement, coursework intensity, and CS major attainment? RQ3b (Workforce). To what extent is Grades 6–12 CS participation associated with early-career employment in CS-related industries and early-career earnings? RQ3c (Heterogeneity). To what extent do these associations vary by race/ethnicity and family economic disadvantage (FARMS)?
RPB Review	The RPB was supportive of the project.
Exec. Dir. Determination	Approved. The subject of this project is responsive to the Research Agenda, provides information about student performance that can be used to improve the state's education system, requires the use of longitudinal cross sector data, and is being conducted by a qualified researcher.
Board Action	Informational

Project Updates

ERA # 34	<i>Long-Term Effects of Multi-Tiered PBIS: A Randomized Controlled Trial in Maryland Public Elementary Schools</i>
Researcher	Dr. Angela K. Henneberger University of Maryland School of Social Work MLDS Center Research Director
Update	This project leverages MLDS data to identify students who participated in an initial randomized controlled trial (RCT) of multi-tiered PBIS and link to secondary school, postsecondary, labor, and juvenile justice outcomes up to 15 years later to examine long term outcomes, generalized outcomes (e.g., relevant for scale up), and cost benefit. Over the past year, the team completed the following activities: • Analyzed data examining arrests, suspensions, standardized test scores, and postsecondary outcomes. • Applied machine learning approaches to identify early predictors of nonresponse to the interventions studied in this RCT. • Examined moderating effects of the intervention. • Completed initial stages of examining generalized effects. • Presented in multiple forums, including at national conferences (i.e., Society for Prevention Research) and local presentations (i.e., UMB School of Social Work research day). • Prepared manuscripts for publication.

ERA # 62	<i>Using Maryland's SLDS to Strengthen and Diversify the Teacher Workforce</i>
Researcher	Dr. Jane Lincove University of Maryland Baltimore County MLDS Center Investigator
Update	This project is funded by the Institute of Education Sciences and there are two research questions: RQ1: What are the incentives, pathways, and obstacles for Maryland high school graduates to enter the teacher workforce? RQ2: What were the pathways into teaching of current teachers in Maryland public schools? Which of these pathways most often produce teachers who persist in long-term employment and positively impact student performance? The project team is currently completing Year 2. During Year 2, the team

	completed the following objectives: • Continued research analyses for RQ 1 and RQ 2 • Planned and executed a half-day convening in Baltimore, MD, bringing together over 100 researchers, policymakers, and practitioners from across the state to provide a comprehensive understanding of Maryland’s Teacher Pipeline. • Disseminated results in local, state, and national forums, including presentations, research briefs, and manuscript publications.
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*This form is subject to disclosure in a Public Information Act request.

Project Title	Agency Control #
Leading by Example: The Impact of Principal–Student Demographic Matching on Student Outcomes	132

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Section 1. Principal Investigator

Principal Investigator (please list additional project team members in Section 7)
Shuting He
Principal Investigator's Email Address
sutyhe@umd.edu
Name of University or Organization
University of Maryland College Park
Principal Investigator Background and Qualification (provide overview of experience and attach a CV)
Shuting He is a fourth year Ph.D. candidate in Economics at the University of Maryland, specializing in Labor Economics with a focus on gender, education, and public policy. Her research examines how policy interventions affect gender equity and human capital outcomes. She has extensive experience handling and analyzing restricted-use microdata and administrative datasets, applying advanced econometric techniques. She is proficient in Stata, Python, and MATLAB, and has completed graduate-level coursework in micro-econometrics, causal inference, and data security protocols. Her strong empirical background, familiarity with sensitive data handling, and commitment to rigorous policy-relevant research make her well qualified to responsibly access and analyze MLDS data.

Important: Once submitted, this application is a public document that will be shared with stakeholders throughout the project review process and generally made available pursuant to a *Public Information Act Request*.

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A completed form is available [here](#) for your review.

Section 2. Project Information

Background and Purpose of the Study

(No more than 500 words; please include references; references do not count toward the word count)

School principals are central to K–12 education, shaping discipline, expectations, and school culture. Yet, compared with teachers, little is known about how principals’ identities and representation affect students. Prior research shows that students perform better and behave differently when taught by teachers who share their race or gender (Dee 2005, 2007; Gershenson et al. 2022; Egalite et al. 2015). If representation matters in the classroom, it may also matter in the principal’s office, where a demographically matched leader can influence outcomes by shaping norms, expectations, and fairness perceptions, or by acting as a role model who signals inclusion and belonging.

National data show a persistent lack of diversity among school principals. According to NCES (2022), about 80% of principals are White, while Black, Hispanic, and Asian principals together make up less than 20%. Women account for roughly 56% of principals, but they are more concentrated in elementary schools and less represented in secondary schools. Maryland mirrors these national patterns, meaning many students—particularly those from underrepresented racial and ethnic groups—rarely have principals who share their demographic background.

Representation at the leadership level can also shape teachers’ composition, quality, and behavior. Evidence shows that principals’ demographic identities influence the teacher workforce and school environment: same-race principal–teacher pairings improve teacher satisfaction and retention (Grissom, Nicholson-Crotty & Keiser 2012), and black principals recruit and retain more black teachers (Bartanen & Grissom 2023). Principal demographics also affect teacher evaluation and feedback (Grissom & Loeb 2011; Grissom & Bartanen 2022), suggesting that leadership representation may indirectly influence students by shaping teacher diversity and school climate.

The first part of this project focuses on providing a rigorous measure of principals’ contributions to average student outcomes such as test scores, attendance, disciplinary outcomes, and longer-run outcomes such as college enrollment, major choice, and earnings. The second part of the study examines whether principal value-added differs systematically based on demographic alignment with students, such as shared race or gender, providing large-scale empirical evidence on the effectiveness of principal-student identity matching on student outcomes. The project also investigates the mechanisms through which principal representation shapes student outcomes, including potential effects through teacher composition, retention, and performance. This overall approach will then be broadened beyond just principals to incorporate analyses of all school administrators.

Reference

Bartanen, B., & Grissom, J. A. (2023). School principal race, teacher racial diversity, and student achievement. *Journal of Human Resources*, 58(2), 666–712.

Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014). Measuring the impacts of teachers I: Evaluating bias in teacher value-added estimates. *American Economic Review*, 104(9), 2593–2632.

<https://doi.org/10.1257/aer.104.9.2593>

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Dee, T. S. (2005). A teacher like me: Does race, ethnicity, or gender matter? <i>American Economic Review</i>, 95(2), 158–165. https://doi.org/10.1257/000282805774670446 Dee, T. S. (2007). Teachers and the gender gaps in student achievement. <i>Journal of Human Resources</i>, 42(3), 528–554. https://doi.org/10.3368/jhr.XLII.3.528 Egalite, A. J., Kisida, B., & Winters, M. A. (2015). Representation in the classroom: The effect of own-race teachers on student achievement. <i>Economics of Education Review</i>, 45, 44–52. https://doi.org/10.1016/j.econedurev.2015.01.007 Gershenson, S., Hart, C. M. D., Hyman, J., Lindsay, C., & Papageorge, N. W. (2022). The long-run impacts of same-race teachers. <i>American Economic Journal: Economic Policy</i>, 14(4), 300–342. (Originally published as NBER Working Paper No. 25254, 2018). https://doi.org/10.1257/pol.20190594 Grissom, J. A., & Bartanen, B. (2022). Potential race and gender biases in high-stakes teacher observations. <i>Journal of Policy Analysis and Management</i>, 41(1), 131–161. https://doi.org/10.1002/pam.22312 Grissom, J. A., & Loeb, S. (2011). Triangulating principal effectiveness: How perspectives of parents, teachers, and assistant principals identify the central importance of managerial skills. <i>Educational Administration Quarterly</i>, 47(1), 99–137. https://doi.org/10.1177/0013161X10376497 Grissom, J. A., Nicholson-Crotty, J., & Keiser, L. R. (2012). Does my boss’s gender matter? Explaining job satisfaction and employee turnover in the public sector. <i>Journal of Public Administration Research and Theory</i>, 22(4), 649–673. https://doi.org/10.1093/jopart/mus004 National Center for Education Statistics. (2022). <i>Characteristics of 2020–21 public and private school principals in the United States: First look</i> (NCES 2022-112). U.S. Department of Education. https://nces.ed.gov/pubs2022/2022112.pdf
Research Project Question
1. How does exposure to a demographically matched school principal—by race and gender—affect students’ academic, behavioral (as measured by disciplinary incidents), and long-term educational outcomes? 2. Do principals generate different impacts for demographically matched versus unmatched students? 3. Through what mechanisms (e.g., teacher composition and retention) do any differences arise?
Research Methods (Please include information for: Sample/Cohort and Justification; Definition of Measures and Constructs; Analysis Approach)
Sample/Cohort and Justification This study will include all Maryland public K–12 students between 2008 and 2024, with a primary focus on elementary schools where principals have more direct and frequent interactions with students, teachers, and families. Elementary principals play a particularly visible role in shaping school

climate and expectations, making them especially influential in students' early academic and behavioral development. Including middle and high schools allows for comparison across grade levels and the assessment of whether leadership representation has lasting or diminishing effects as students' progress through the education system.

When examining long-run outcomes such as postsecondary education and labor market performance, I will focus on earlier student cohorts to allow sufficient follow-up time for linkage to postsecondary and workforce data. For elementary school students, who constitute the main study population of this project, the outcomes potentially analyzed are listed below. For middle and high school students, both post-secondary and labor market outcomes can be examined, as sufficient time has elapsed following graduation for these outcomes to be observed.

Entry Grade & Year	Expected HS Grad Year	Postsecondary Outcomes Observable	Labor Market Outcomes Observable
Grade 5, 2008	2015	Enrollment, completion, major	Employment & earnings
Grade 4, 2008	2016	Enrollment, completion, major	Employment & earnings
Grade 3, 2008	2017	Enrollment, completion, major	Employment & earnings
Grade 2, 2008	2018	Enrollment, completion, major	No
Grade 1, 2008	2019	Enrollment, completion, major	No

Definition of Measures and Constructs

The main independent variables measure principal–student demographic matching by race and gender, represented by binary indicators for shared identity and an interaction term for joint race–gender alignment. Student-level outcomes include academic performance (standardized test scores, GPA), degree attainment, and disciplinary actions (suspensions). For the long-term analysis, MLDS linkages will be used to measure postsecondary outcomes (enrollment, degree completion, and major choice) and labor market outcomes (employment, occupation, and earnings).

To explore mechanisms, I will incorporate teacher-level data to examine whether principal race or gender affects teacher diversity, retention, and effectiveness. Principal-level variables (e.g., experience, tenure, certification) and school-level characteristics (e.g., size, location, student demographics) will be included as controls.

Analysis Approach

This project has two analytically distinct but related components. First, I estimate principal value-added to student outcomes using a value-added framework following Chetty et al. (2014). Specifically, I estimate student-level regressions of outcomes on prior outcomes, student demographics, and school and year fixed effects, along with principal fixed effects. The estimated principal fixed effects capture the average contribution of each principal to student outcomes after accounting for observable student characteristics and common shocks. Identification comes from within-school variation over time as principals change. To assess whether the estimated effects reflect

principals' causal contributions rather than bias from student sorting or other confounding factors, I conduct a quasi-experimental validation similar to Chetty et al. (2014). Specifically, I examine whether changes in student outcomes following principal turnover correspond to changes in predicted principal value-added. If the estimates capture true principal effectiveness, improvements (declines) in estimated principal value-added should be associated with corresponding improvements (declines) in student outcomes when schools experience leadership changes.

Second, I examine whether principal value-added and student outcomes differ systematically when students are demographically matched to principals by race or gender. The main methodological challenge lies in the non-random assignment of principals to schools. To address this, I will use fixed-effects models that exploit within-school, overtime variation in principal identity. The baseline analysis compares student outcomes before and after a leadership change within the same school, controlling school, grade, and year fixed effects. This design removes time-invariant differences across schools (such as resources or community characteristics) and statewide trends. I will extend the model to include student fixed effects (for students who remain in the same school across principal transitions) and principal fixed effects (for principals who serve in multiple schools) to separate leadership effects from school-specific factors.

As a complementary strategy, I will implement a triple-difference framework that compares changes in outcomes for students who share a principal race or gender to those who do not, before and after leadership transitions, relative to schools experiencing principal turnover without demographic change. I will also estimate event-study models to test pre-trends and examine how effects evolve over time.

Finally, to understand mechanisms, I will assess whether principal demographics influence teacher diversity, retention, disciplinary practices (i.e. giving suspensions), and effectiveness, linking these school-level changes to student outcomes. Together, these approaches provide a robust framework for identifying the causal impact of principal–student demographic matching on academic, behavioral, and longer-term outcomes.

How will this research benefit the State of Maryland in terms of state or local policy and/or practice?

This project addresses two related policy questions using Maryland-specific empirical evidence: principal effectiveness and the effects of principal–student demographic matching on students' short- and long-term outcomes.

First, the study evaluates principal effectiveness by estimating their value-added and then using principal turnover as a mechanism for understanding how principal value-added affects school outcomes such as test scores, attendance, and disciplinary outcomes. This approach assesses the extent to which principals matter and for which school-based outcomes. Linking these value-added estimates to longer-term outcomes such as postsecondary enrollment and labor market participation then creates the opportunity to measure whether differences in principal effectiveness are associated with students' subsequent educational and economic trajectories. If principals play a key role in some dimensions of student outcomes but not others, targeted interventions to help close gaps where they are largest can be designed, tested, and implemented, for example through enhanced principal training or additional in-school support. The bottom line is that without understanding the roles that

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principals play in student outcomes, it is difficult, if not impossible, to help create level playing fields for students when it comes to principal assignments and roles.

The second part examines whether student outcomes differ when students are exposed to principals who share their demographic characteristics. This analysis evaluates whether demographic alignment improves student performance, especially for socioeconomically disadvantaged students, who have been documented as having lower educational performance. If meaningful effects of matching along demographic dimensions such as race, gender, and ethnicity are identified, the findings may provide supporting evidence for ongoing policy, including the Blueprint for Maryland's Future Pillar 2, regarding the importance of school leader diversity. The results would also suggest that meaningful efforts to expand the school leadership pipeline could lead to consequential improvements in student outcomes, for example through policies aimed at broadening access to principal and assistant principal positions via improved salaries, enhanced training and mentorship, and additional resources within schools.

In addition, the study documents how frequently principal–student demographic alignment occurs across Maryland schools. These descriptive patterns provide a baseline description of current demographic matching in Maryland and suggest whether there is demographic sorting across schools. This may help assess the current distribution of school leadership diversity and support ongoing projects, such as Blueprint for Maryland's Future Pillar 2, by identifying schools that may lack principal diversity.

Although this study does not provide a direct solution for optimal principal assignments, its findings may support future work in this area. For example, a model of optimal principal assignments could be constructed following the “second-best” optimal assignment framework developed by Eastmond et al. (2026). While their work focuses on teacher–student assignments, the framework provides a structure for thinking about how match-specific demographics and the comparative advantage of teaching staffs affect overall outcomes.

Reference

Eastmond, T. S., Ricks, M., Betts, J., & Mather, N. (2026). Welfare added? Optimal teacher assignment with value-added measures (NBER Working Paper No. 34768). National Bureau of Economic Research. <https://doi.org/10.3386/w34768>

Explain why this research requires longitudinal cross-sector data?

This study requires longitudinal cross-sector data to follow students from K–12 through postsecondary education and into the workforce. Linking student records with principal demographics allows analysis of how leadership diversity affects academic and behavioral outcomes in school. Connecting these data to higher education and labor market records makes it possible to assess whether early exposure to demographically matched principals influences college enrollment, degree completion, and employment outcomes. This cross-sector linkage is essential for understanding both the short- and long-term impacts of principal representation on Maryland students.

Proposed Center Output

(Typical products for the MLDS Center include a research series presentation to stakeholders and a research brief in the MLDS Center template).

I will produce two main outputs for the MLDS Center:

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- A Research Series Presentation to share key findings with MLDS stakeholders and policymakers, focusing on how principal diversity affects student outcomes, teacher composition, and long-term educational and workforce trajectories. - A Research Brief in the MLDS Center template summarizing the study's motivation, data, methodology, results, and policy implications in an accessible format.
Timeline for the proposed project (identify major deliverables and approximate dates)
The project is expected to take approximately one to one and a half years, depending on the timing of MLDS data access. Data Access and Preparation (3 months): Upon project approval and data delivery—anticipated by February 2026—I will complete data cleaning, merging, and construction of analytic variables. Descriptive and Baseline Analysis (3 months): Then I will conduct descriptive analyses and estimate baseline fixed-effects models. Extended Analysis and Mechanisms (3 months): Next, I will develop event-study and triple-difference models and explore mechanisms related to teacher composition and effectiveness. Presentation and Feedback (2 months): By the end of 2026, I will present preliminary findings at the University of Maryland Economics Brownbag Seminar and incorporate feedback. Revision and Dissemination: In the middle of next year, I will finalize the Research Brief and prepare materials for dissemination.
Plans for further development (i.e. journal submission, etc)
Following the completion of the analysis, I plan to revise the paper based on feedback and prepare it for journal submission. The manuscript will be targeted to a peer-reviewed journal in labor economics or the economics of education. I also plan to present the paper at academic conferences in labor economics or education policy. In the longer term, this project will form one chapter of my Ph.D. dissertation, with potential extensions examining leadership diversity and school equity outcomes in other states.

Section 3. MLDS Center [Research Agenda](#)

Does your project relate to one of the following areas which the General Assembly has specifically directed the MLDSC to study:	Yes	No
The impact of a State or federal education program? ¹	X	
The performance of educator preparation programs?	X	

¹ All projects must relate to a state or federal education program. If you are not sure, please contact ross.goldstein@maryland.gov.

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Best practices regarding classroom instruction?	X	
The impact of child welfare programs on the educational and economic outcomes of students?		X
An analysis of social determinants, provided by State agencies ² and appropriate local agencies, that impact education performance of students and indicate the need for wraparound services for students.		X
Does your project use State or Federal financial aid ³ data?		X
If you are requesting to use FAFSA data please explain how this research will benefit the administration of Title IV federal financial aid.		
N.A.		
Research Agenda Category (page 2 of the Research Agenda) – Which category does the project address? Please explain.		
Educational, Service & Workforce Outcome This study examines how principal–student demographic matching (by race and gender) influences students’ academic, behavioral, and long-term outcomes, including college enrollment and employment trajectories. It aligns with the Educational, Service & Workforce Outcomes category by analyzing how the demographic characteristics of school leadership and their alignment with students predict variations in educational and workforce outcomes.		
Research Agenda Themes (page 2-3 of the Research Agenda) - Which cross cutting theme is incorporated in the project? Please explain.		
Equity and Inclusion The project directly relates to Equity and Inclusion by studying how diversity in school leadership influences outcomes for students with same racial and gender backgrounds.		

² State agencies include: Maryland Department of Health, Department of Human Services, and Department of Juvenile Services

³ Financial aid data derived from the FAFSA may only be used in research to improve the administration of federal financial aid programs.

Section 4. Data and Cross Sector Analysis

Please review the MLDS Center [Data Inventory](#) and the MLDS Center [Data Gap Analysis](#) prior to completing this section.

Sectors* *The data falling within each sector is outlined below. The purpose of this section is to ensure the project is cross sector. Projects will not necessarily use all data elements within the sector (see methods section for definitions of measures).	X
Early Childhood Education Sector	
K-12 Education Sector	X
Adult Education Sector	
Justice Involved Youth Sector	
Child Welfare Sector	
Postsecondary Education Sector	X
Other Completions and Credentials Sector	X
Workforce Sector	X

Put an 'x' next to each data sector your project will include. You must have at least 2 sectors.

Do you plan to request to include external data as part of your project?

*Sectors

Early Childhood Education Sector

- PreK Academic Engagement

K-12 Public School Education Sector

- Enrollment and attendance
- Assessments
- Courses and grades
- Completions
- Discipline
- Public School Characteristics

Adult Education Sector

- GED/NEDP Exam Results
- Apprenticeship
- Adult Education
- Correction Education

Juvenile Justice Sector

- Juvenile Justice Records
- Juvenile Education Records

Child Welfare Sector

- Out-of-Home Placements

Postsecondary Education Sector

- College and University Enrollment
- College and University Courses, Credits and Grades
- College and University Degrees
- College and University Workforce Training
- Financial Aid

Other Completions and Credentials Sector

- Industry Certifications
- Licenses

Workforce Sector

- Public School Teachers
- Public School Staff
- Workforce visibility/participation
- Workforce Earnings
- Workforce Industry

Section 5. Financial Information

The MLDS Center incurs costs for every project related to: (a) IT support and infrastructure; (b) assistance from subject matter experts, (c) criminal history background checks; and (d) creation of an analytic data set. Average project costs are between \$1,000 and \$3,000. A detailed, customized estimate will be provided prior to project initiation. (Please indicate your answer with an "X")	
☐	I will reimburse MLDSC for all applicable fees.
☐	I will only be able to provide partial reimbursement.
☒	I will need a waiver.
Grant Funding (indicate with an 'X')	
☐	This project has already received funding
☐	I plan to apply or am in the process of applying for grant funding
☒	No grant funding is planned
Name of Grantor	
RFP or Grant Program Information (you may provide a link to the grantor's website)	
Amount of grant funds sought or awarded.	
Grant Application Date	
Do you intend to proceed without grant funding? Yes, the Economics department of the University of Maryland provides travel and research expense for graduate students.	
Are you receiving other funding for this proposed project? If yes, how much?	

Section 6. Special Considerations

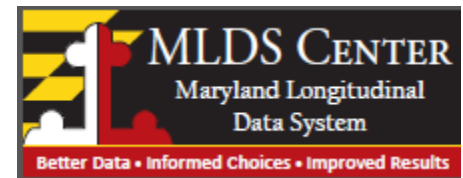
Principal Investigators NOT affiliated with a Maryland College or University – please provide information on: a. Your familiarity with Maryland policies affecting your research topic; and b. How your project meets a specific Maryland research need? Please also upload (with this form) any letters of reference or endorsement from a Maryland researcher or a State or local agency that vouches for your qualifications and expertise.
N.A.
For projects that involve a small population, please confirm that you are aware of the MLDS Center's data suppression policy and explain how you will report your findings while conforming to the suppression requirements.
N.A.
For projects that involve a single school system, university, or program, please explain the statewide implications of the project. Please also upload (with this form) any letters of support from the subject (i.e. school system or university) of the study.
N.A.

Section 7. Project Team

Project Team - Please list all members of the research team and indicate roles and responsibilities. - If the Principal Investigator listed in Section 1 above is NOT the primary point of contact for the project (including research, data access, and presentations to stakeholders), please indicate which team member is the primary point of contact and provide that individual's contact information.		
Name and Organization	Role	Is system access needed? (Yes/No)
Judith Hellerstein, University of Maryland	Advisor	No
Nolan Pope, University of Maryland	Advisor	No

Section 8. Submission

Once this form is completed, please complete the online application ([here](#)) and upload this form, CVs for all members of the research team, and any other supporting materials.



*This form is subject to disclosure in a Public Information Act request.

Project Title	Agency Control #
Maryland National Board-Certified Teacher Incentives Equity Analysis	133

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Section 1. Principal Investigator

Principal Investigator (please list additional project team members in Section 7)
Lucy C. Sorensen
Principal Investigator's Email Address
lsorensen@learningpolicyinstitute.org
Name of University or Organization
Learning Policy Institute
Principal Investigator Background and Qualification (provide overview of experience and attach a CV)
Lucy Sorensen is a Principal Researcher at the Learning Policy Institute. She has 15 years of experience conducting K–12 education policy research using administrative data, with a substantial body of work focused on teacher labor markets, teacher effectiveness, and the impacts of teacher-focused policies on school systems and student outcomes. More broadly, her research uses quantitative methods to examine how education policies influence youth development and patterns of social and economic inequality. Her work has appeared in journals including the <i>Journal of Policy Analysis and Management</i>, <i>Economics of Education Review</i>, <i>Educational Evaluation and Policy Analysis</i>, and <i>Child Development</i>, and has been featured in outlets such as <i>The New York Times</i>, <i>Washington Post</i>, and

Important: Once submitted, this application is a public document that will be shared with stakeholders throughout the project review process and generally made available pursuant to a *Public Information Act Request*.

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NPR. Sorensen holds a PhD in Public Policy and MA in Economics from Duke University, and a BA in Economics and East Asian Studies from Yale University.

A completed form is available [here](#) for your review.

Section 2. Project Information

Background and Purpose of the Study

(No more than 500 words; please include references; references do not count toward the word count)

Across the U.S., schools serving high concentrations of low-income students and students of color often struggle to attract, retain, and develop experienced and well-qualified teachers. These staffing challenges directly affect student learning and contribute to inequities in educational opportunity.

Maryland has become a national test case for addressing this problem. In 2022, the state launched one of the country's most ambitious National Board Certification (NBC) programs, designed to attract, develop, and retain highly qualified teachers in the schools that need them most. Under this program, teachers who earn NB certification receive a \$10,000 annual salary increase, with an additional \$7,000 for those who remain in or transfer to schools identified as low performing. The state also fully covers NBC application and renewal costs.

These incentives were established as part of the Blueprint for Maryland's Future, a sweeping 10-year plan passed in 2021 to transform and equalize educational opportunity. Alongside the NBC incentives, the Blueprint raised starting teacher salaries to \$60,000, introduced a career ladder, and strengthened preparation, induction, and mentoring. Because the Blueprint emphasizes equitable access to highly effective teachers and continuous monitoring of implementation, rigorous evaluation of these incentives is essential for informing implementation, program design, and future policy decisions.

Early results are promising. Between the 2023–24 and 2024–25 school years, the number of National Board-Certified Teachers (NBCTs) in Maryland grew by more than 40%, from 1,626 to 2,279 (Maryland State Department of Education, 2025). Each year, MSDE publishes a list of low-performing schools eligible for the additional \$7,000 equity incentive. This list includes schools that earned a 1- or 2-star rating in Maryland's Accountability System in two of the three most recent years of available data, as well as schools nominated by their local educational agency as among the lowest-performing 10 percent in the district. Teachers who commit to these schools remain eligible even if their school's performance later improves.

LPI proposes a study of these equity-oriented incentives to determine how effectively they promote equal access to effective instruction and reduce turnover in low-performing schools. This research builds on extensive evidence that access to qualified teachers is a central equity issue. Teachers are more likely to leave schools serving low-income and minoritized students due to challenging working conditions and lower pay (Cardichon et al., 2020; Darling-Hammond, 2024). This turnover forces high-need schools to rely on underprepared educators, undermining student learning and school climate (Boyd et al., 2006; Clotfelter et al., 2007; Podolsky et al., 2019; Sorensen & Ladd, 2020). Targeted financial incentives can help reverse these trends: research shows they reduce turnover (Springer et al., 2016), improve outcomes (Swain et al., 2019), and attract effective teachers to priority schools (Cowan & Goldhaber, 2018).

The NBC process itself can also improve teaching quality by fostering reflection, mentorship, and professional community (Coskie & Place, 2008; Lustick, 2011; Park et al., 2007). NBCTs have been shown to raise student achievement more than other teachers, yet are historically concentrated in more advantaged schools (Goldhaber et al., 2007; Clotfelter et al., 2010). Maryland's program directly

addresses this inequity by combining unusually large salary incentives with highly targeted supports for low-performing schools.

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Sorensen, L. C., & Ladd, H. F. (2020). The hidden costs of teacher turnover. *AERA open*, 6(1), 2332858420905812.

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Springer, M. G., Swain, W. A., & Rodriguez, L. A. (2016). Effective teacher retention bonuses: Evidence from Tennessee. *Educational Evaluation and Policy Analysis*, 38(2), 199-221.

Swain, W. A., Rodriguez, L. A., & Springer, M. G. (2019). Selective retention bonuses for highly effective teachers in high-poverty schools: Evidence from Tennessee. *Economics of Education Review*, 68, 148-160.

Research Project Question

1. How does student exposure to National Board Certified Teachers (NBCTs) vary by student race/ethnicity, socioeconomic status, disability status, and English learner status?
2. How has the number of NBC teachers and candidates in Maryland changed over time?
 - a. By district
 - b. By teacher demographics
3. How does the demographic composition of teachers vary by NB candidates, NBC completers, and all teachers, statewide and by LEA?
4. To what extent have the NBC salary incentives increased the proportion of teachers (or proportion of eligible teachers) who are NB candidates and NBCTs in Low Performing Schools (LPS)?**
 - a. Through changes in teacher mobility to or from LPS?
 - b. Through changes in teachers seeking certification in LPS?
 - c. Through changes in teacher retention in LPS?

*We have access to separate data from the National Board of Professional Teaching Standards (NBPTS) that allows us to answer question 2.

**Answering question 4 is contingent on teacher-level linkages between the NBPTS records and MLDS staffing data between 2016-17 and the present.

Research Methods

(Please include information for: Sample/Cohort and Justification; Definition of Measures and Constructs; Analysis Approach)

Sample. This study will draw from teacher- and student-level data between 2016-17 and the most recent year in the data (2024-25 currently) from the full universe of K-12 public schools in the state. We restrict the teacher sample to licensed NBC and non-NBC *classroom* teachers, in particular, because this allows us to link each student to each of their classroom teachers. We seek to use data from both prior to the policy change in 2022 and after the policy change in order to observe changes over time in student and teacher outcome measures. The 2016-17 school year serves as the first year of the data because we need several years in the pre-policy and pre-pandemic period over which to establish pre-treatment trends and test necessary assumptions for a difference-in-differences analysis. Furthermore, the process to achieve National Board Certification went under a major overhaul between 2015 and 2017, and so teacher certification data prior to the 2016-17 school year may not be as comparable.

Measures.

Relevant to the proposed study, we will examine MSDE teacher-level variables on National Board Certification status as well as the dates that the certification is valid (available since the 2022-23 school year). Contingent upon linkage with NBPTS records, we will also use historical and current

measures of teacher candidacy for NB certification. These records contain detailed information on the teacher's pursuit of NBC, including:

- Certification subject area
- Date of account registration
- Date of first component purchased (this initiates candidacy)
- Date of each component purchased
- Date of achieving certification
- Date of certification expiration
- Race/ethnicity of teacher

In addition to NB candidacy and certification, our primary outcomes related to teachers will be:

- Teacher retention: the proportion of classroom teachers at the school remaining as classroom teachers at that same school in the following school year.
- Teacher mobility: the rate of classroom teachers moving to a low performing school from a different Maryland public school.

We will also use teacher-level information on education, certification, demographics, and experience, to further examine the characteristics of teachers affected by the teacher salary incentive. We will use variables related to student and school demographic characteristics to explore differential impacts of the policy across different subgroups of students.

In addition to statewide incentives, we will document any district-specific (LEA) policies that may influence National Board Certification uptake and teacher retention, including locally funded bonuses, mentoring and support programs, National Board Networks, partnerships with higher education institutions, and application assistance. These measures will be constructed using historical district policy documents, NBPTS records, publicly available information, and targeted outreach to large districts. NBPTS tracks many district policies, which will facilitate data collection.

Analysis. In addition to descriptive tables and graphs, we will employ a difference-in-differences (DiD) analysis, a quasi-experimental method, to isolate program effects, comparing changes over time between low-performing schools eligible for the \$7,000 salary supplement and similar schools that lie just outside eligibility based on student achievement. This approach first restricts the sample to only schools performing at baseline test proficiency levels equal to or lower than the highest performing low-performing school identified through local eligibility, ensuring more similar characteristics across the treatment and control groups. (This restriction corresponds approximately to schools with average ELA and math proficiency rates of below 41 percent in the 2018-19 school year). We then would conduct DiD estimation, which compares the average changes in each outcome between the post- and pre-period for eligible schools to the average changes in each outcome between the post- and pre-period for similar-performing control schools. This is typically achieved through regression analysis with school and year fixed effects to account for fixed school characteristics. Assuming that the eligible schools would have followed similar trends to the matched control schools after 2022 if not for the NBC teacher salary incentive, this approach provides a causal estimate of the impact of the program on key outcomes. To account for the staggered nature of eligibility for the salary incentive—since there are multiple cohorts of low-performing schools identified by the state of Maryland—we will replicate all analyses using a modern difference-in-differences estimator such as the Stacked DiD estimator. We will restrict the control group to only contain never-treated schools, since it is possible that teachers could have knowledge about future school eligibility and change their behavior prior to the incentive being formally activated. Finally, we will conduct heterogeneity analyses comparing

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districts with and without substantial local initiatives to assess whether the state incentive effects differ depending on the presence of additional LEA support programs.
How will this research benefit the State of Maryland in terms of state or local policy and/or practice?
This research will benefit the State of Maryland by both evaluating a recent, large-scale state policy initiative and providing more generalizable evidence on how the state and/or its districts can best improve teacher retention and effectiveness in the highest-need schools. It can identify how schools and students have benefitted from the incentive program rolled out as part of the Blueprint for Maryland's Future. It will also test whether the policy has successfully improved the stability of the teacher workforce in high-need schools, explore the distributional impact of the policy on NB certified teachers across the state, and inform future policy actions to address teacher staffing challenges. We will engage with MSDE and AIB staff to ensure that findings are responsive to current policy priorities and support ongoing implementation and evaluation efforts. Findings will inform decisions about sustaining, refining, or expanding Blueprint investments in teacher workforce initiatives, particularly those aimed at improving equity in access to effective educators. Finally, the project aims to help establish a permanent linkage of National Board candidacy data to the Maryland Longitudinal Data System, providing the state with sustained data access to support ongoing policy evaluation, program improvement, and research on teacher effectiveness.
Explain why this research requires longitudinal cross-sector data?
This research requires longitudinal data because our research approach relies on changes in outcomes over time, between the period prior to the policy change and the period following the policy change. It requires cross-sector data because necessary staffing variables are included in the workforce data (e.g. teacher certification, experience) and necessary student outcomes variables are included in the MSDE student data (test scores, attendance). We will link the teacher workforce records to the student records using classroom-level data, which includes both IDs.
Proposed Center Output (Typical products for the MLDS Center include a research series presentation to stakeholders and a research brief in the MLDS Center template).
In order to ensure our findings are presented to relevant stakeholders in Maryland, we propose the following dissemination products for the MLDS Center: • A research series presentation to stakeholders • A research brief in the MLDS Center template • A presentation of findings to MSDE and AIB Solicitation of MSDE and AIB input and feedback on preliminary report of findings
Timeline for the proposed project (identify major deliverables and approximate dates)
• Spring, 2026: Preliminary data cleaning and analysis (research questions 1 and 2) • May 30, 2026: Report on early descriptive findings due to funder

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- Summer, 2026: Construct student-teacher longitudinal dataset and perform DID analysis of impacts on school-level outcomes - Fall, 2026: Perform longitudinal analyses with NBC-linked dataset - Winter, 2026: Write report (research questions 3 and 4) and conduct peer review and dissemination January 15, 2027: Final report due to funder
Plans for further development (i.e. journal submission, etc)
The project will overall lead to two reports: one report on early descriptive findings by May 30, 2026, and the other report on longer-term findings and equity impacts by January 15, 2027. We may also seek to translate some of these findings into an academic-style article for submission to a peer-reviewed journal and academic conferences.

Section 3. MLDS Center [Research Agenda](#)

Does your project relate to one of the following areas which the General Assembly has specifically directed the MLDSC to study:	Yes	No
The impact of a State or federal education program? ¹	X	
The performance of educator preparation programs?		X
Best practices regarding classroom instruction?		X
The impact of child welfare programs on the educational and economic outcomes of students?		X
An analysis of social determinants, provided by State agencies ² and appropriate local agencies, that impact education performance of students and indicate the need for wraparound services for students.		X
Does your project use State or Federal financial aid ³ data?		X
If you are requesting to use FAFSA data please explain how this research will benefit the administration of Title IV federal financial aid.		
Research Agenda Category (page 2 of the Research Agenda) – Which category does the project address? Please explain.		
This research addresses multiple categories in the research agenda for the Maryland Longitudinal Data System, as described below. Program and policy evaluations. We propose to evaluate the effectiveness of the NBC teacher salary incentives introduced by the state of Maryland in 2022. We will assess the extent to which this program incentivized teachers to seek National Board certification, the extent to which is incentivized teachers to work at and remain at high-need schools, and the extent to which these changes		

¹ All projects must relate to a state or federal education program. If you are not sure, please contact ross.goldstein@maryland.gov.

² State agencies include: Maryland Department of Health, Department of Human Services, and Department of Juvenile Services

³ Financial aid data derived from the FAFSA may only be used in research to improve the administration of federal financial aid programs.

translated into improved student outcomes at the high-need schools. This can assist the state of Maryland in understanding and documenting the value of this program moving forward and also point to the components of the program that contribute most to its effectiveness.

Pathways and pipelines. This proposed research will also speak to the pathways and pipelines for educators in Maryland public schools. One central challenge in the state is the high turnover rates of teachers, particularly in high-need schools. Our research will determine whether an equity-based salary incentive can improve the pipeline of highly-qualified teachers into high-need schools and/or improve the retention of those highly-qualified teachers in those schools and in the profession.

Research Agenda Themes (page 2-3 of the [Research Agenda](#)) - Which cross cutting theme is incorporated in the project? Please explain.

Once again, the proposed research project incorporates two cross-cutting themes described in the MLDS research agenda.

Supports and barriers. In the case of the proposed research, we consider a policy aiming to increase support and reduce barriers for highly qualified teachers to work in the lowest-performing schools. Working conditions at schools serving high concentrations of students in poverty are known to be challenging due to long-standing resource deficits and more intensive student academic and non-academic needs. The NBC teacher salary incentive seeks to in some part counterbalance these challenging working conditions by reducing financial barriers for teachers to work in such schools and incentivizing their professional development.

Equity and inclusion. The set of low-performing schools receiving additional \$7,000 NBC teacher bonuses in Maryland serves students who are more likely to be low-income, racially minoritized, receiving special education services, and/or English learners. Our research aims to study a policy that could improve access to more highly qualified and effective teachers for this set of students. In doing so, it contributes to a broader evidence base on state policies that can improve equity and inclusion for student access to excellent instruction.

Section 4. Data and Cross Sector Analysis

Please review the MLDS Center [Data Inventory](#) and the MLDS Center [Data Gap Analysis](#) prior to completing this section.

Sectors* *The data falling within each sector is outlined below. The purpose of this section is to ensure the project is cross sector. Projects will not necessarily use all data elements within the sector (see methods section for definitions of measures).	X
Early Childhood Education Sector	
K-12 Education Sector	X
Adult Education Sector	
Justice Involved Youth Sector	
Child Welfare Sector	
Postsecondary Education Sector	
Other Completions and Credentials Sector	
Workforce Sector	X

Put an 'x' next to each data sector your project will include. You must have at least 2 sectors.

Do you plan to request to include external data as part of your project? No.

*Sectors

Early Childhood Education Sector

- PreK Academic Engagement

K-12 Public School Education Sector

- Enrollment and attendance
- Assessments
- Courses and grades
- Completions
- Discipline
- Public School Characteristics

Adult Education Sector

- GED/NEDP Exam Results
- Apprenticeship
- Adult Education
- Correction Education

Juvenile Justice Sector

- Juvenile Justice Records
- Juvenile Education Records

Child Welfare Sector

- Out-of-Home Placements

Postsecondary Education Sector

- College and University Enrollment
- College and University Courses, Credits and Grades
- College and University Degrees
- College and University Workforce Training
- Financial Aid

Other Completions and Credentials Sector

- Industry Certifications
- Licenses

Workforce Sector

- Public School Teachers
- Public School Staff
- Workforce visibility/participation
- Workforce Earnings
- Workforce Industry

Section 5. Financial Information

The MLDS Center incurs costs for every project related to: (a) IT support and infrastructure; (b) assistance from subject matter experts, (c) criminal history background checks; and (d) creation of an analytic data set. Average project costs are between \$1,000 and \$3,000. A detailed, customized estimate will be provided prior to project initiation. (Please indicate your answer with an "X")	
☒	I will reimburse MLDS Center for all applicable fees.
☐	I will only be able to provide partial reimbursement.
☐	I will need a waiver.
Grant Funding (indicate with an 'X')	
☒	This project has already received funding
☐	I plan to apply or am in the process of applying for grant funding
☐	No grant funding is planned
Name of Grantor	
Funds from the Walton Family Foundation through a subgrant with the National Board of Professional Teaching Standards	
RFP or Grant Program Information (you may provide a link to the grantor's website)	
Not through an RFP. Websites: https://www.waltonfamilyfoundation.org/ , https://www.nbpts.org/ . Our MOU with NBPTS ensures full research independence: "LPI shall conduct any research and prepare all Work Product with full editorial independence and in accordance with its professional research standards and policies."	
Amount of grant funds sought or awarded.	
\$125,000	
Grant Application Date	
N/A	
Do you intend to proceed without grant funding?	
N/A	
Are you receiving other funding for this proposed project? If yes, how much?	
No	

Section 6. Special Considerations

Principal Investigators NOT affiliated with a Maryland College or University – please provide information on:

- a. Your familiarity with Maryland policies affecting your research topic; and**
- b. How your project meets a specific Maryland research need?**

Please also upload (with this form) any letters of reference or endorsement from a Maryland researcher or a State or local agency that vouches for your qualifications and expertise.

We have done careful research into the Maryland National Board Certified Teachers salary incentive and its role within Blueprint implementation, and we will coordinate with MSDE and AIB staff to ensure the study addresses current policy priorities and complements existing evaluation efforts. In addition, we are collaborating for this project with the research team at the National Board for Professional Teaching Standards, who is providing consulting assistance on the details of certification, the Maryland policy, and district-specific initiatives.

Our project meets a specific Maryland research need in that it: (1) addresses multiple categories and cross-cutting themes in the MLDS research agenda; (2) evaluates a major Blueprint investment in strengthening the state's public school teacher workforce; and (3) can inform design and implementation features for future initiatives aimed at promoting a stable, effective, and equitable teacher workforce in the state.

Our study will complement other state evaluations. The AIB has contracted NORC to conduct a broader evaluation of the Blueprint for Maryland's Future, which will encompass a much wider scope (NORC, 2025). Their interim plan indicates that they will report several descriptive indicators related to teacher National Board Certification. Our proposed study is complementary to this effort but differs in analytic focus. Specifically, we aim to estimate the causal impacts of the National Board salary incentive policy alone on teacher retention in low-performing schools and on student outcomes across different student groups—outcomes that are central to the goals of the Blueprint. Our more targeted study of the incentive can provide deeper insight into the mechanisms through which the policy operates and inform potential refinements moving forward.

Our research team has extensive experience conducting quantitative research using administrative data on topics related to teacher policy and teaching effectiveness. See for instance:

- **Sorensen, L. C.**, & Ladd, H. F. (2020). The hidden costs of teacher turnover. *AERA open*, 6(1), 2332858420905812.
- **Swain, W. A.**, Rodriguez, L. A., & Springer, M. G. (2019). Selective retention bonuses for highly effective teachers in high poverty schools: Evidence from Tennessee. *Economics of Education Review*, 68, 148-160.
- Cardichon, J., **Darling-Hammond, L.**, et al. (2020). Inequitable opportunity to learn: Student access to certified and experienced teachers. Palo Alto, CA: **Learning Policy Institute**.

The communications and policy teams at LPI also have significant experience with dissemination and engagement with state policy-makers and decision-makers.

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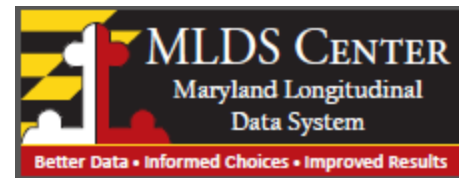
For projects that involve a small population, please confirm that you are aware of the MLDS Center's data suppression policy and explain how you will report your findings while conforming to the suppression requirements.
N/A
For projects that involve a single school system, university, or program, please explain the statewide implications of the project. Please also upload (with this form) any letters of support from the subject (i.e. school system or university) of the study.
N/A

Section 7. Project Team

Project Team - Please list all members of the research team and indicate roles and responsibilities. - If the Principal Investigator listed in Section 1 above is NOT the primary point of contact for the project (including research, data access, and presentations to stakeholders), please indicate which team member is the primary point of contact and provide that individual's contact information.		
Name and Organization	Role	Is system access needed? (Yes/No)
Lucy C. Sorensen, Learning Policy Institute	PI	Yes
Walker Swain, Learning Policy Institute	Senior Researcher	Yes
Chazz Higginbotham, Learning Policy Institute	Researcher	Yes
Linda Darling-Hammond, Learning Policy Institute	Senior Advisor	No

Section 8. Submission

Once this form is completed, please complete the online application ([here](#)) and upload this form, CVs for all members of the research team, and any other supporting materials.



*This form is subject to disclosure in a Public Information Act request.

Project Title	Agency Control #
From Homelessness to Education and Employment Systems: A Cross-Agency Data Match Study of Unaccompanied Youth in Maryland	ERA 137

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Section 1. Principal Investigator

Principal Investigator (please list additional project team members in Section 7)
Terry Shaw and Suzanne Korff
Principal Investigator's Email Address
tshaw@ssw.umaryland.edu Suzanne.korff@maryland.gov
Name of University or Organization
University of Maryland, School of Social Work Maryland Department of Housing and Community Development
Principal Investigator Background and Qualification (provide overview of experience and attach a CV)
Terry Shaw is an Associate Professor at the University of Maryland Baltimore, School of Social Work and his background and interests focus on leveraging existing administrative data systems to improve state policy and practice related to child and family health. Dr. Shaw is particularly interested in examining the pathways into and through child serving systems focusing on opportunities for state systems to collaborate, understand service overlaps, improve overall service delivery and address the multiple needs of the children and families involved with these systems (including child, youth and family physical and mental health; surveillance of psychotropic medication use; pathways to

Important: Once submitted, this application is a public document that will be shared with stakeholders throughout the project review process and generally made available pursuant to a *Public Information Act Request*.

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permanency; educational access; interactions between the court and child welfare services, and child maltreatment prevention). Dr. Shaw has over two decades of expertise in developing the infrastructure, relationships, and programming structure to successfully implement multi-agency data linking systems (having instituted data linking projects in South Carolina, California, and Maryland). Dr. Shaw has expertise in advanced statistical methods and extensive experience utilizing longitudinal data systems to answer questions related to service outcomes to inform policy and practice.

Suzanne Korff is a Senior Policy Officer, Division of Homeless Solutions at Maryland Department of Housing and Community Development. Suzanne oversees the contracted work on the Maryland Homeless and Management Information System and is the project officer overseeing the Youth REACH MD (Reach out, Engage, Assist, & Count to end Homelessness) effort to obtain accurate, detailed information about unaccompanied homeless youth in Maryland.

A completed form is available [here](#) for your review.

Section 2. Project Information

Background and Purpose of the Study

(No more than 500 words; please include references; references do not count toward the word count)

The State of Maryland Department of Housing and Community Development (MD DHCD) operates the Maryland Homeless Management Information System (MARYLAND HMIS). The HMIS is an internet-based database used by homeless service organizations throughout Maryland to record and store client-level services information for individuals and families at risk of homelessness. This information is designed to help the state and local continuums of care (CoCs) track service utilization, understand characteristics of their service population and evaluate the effectiveness of housing programs.

The data in the HMIS system can provide opportunities to efficiently target housing and service resources to meet the needs homeless persons and those at risk of homelessness. The data collected within the HMIS focuses on demographics, service needs and program outcomes. Educational records, participation in other service systems (such as Child Welfare or Juvenile Services), nor Labor records are collected as part of the HMIS system.

MD DHCD is interested in partnering with the MLDSC to integrate data from the MD HMIS system and provide opportunities to understand service overlaps and identify opportunities to efficiently partner with other service agencies.

As a first step the purpose of this study is to conduct an administrative data match between our statewide homeless services data and the data in MLDSC to provide an understanding of how homeless children and youth move between systems, and to explore risk factors for unaccompanied youth homelessness.

Through the MLDS we have the opportunity to develop a more complete understanding of the educational processes, educational outcomes, and service history (DJS and Child Welfare) for youth who are identified as being homeless.

Research Project Question

For children and unaccompanied youth (children in the HMIS data system under the age of 25 at the time of services in the HMIS):

- What is the degree of record match between youth identified in HMIS and the MLDS?
- What percentage of unaccompanied young adults (age 25 and under) and children in the HMIS data system have history in the juvenile justice system?
- What percentage of unaccompanied young adults (age 25 and under) and children in the HMIS data system have history in the child welfare system?
- How does the data in the HMIS system compare to data already known in the MLDSC system (homeless indicators)?
- To what extent do youth in HMIS also receive services in the education sector (such as free and reduced-meals, special education, and English language services) and how does this compare with the population of Maryland as a whole?

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- What is the average education level obtained by unaccompanied homeless young adults (age 25 and under) and children in HMIS?
- What percentage of young adults (age 25 and under) and children who are eligible graduate high school on time? What percentage get a GED? And What percentage go on to higher education?
- What percentage of young adults (age 25 and under) and children who are eligible and are part of the HMIS system access the tuition waiver programs?
- What is the college uptake and employment outcomes of young adults (age 25 and under) and children that are part of the HMIS system? Of the young adults (age 25 and under) and children in the HMIS system who do enroll in higher education, do they persist through completion of a degree (what type of degree)?
- How many young adults (age 25 and under) and children identified in the HMIS system enroll in higher education and what is the timing of that enrollment (using the five college-going patterns: Complete, immediate, non-traditional, within one year, within two years – *defined below from the MLDSC data dashboard)?
- What are the educational and workforce outcomes of youth in HMIS (such as high school graduation, GED attainment, and college enrollment, persistence, and degree attainment)?
- To what extent are youth in HMIS also identified as homeless based on McKinney-Vento?

* **Immediate College Enrollment** includes high school graduates who enroll in college as full-time, degree-seeking students in the fall immediately following high school graduation.

Complete College Enrollment includes high school graduates who enroll in college either full-time or part-time as degree-seeking or non-degree seeking students at any point after high school graduation. Complete College Enrollment is not reported until three years have lapsed since high school graduation. The totals reported for the Complete enrollment are impacted by the number of years that have passed since high school graduation. The totals reported for Complete college enrollment should not be interpreted as declines in college enrollment as not all cohorts have been out of high school for the same number of years.

Within One Year College Enrollment includes high school graduates who enroll in college either full-time or part-time as degree-seeking or non-degree seeking students within one year of high school graduation.

Within Two Years College Enrollment includes high school graduates who enroll in college either full-time or part-time as degree-seeking or non-degree seeking students within two years of high school graduation. Enrollment data are not reported until two years have lapsed since high school graduation.

Non-Traditional College Enrollment includes high school graduates that either delayed degree-seeking enrollment in college until age 20, or enrolled for the first time as part-time degree-seeking. Non-Traditional College Enrollment is not reported until two years have lapsed since high school graduation.

Research Methods

(Please include information for: Sample/Cohort and Justification; Definition of Measures and Constructs; Analysis Approach)

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This is a descriptive examination of the factors discussed above, using counts, percentages, and correlations. Depending on the sample size chi-squared tests looking at differences between groups (HMIS identified or not) for the count measures will be calculated.

The initial exploration will look at youth and young adults (ages 25 and younger) who were identified as being part of the HMIS system in 2020. This snapshot will be used to understand the service and system overlap that occurs during services and up to 5 years after the completion of HMIS services. Older youth (18 and above) who are part of the HMIS system in 2020 will be used to explore high school completion, college uptake, and workforce results.

We are interested in understanding the rates and percentages discussed above and to set up a structure that is replicable as we continue to have additional data added to the MLDSC.

Administrative data match to understand the overlap between homeless services, and other social service systems targeting vulnerable children and youth.

How will this research benefit the State of Maryland in terms of state or local policy and/or practice?

The Maryland Department of Housing and Community Development has an interest in ongoing reporting of the outcomes of HMIS services and the results of this work will provide an understanding of outcomes outside of the possibility of the HMIS system itself.

The information collected and maintained in the HMIS system will provide an additional source of youth and children who have received homeless services in Maryland. This information will provide an opportunity for the MLDSC to examine the completeness of the existing homeless data within the MLDSC. The HMIS data is a source of information for other partner agencies to access that include information on homeless services uptake in Maryland.

This research is anticipated to help foster collaboration between youth homeless service providers locally, and their local McKinney Vento liaisons, community schools, public universities, Juvenile Services and local DSS Child Welfare offices, as well as state level collaboration between the DHCD Homeless Solutions policy team, and MSDE, DJS, DHS and MHEC.

Explain why this research requires longitudinal cross-sector data?

This requires data from the Maryland child welfare system, the Maryland Department of Human Services, the Maryland State Department of Education, the Maryland Department of Juvenile Services, and the Maryland Higher Education Commission. The exploratory questions on workforce outcomes requires data from the Department of Labor.

Without linked longitudinal access it would not be possible to examine the outcomes over time or the possible correlation between HMIS services participation and participation in other service systems (DHS and DJS) nor on students' mobility in school or workforce.

Proposed Center Output
(Typical products for the MLDS Center include a research series presentation to stakeholders and a research brief in the MLDS Center template).

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The results will be presented in a research series presentation and a research brief in the MLDS Center template showing the total number of children and youth served by multiple systems over time. The SAS code used to develop the queries will be made available for replication and the production of dashboards.

Timeline for the proposed project (identify major deliverables and approximate dates)

MLDS proposal submission – March 2026
 MD HMIS data integration – August - September 2026
 DHCD is considering proposing legislation to permanently add homeless services data to MLDS for sustainability, and long-term policy coordination - Complete external data procedures for ongoing participation in the MLDS – March 2027
 MLDS RPB presentation – March 2027
 MLDS analyses – August through December 2026
 Discussion of results with HMIS staff – December 2026
 Research series presentation – Spring 2027

Plans for further development (i.e. journal submission, etc)

Creation of a report for MD HUD and data tables to be included as part of the YouthREACH report (June 2027).

Section 3. MLDS Center [Research Agenda](#)

Does your project relate to one of the following areas which the General Assembly has specifically directed the MLDS to study:	Yes	No
The impact of a State or federal education program? ¹	x	
The performance of educator preparation programs?		x
Best practices regarding classroom instruction?		x
The impact of child welfare programs on the educational and economic outcomes of students?	x	
An analysis of social determinants, provided by State agencies ² and appropriate local agencies, that impact education performance of students and indicate the need for wraparound services for students.	x	
Does your project use State or Federal financial aid ³ data?		x
If you are requesting to use FAFSA data please explain how this research will benefit the administration of Title IV federal financial aid.		

¹ All projects must relate to a state or federal education program. If you are not sure, please contact ross.goldstein@maryland.gov.

² State agencies include: Maryland Department of Health, Department of Human Services, and Department of Juvenile Services

³ Financial aid data derived from the FAFSA may only be used in research to improve the administration of federal financial aid programs.

Research Agenda Category (page 2 of the Research Agenda) – Which category does the project address? Please explain.
Educational, Service & Workforce Outcomes: Research and reports on student-level and/or institutional-level characteristics and the importance of these characteristics in predicting outcomes.
Research Agenda Themes (page 2-3 of the Research Agenda) - Which cross cutting theme is incorporated in the project? Please explain.
Social determinants – understanding the impact of homelessness on educational and workforce outcomes, assessing % of children experiencing homelessness accessing McKinney Vento supports, understanding the overlap between child welfare and juvenile services involvement, and future homelessness.

Section 4. Data and Cross Sector Analysis

Please review the MLDS Center [Data Inventory](#) and the MLDS Center [Data Gap Analysis](#) prior to completing this section.

Sectors* *The data falling within each sector is outlined below. The purpose of this section is to ensure the project is cross sector. Projects will not necessarily use all data elements within the sector (see methods section for definitions of measures).	X
Early Childhood Education Sector	
K-12 Education Sector	X
Adult Education Sector	X
Justice Involved Youth Sector	X
Child Welfare Sector	X
Postsecondary Education Sector	X
Other Completions and Credentials Sector	X
Workforce Sector	X

Put an 'x' next to each data sector your project will include. You must have at least 2 sectors.

Do you plan to request to include external data as part of your project?
YES – Homeless Services Data, collected through local Continuums of Care (CoCs) in the HMIS (Homeless Management Information Systems)

*Sectors

Early Childhood Education Sector

- PreK Academic Engagement

K-12 Public School Education Sector

- Enrollment and attendance
- Assessments
- Courses and grades
- Completions

Child Welfare Sector

- Out-of-Home Placements

Postsecondary Education Sector

- College and University Enrollment
- College and University Courses, Credits and Grades
- College and University Degrees

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- Discipline
- Public School Characteristics

Adult Education Sector

- GED/NEDP Exam Results
- Apprenticeship
- Adult Education
- Correction Education

Juvenile Justice Sector

- Juvenile Justice Records
- Juvenile Education Records

- College and University Workforce Training
- Financial Aid

Other Completions and Credentials Sector

- Industry Certifications
- Licenses

Workforce Sector

- Public School Teachers
- Public School Staff
- Workforce visibility/participation
- Workforce Earnings
- Workforce Industry

Section 5. Financial Information

The MLDS Center incurs costs for every project related to: (a) IT support and infrastructure; (b) assistance from subject matter experts, (c) criminal history background checks; and (d) creation of an analytic data set. Average project costs are between \$1,000 and \$3,000. A detailed, customized estimate will be provided prior to project initiation. (Please indicate your answer with an "X")	
☒	I will reimburse MLDS for all applicable fees.
☐	I will only be able to provide partial reimbursement.
☐	I will need a waiver.
Grant Funding (indicate with an 'X')	
☒	This project has already received funding
☐	I plan to apply or am in the process of applying for grant funding
☐	No grant funding is planned
Name of Grantor	
Youth Homelessness Systems Improvement Project	
RFP or Grant Program Information (you may provide a link to the grantor's website)	
https://www.hudexchange.info/homelessness-assistance/resources-for-homeless-youth/yhsi/	
Amount of grant funds sought or awarded.	
\$2,000,000 awarded. \$705,882 for Data and Research	
Grant Application Date	
Awarded.	
Do you intend to proceed without grant funding?	
We have grant funding allocated.	
Are you receiving other funding for this proposed project? If yes, how much?	
We have state funds in our budget that could also support this work.	

Section 6. Special Considerations

Principal Investigators NOT affiliated with a Maryland College or University – please provide information on:

- a. Your familiarity with Maryland policies affecting your research topic; and
- b. How your project meets a specific Maryland research need?

Please also upload (with this form) any letters of reference or endorsement from a Maryland researcher or a State or local agency that vouches for your qualifications and expertise.

For projects that involve a small population, please confirm that you are aware of the MLDS Center's [data suppression policy](#) and explain how you will report your findings while conforming to the suppression requirements.

For projects that involve a single school system, university, or program, please explain the statewide implications of the project.

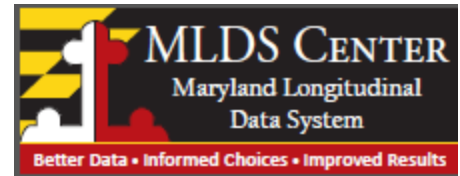
Please also upload (with this form) any letters of support from the subject (i.e. school system or university) of the study.

Section 7. Project Team

Project Team - Please list all members of the research team and indicate roles and responsibilities. - If the Principal Investigator listed in Section 1 above is NOT the primary point of contact for the project (including research, data access, and presentations to stakeholders), please indicate which team member is the primary point of contact and provide that individual's contact information.		
Name and Organization	Role	Is system access needed? (Yes/No)
Suzanne Korff, Maryland Department of Housing and Community Development	Senior Policy Officer	Yes
Dr. Terry Shaw, University of Maryland	Data Analyst	Yes

Section 8. Submission

Once this form is completed, please complete the online application ([here](#)) and upload this form, CVs for all members of the research team, and any other supporting materials.



*This form is subject to disclosure in a Public Information Act request.

Project Title	Agency Control #
Effects of Baltimore Workforce Training Programs on Employment, Earnings, and Recidivism in Maryland	143

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Section 1. Principal Investigator

Principal Investigator (please list additional project team members in Section 7)
Dr. Rachel Durham
Principal Investigator's Email Address
rdurham@ndm.edu
Name of University or Organization
Notre Dame Of Maryland University
Principal Investigator Background and Qualification (provide overview of experience and attach a CV)
Rachel E. Durham (Ph.D. in Sociology/Demography, Pennsylvania State University) is a Professor of Education at Notre Dame of Maryland University (NDMU). She is also Senior Research Fellow at the Baltimore Education Research Consortium (BERC) and a member of the Research and Policy Board at the Maryland Longitudinal Data System Center. With a background in the sociology of education, her previous published research has focused on Baltimore City Schools graduates' transitions through high school and into early adulthood, career and technical education, as well as full-service community schools, and research-practice partnerships. Prior to joining NDMU, she spent 11 years as a research faculty member at Johns Hopkins University.

Important: Once submitted, this application is a public document that will be shared with stakeholders throughout the project review process and generally made available pursuant to a *Public Information Act Request*.

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A completed form is available [here](#) for your review.

Section 2. Project Information

Background and Purpose of the Study (No more than 500 words; please include references; references do not count toward the word count)
This project aims to determine the outcomes of recent participants of several dozen occupational skills training programs supported by the Baltimore Workforce Funders Collaborative (BWFC) using data housed at the Maryland Longitudinal Data System Center (MLDSC). The specific outcomes to be examined include employment entry, job retention, wages, entry into other job training or apprenticeship programs, and criminal recidivism (if feasible). In Baltimore city, one-in-five residents live at or below the federal poverty threshold (U.S. Census Bureau, 2025), which stems from structural barriers to gainful employment, such as low rates of high school graduation (Maryland State Department of Education, 2025) and postsecondary degree completion (Durham et al., 2023), mass incarceration of youth and adults (Campbell, 2025; Pager, 2008), and mismatches between worker skills and meaningful job opportunities. Thus, effective occupational skills training programs are crucial to improving the social and economic welfare of Baltimore city. To date, employment and wage outcomes have been reported in aggregate for specific BWFC occupational training programs. However, reports have been largely descriptive and lacked a comparative research design that allows for rigorous conclusions about program effects. We build upon prior work to implement a rigorous research design, as well as to determine the feasibility of leveraging novel data sources available through MLDSC, including data from the Maryland Department of Corrections (DOC) to measure recidivism (if feasible).
Research Project Question 1. As compared to program non-completers and a statistically matched comparison group, what are the impacts of the occupational training programs supported by the BWFC on participants' employment entry, job retention, apprenticeship, and workforce training programs, wages, and criminal recidivism*? 2. How do the impacts of program completion on each outcome vary by participant demographic characteristics, i.e., gender, race, and age? 3. How do the impacts of program completion vary across specific training programs? *If linkage to data from the Department of Corrections is feasible.
Research Methods (Please include information for: Sample/Cohort and Justification; Definition of Measures and Constructs; Analysis Approach)
Prior to evaluating the outcomes stipulated in the research questions, propensity score matching approaches will be employed to ensure comparability between program completers and comparison group(s). Propensity score matching is a quasi-experimental method that reduces selection bias by identifying individuals for a comparison group who have a similar probability of receiving the treatment as those in the treatment group (i.e., occupational training participants) as determined by observable characteristics or experiences (Ho et al., 2011; Rosenbaum & Rubin, 1983). This phase of the research will involve the generation of several comparison groups through different matching techniques (i.e., nearest neighbor, strata, and full [weighted] matching), with results of later outcome analyses compared across matching techniques to ensure consistent and robust conclusions.

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Once suitable matched comparisons are identified, the research will proceed in four phases to address multiple outcomes of interest. First, employment entry will be measured as a dichotomous outcome indicated by Maryland UI wage visibility during the first full quarter following training program completion. This outcome will also compare employment status change from the quarter immediately before the training program participation commenced to post-completion (i.e., unemployed->employed, employed->unemployed, or no change per status). We also plan to supplement the UI wage data with information from the Maryland Comptroller to examine aggregate wages for subgroups of interest.

Second, job retention will be operationalized as UI wage visibility in subsequent quarters through the latest time period that MLDSC data are available as of August 31, 2026. The third outcome – wages – will be measured as absolute dollars earned per quarter as well as change in quarterly earnings from pre-training program participation to a year or more following program completion. We will also examine entry into apprenticeships and workforce training programs as exploratory outcomes of interest.

Finally, criminal recidivism will be operationalized as a criminal charge or conviction per DJS or DOC data during any observable quarter post-training program completion among participants with a criminal charge or conviction prior to program participation. This stage of the research will require special matching analyses to ensure that all members of the comparison group also experienced criminal justice involvement during a comparable age or time period.

To address Research Questions 2 and 3, we will conduct analyses to determine how effects on each of the four outcomes of interest differ by racial/ethnic group, gender, age category (e.g., 18-26, 27-34, 35-44, etc.), as well as by specific occupational training program. Age and occupational program will be provided by the BWFC.

Data availability within the MLDSC may be limited by statutory bounds around who may be included in the database, such as attendance at an educational agency within the last 20 years and whether that attendance occurred during the years of data included in the MLDSC, which spans 2007-08 through current. In practical terms, this implies that older occupational training participants who have not enrolled in a state education agency since their youth may be underrepresented in the research.

Depending upon program completion date, several years of post-program earnings may be observable. The research will explore earnings after at least one year or maximum three years, as feasible. Dollar amounts will be standardized to January 2026 dollars to adjust for inflation across time.

How will this research benefit the State of Maryland in terms of state or local policy and/or practice?

Effective occupational skills training programs are crucial to improving the social and economic welfare of Baltimore city. The BWFC has used several approaches to workforce training with several different populations in Baltimore city. We will report results back to BWFC so they have a better understanding of which programs are effective for which participants. These results can lead to better decisions about which programs to offer, where, when, and for whom. Specifically, this work will help actors within Baltimore's workforce ecosystem to measure and understand whether collective efforts are making progress in improving employment and earnings outcomes, reducing disparities, strengthening the workforce system, and achieving equity. This understanding can inform investments

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and strategies that lead to better occupational training and support services, better jobs, improved connectivity, and fewer gaps in service. The Baltimore Mayor's Office of Employment Development (MOED) and the Baltimore County Department of Economic and Workforce Development are members of the BWFC, and our results will be shared directly with these bodies for decision making.
Explain why this research requires longitudinal cross-sector data?
This research requires data from K12, postsecondary, juvenile justice, and the labor market to create propensity score matched groups. The research requires data from the labor market (and Corrections if feasible) for examining outcomes.
Proposed Center Output (Typical products for the MLDS Center include a research series presentation to stakeholders and a research brief in the MLDS Center template).
Presentations and research brief
Timeline for the proposed project (identify major deliverables and approximate dates)
BWFC provides external data for linkage – Summer 2026 Analyses and identifying the comparison group(s) – Fall 2026 Outcome analyses – Spring 2027 Dissemination – June – September 2027
Plans for further development (i.e. journal submission, etc)
Grant report(s), peer reviewed manuscript(s)

Section 3. MLDS Center [Research Agenda](#)

Does your project relate to one of the following areas which the General Assembly has specifically directed the MLDSC to study:	Yes	No
The impact of a State or federal education program? ¹	x	
The performance of educator preparation programs?		x
Best practices regarding classroom instruction?		x
The impact of child welfare programs on the educational and economic outcomes of students?		x
An analysis of social determinants, provided by State agencies ² and appropriate local agencies, that impact education performance of students and indicate the need for wraparound services for students.		x
Does your project use State or Federal financial aid ³ data?		x
If you are requesting to use FAFSA data please explain how this research will benefit the administration of Title IV federal financial aid.		

¹ All projects must relate to a state or federal education program. If you are not sure, please contact ross.goldstein@maryland.gov.

² State agencies include: Maryland Department of Health, Department of Human Services, and Department of Juvenile Services

³ Financial aid data derived from the FAFSA may only be used in research to improve the administration of federal financial aid programs.

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N/A
Research Agenda Category (page 2 of the Research Agenda) – Which category does the project address? Please explain.
Program and policy evaluation – We intend to understand whether the BWFC training programs have been successful in improving outcomes for Baltimore City participants.
Research Agenda Themes (page 2-3 of the Research Agenda) - Which cross cutting theme is incorporated in the project? Please explain.
Supports and barriers – Training is often a barrier for Baltimore City residents entering the workforce. We intend to examine the BWFC as a training model that can help to reduce that barrier.

Additional information on program funding and partnerships: Each workforce training program in the study is uniquely funded, typically by a combination of philanthropic dollars and public funds through grants such as MD EARN, SNAP E&T, City Administered ARPA funding, etc. BWFC does not have complete information about each organization's funding during the time period in which the training took place, and that would be difficult to identify.

Section 4. Data and Cross Sector Analysis

Please review the MLDS Center [Data Inventory](#) and the MLDS Center [Data Gap Analysis](#) prior to completing this section.

Sectors* *The data falling within each sector is outlined below. The purpose of this section is to ensure the project is cross sector. Projects will not necessarily use all data elements within the sector (see methods section for definitions of measures).	X
Early Childhood Education Sector	
K-12 Education Sector	X
Adult Education Sector	X
Justice Involved Youth Sector	X
Child Welfare Sector	
Postsecondary Education Sector	X
Other Completions and Credentials Sector	X
Workforce Sector	X

Put an 'x' next to each data sector your project will include. You must have at least 2 sectors.

Do you plan to request to include external data as part of your project?
Yes. We have submitted the external data request to add data from the BWFC.

*Sectors

Early Childhood Education Sector

- PreK Academic Engagement

K-12 Public School Education Sector

- Enrollment and attendance
- Assessments
- Courses and grades
- Completions
- Discipline
- Public School Characteristics

Adult Education Sector

- GED/NEDP Exam Results
- Apprenticeship
- Adult Education
- Correction Education

Juvenile Justice Sector

- Juvenile Justice Records
- Juvenile Education Records

Child Welfare Sector

- Out-of-Home Placements

Postsecondary Education Sector

- College and University Enrollment
- College and University Courses, Credits and Grades
- College and University Degrees
- College and University Workforce Training
- Financial Aid

Other Completions and Credentials Sector

- Industry Certifications
- Licenses

Workforce Sector

- Public School Teachers
- Public School Staff
- Workforce visibility/participation
- Workforce Earnings
- Workforce Industry

Section 5. Financial Information

The MLDS Center incurs costs for every project related to: (a) IT support and infrastructure; (b) assistance from subject matter experts, (c) criminal history background checks; and (d) creation of an analytic data set. Average project costs are between \$1,000 and \$3,000. A detailed, customized estimate will be provided prior to project initiation. (Please indicate your answer with an "X")	
☒	I will reimburse MLDS Center for all applicable fees.
☐	I will only be able to provide partial reimbursement.
☐	I will need a waiver.
Grant Funding (indicate with an 'X')	
☐	This project has already received funding
☒	I plan to apply or am in the process of applying for grant funding
☐	No grant funding is planned
Name of Grantor	
Abell Foundation	
RFP or Grant Program Information (you may provide a link to the grantor's website)	
https://abell.org/	
Amount of grant funds sought or awarded.	
\$45,000	
Grant Application Date	
March 2026	
Do you intend to proceed without grant funding?	
No	
Are you receiving other funding for this proposed project? If yes, how much?	
No	

Section 6. Special Considerations

Principal Investigators NOT affiliated with a Maryland College or University – please provide information on: a. Your familiarity with Maryland policies affecting your research topic; and b. How your project meets a specific Maryland research need? Please also upload (with this form) any letters of reference or endorsement from a Maryland researcher or a State or local agency that vouches for your qualifications and expertise.
For projects that involve a small population, please confirm that you are aware of the MLDS Center's data suppression policy and explain how you will report your findings while conforming to the suppression requirements.
Some of the included programs may have enrolled small numbers of participants. Any results disaggregated by specific program will be masked according to the data suppression policy (i.e., no counts or percentages representing fewer than 10 individuals, adjacent cell masking when counts/percentages sum to a known total/100%)
For projects that involve a single school system, university, or program, please explain the statewide implications of the project. Please also upload (with this form) any letters of support from the subject (i.e. school system or university) of the study.

Section 7. Project Team

Project Team - Please list all members of the research team and indicate roles and responsibilities. - If the Principal Investigator listed in Section 1 above is NOT the primary point of contact for the project (including research, data access, and presentations to stakeholders), please indicate which team member is the primary point of contact and provide that individual's contact information.		
Name and Organization	Role	Is system access needed? (Yes/No)
Angela Henneberger	Co-PI	Yes (Already has it)

Section 8. Submission

Once this form is completed, please complete the online application ([here](#)) and upload this form, CVs for all members of the research team, and any other supporting materials.

References

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*This form is subject to disclosure in a Public Information Act request.

Project Title	Agency Control
From School to Workforce: A Data-Driven Journey to Understanding Participation Disparities in Computer Science	ERA 104

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Section 1. Principal Investigator

Principal Investigator (please list additional project team members in Section 7)
Xiaoxue Zhou
Principal Investigator's Email Address
xxzhou@umd.edu
Name of University or Organization
The University of Maryland, College Park
Principal Investigator Background and Qualification (provide overview of experience and attach a CV)
Xiaoxue Zhou is a Ph.D. candidate in Technology, Learning, and Leadership (Technology-Based Learning) at the University of Maryland, College Park (expected May 2026). Her approved dissertation utilizes linked MLDS datasets to quantify disparities in computer science participation from K-12 through postsecondary and early workforce outcomes, employing disparity indices, discrete-time hazard models, and multilevel models. Since 2021, she has cleaned, merged, and analyzed multi-year administrative data to produce statewide CS participation reports for the Maryland Center for Computing Education. Her CV is attached.

Important: Once submitted, this application is a public document that will be shared with stakeholders throughout the project review process and generally made available pursuant to a *Public Information Act Request*.

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A completed form is available [here](#) for your review.

Section 2. Project Information

Background and Purpose of the Study

(No more than 500 words; please include references; references do not count toward the word count)

Computer science (CS) has emerged from its STEM roots as a distinct discipline focused on algorithms, programming, and system design (Guzdial & Morrison, 2016). As CS innovation has become increasingly important across industries, interest in expanding CS learning opportunities in K–12 has grown (Hubwieser et al. 2014). In response, K-12 computer science education (CSEd) has increasingly emphasized computational thinking and problem-solving skills (Barr & Stephenson, 2011; Grover & Pea, 2013). Despite national efforts such as Broadening Participation in Computing (BPC) and Computer Science for All (CSforALL), progress in diversifying computer science has been uneven. While participation has increased overall, with more women and Hispanic students entering CS programs, structural inequities persist, particularly for intersectional groups (e.g., Hispanic Female Students with Language proficiency barriers) who face compounded marginalization (Zarch et al., 2020; Sax et al., 2024; Childs et al., 2024). For instance, since 2006, the number of graduates majoring in CS has grown by over 300%. Yet, women’s share of computing bachelor’s degrees has stagnated or declined (Melton & Rorrer, 2024), and Black and Hispanic women remain significantly underrepresented in the field, earning less than 10% of computing degrees combined (NCSES, 2023). Gaps are also clear for students from rural schools, low-income families, and immigrant communities (Warner et al., 2022; Lei & Allen, 2022; Greenwood, 2023). These patterns underscore the urgency of asking: (1) Who is underrepresented in CS learning and early employment? (2) When do disparities emerge, widen, or narrow across the educational-to-workforce pipeline? and (3) How are the participation disparities at the secondary level significantly associated with college CS participation and workforce outcomes?

Research on underrepresentation in CS has often been studied in isolation across stages- K-12 (Bahar et al., 2022), postsecondary (Greenwood, 2023), and the workforce (Marshall & Grooms, 2022) -without a comprehensive lens that follows students across the full educational-to-workforce pipeline. As a result, little is known about when disparities emerge, how they evolve across education to workforce transition points, and whether they widen or narrow over time. A recent national report shows that while 44% of female students enroll in CS courses in middle school, this rate drops to 32.5% in high school, 21% in college, and 26.8% in the computing workforce (code.org, 2024; NCSES, 2023; NCWIT Scorecard, 2024). Such findings suggest critical “leakage points” along the pipeline where women and other historically underrepresented groups disproportionately disengage from CS pathways. Identifying these transition points is crucial for informing targeted interventions.

By systematically quantifying disparities across the educational and workforce pipeline, this study provides a nuanced understanding of who is excluded from computing and when inequities are most pronounced. Specifically, it evaluates whether participation influences later learning outcomes through the lens of the CAPE framework (Fletcher & Warner, 2021), which examines Capacity, Access, Participation, and Experiences in computer education. The findings are expected to generate actionable, data-driven evidence that can inform strategies to promote equitable participation in CSEd and employment. This work will benefit multiple audiences- including state and institutional policymakers aiming to broaden participation in

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CS, educators and program leaders designing inclusive interventions across K-12 and postsecondary settings, and researchers and scholars in computing education and equity studies.

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Zarch, R., Dunton, S., Childs, J., & Leftwich, A. (2020, March). Through the looking glass: Computer science education and the unintended consequences of broadening participation policy efforts. In 2020 research on equity and sustained participation in engineering, computing, and technology (RESPECT) (Vol. 1, pp. 1-4). IEEE.

Research Project Question

RQ1: Who is underrepresented in CS participation across the pathway from grade 6 through workforce entry?

RQ1a: What disparities exist in CS participation and outcomes among demographic groups (gender, race/ethnicity, socioeconomic status, language proficiency, and receipt of special education services) at each stage of the educational pipeline through early workforce entry?

RQ1b: Which intersectional groups (such as Black females, low socioeconomic status female Hispanic students) experience the highest disparities in CS participation?

RQ2. When do disparities in 6–12 CS participation emerge, widen, or narrow?

RQ2a: At which grade-to-grade progressions (e.g., 6→7, 7→8, 8→9, 9→10, 10→11, 11→12) do gaps first appear or intensify?

RQ2b: How do cumulative participation rates differ by group across grades (6-12) and transitions, and what do these patterns reveal about critical “leakage points” in the K-12 CS pathway?

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RQ3. How is Grades 6–12 CS participation associated with observed Maryland postsecondary and early workforce CS outcomes?

RQ3a (Postsecondary). To what extent are the timing, persistence, and rigor of Grades 6–12 CS participation associated with postsecondary CS engagement, coursework intensity, and CS major attainment?

RQ3b (Workforce). To what extent is Grades 6–12 CS participation associated with early-career employment in CS-related industries and early-career earnings?

RQ3c (Heterogeneity). To what extent do these associations vary by race/ethnicity and family economic disadvantage (FARMS)?

Research Methods

(Please include information for: Sample/Cohort and Justification; Definition of Measures and Constructs; Analysis Approach)

Sample/Cohort and Justification

Because each research question requires a different inferential target (cross-sectional disparities, longitudinal entry timing, and longer-run outcomes), the study will use three complementary analytic samples drawn from the same underlying administrative data infrastructure.

For RQ1, the analytic goal is to document participation disparities at each grade and stage. Accordingly, the analysis will use all available observations within each grade-year, treating each grade as a cross-sectional snapshot. This approach maximizes coverage and precision for subgroup participation rates and representation patterns, and it allows disparities to be described as they appear at each educational moment, rather than only among students continuously observed over time.

For RQ2, the focus shifts from “how big are the gaps” to when gaps emerge and how participation unfolds across transitions. To do this, I will construct a longitudinal person-grade (person-time) panel with one record per individual per year, following individuals as they move from secondary to postsecondary and into early workforce periods (when observed). The panel structure supports trajectory-based analysis of first entry into CS and how entry timing differs across groups, especially around key transition points.

For RQ3, the goal is to estimate associations between K-12 CS participation patterns (predictors) and later outcomes in postsecondary education and the workforce. For this purpose, I will use person-unique analytic files (one record per individual), created by linking K-12 measures to college outcomes and workforce outcomes. This person-level structure aligns with regression modeling where K-12 participation measures serve as explanatory variables and later-stage outcomes are the dependent variables. It also reduces ambiguity about temporal ordering by ensuring predictors are measured earlier than outcomes.

Definition of Measures and Constructs

This study defines computer science (CS) participation and outcomes in ways that are consistent across stages (6–12 → postsecondary → workforce) while still reflecting how CS

engagement is recorded differently in each sector. Measures are organized around three core constructs: CS course exposure, CS participation, and CS-related outcomes.

1. CS courses

At the K–12 level, CS courses are identified using School Codes for the Exchange of Data (SCED) course codes. The study classifies a set of SCED-coded information technology/computing courses as CS. A subset of these courses is designated as high-quality (HQ) CS, based on a statewide expert-defined crosswalk developed through the Maryland Center for Computing Education (MCCE) and grounded in alignment to the Maryland Computer Science Standards. In analyses, HQ CS is treated as a higher-intensity or higher-quality form of CS exposure, distinct from general CS-coded offerings.

At the postsecondary level, CS course-taking is identified using institution-specific course subject prefixes (e.g., COMP, CMSC, CIS, CSC). As no unified state-level crosswalk for computing course prefixes currently exists for all Maryland public institutions, a prefix crosswalk was compiled by the researcher for each Maryland public community college and four-year institution. This ensured that any course carrying a CS-designated prefix was consistently coded as a CS course for that specific institution.

2. Participation (How “CS participation” is operationalized across stages)

Consistent with the CAPE framework, this study focuses on course-based participation because the administrative data do not capture extracurricular CS activities. Participation is therefore defined using the strongest observed signal at each stage: K–12 participation: Enrollment in at least one CS-coded course; Postsecondary Participation: Measured through two complementary indicators: (1) CS course enrollment and earned credits (identified via institution-specific course prefixes) and (2) CS major declaration. Major declaration is identified using the Classification of Instructional Programs (CIP) taxonomy, specifically focusing on the CIP 11 series (Computer and Information Sciences) and related interdisciplinary computing codes (e.g., CIP 30.08 and 30.70) as defined by the National Center for Education Statistics (NCES) and utilized by the Maryland Higher Education Commission (MHEC). Workforce participation: Employment in a CS-related industry, defined using a set of selected NAICS employer industry codes.

3. Experiences/Learning outcomes (What “outcomes” mean in this study)

In CAPE, “Experience” reflects the outcomes and quality of CS learning. Because direct measures of learning (e.g., competencies, assessments, or classroom practice) are not available in these administrative data, this study defines outcomes using observable educational and labor-market indicators that reflect progress and opportunity. Specifically, Postsecondary CS outcomes: Whether a student takes CS courses and how much CS coursework they complete (e.g., cumulative CS credits), along with CS major declaration where applicable. Early workforce outcomes: Whether an individual enters CS industry employment and their early-career earnings.

Measures

1. Participation Rate

Participation rate is used to quantify CS participation within each subgroup and to identify reference groups. It also provides the basis for the Disparity Index used to measure differences

across groups. For a given subgroup, the participation rate is defined as: the Number of students in the subgroup who participated in CS/Total number of students in the subgroup.

2. Disparity Index (DI)

The Disparity Index (DI) compares a subgroup's participation in CS to that of a reference group to show whether the subgroup is over- or under-represented relative to broader population patterns. In DI calculations, the reference group can be defined in two ways: (1) an internal reference group (e.g., the complementary group within the same category, such as males when examining females), or (2) an overall reference group that represents the full population of interest (e.g., all students in a grade). For example, the DI for females in Grade 7 can be calculated as the ratio of the percentage of Grade 7 female students participating in CS to the CS participation rate of all Grade 7 students.

3. First-time entry Rate

The First-Time Entry Rate measures the percentage of students who take their very first CS course in a specific grade, out of only those students who have never taken one in any prior observed grade from Grade 6 onward.. In other words, we treat Grade 6 as the baseline and track the first time a student takes a formal, recorded CS course along the secondary education pipeline. At each grade level, the denominator includes only students who remain at risk of first entry. Unlike simple participation counts, this rate captures the grade-specific likelihood of entering CS for the first time.

Analysis Approach

This study employs a quantitative, observational, and explanatory design to address three research questions regarding Computer Science (CS) participation and outcomes. The analysis proceeds in three layers, moving from descriptive measures of equity to inferential modeling of longitudinal pathways. Specifically,

Descriptive Analysis and Disparity Indices (RQ1)

I will use grade-by-grade cross-sectional snapshots to describe the CS landscape across middle school, high school, and postsecondary education. I will summarize participation rates overall and by subgroup (e.g., gender, race/ethnicity, socioeconomic indicators, English learner status, disability status), including intersectional subgroups when sample size permits. To quantify equity gaps in an interpretable way, I will compute a Disparity Index that compares each subgroup's CS participation rate to a benchmark. I report disparity results in two complementary forms:

1. Absolute parity: subgroup participation relative to the overall population (useful for answering "is this group represented proportionally?")
2. Reference-group disparity: subgroup participation relative to a clearly defined reference group (useful for answering "how large is the gap compared to the dominant group?")

Longitudinal Hazard Modeling (RQ2)

To identify exactly when disparities begin or widen, I will analyze the First-Time Entry Rate spanning from grade 6 to grade 12. This measure estimates the grade-specific likelihood that a student takes their first recorded CS course in a given grade, conditional on having had no prior CS participation. Using a person-grade panel with one record per student per year, I

estimate discrete-time hazards of first CS entry across the secondary school pathway. This approach identifies the grade levels at which participation patterns begin to diverge across groups. To maintain a consistent grade-based timeline, entry is indexed to students' first observed year in each grade so that grade repetition does not distort estimates of first-entry timing.

I also examine cumulative CS participation by grade, defined as the proportion of students who have taken at least one CS course by each grade from Grade 6 through Grade 12. Comparing these trajectories across groups helps determine whether disparities reflect delayed entry, lower overall access, or widening differences over time.

Linear Regression Model for Outcomes (RQ3)

I will construct a one-record-per-person analytic file by linking K-12 records to postsecondary outcomes and, separately, to workforce outcomes using a unique identifier. The analysis proceeds in two steps:

First, I will summarize K-12 CS participation histories into a small set of pathway indicators that capture timing, intensity, persistence, and course quality (e.g., early vs. late entry; breadth of participation across grades; exposure to advanced/HQ courses).

Second, I will estimate regression models that relate these K-12 pathway indicators to postsecondary and workforce outcomes, while adjusting for key student characteristics and school context.

The results will be interpreted as associations/predictive relationships (not causal effects), because unmeasured factors such as student interest or external opportunities may influence both K-12 participation and later outcomes.

How will this research benefit the State of Maryland in terms of state or local policy and/or practice?

This research will directly leverage the Maryland Longitudinal Data System (MLDS) to provide the State with its first comprehensive, stage-specific roadmap of the Computer Science (CS) education-to-workforce pipeline. By moving beyond isolated snapshots of enrollment, this study offers three concrete benefits to Maryland policy and practice:

1. **Precision Targeting of "Leakage" Points:** Unlike previous reports that identify that disparities exist, this research identifies when they emerge at k-12 level. By pinpointing specific critical transition points- such as the drop-off between Grade 8 and Grade 9 -can target interventions precisely where students are exiting the pathway, rather than applying broad, less effective resources.
2. **Unmasking Intersectional Inequities:** This project supports Maryland's equity goals by using the Disparity Index (DI) to expose gaps that aggregate data often hide. It specifically quantifies barriers for intersectional subgroups- such as low-income multilingual learners or female students of color- allowing local districts to tailor support services (e.g., advising, course sequencing) to those most marginalized by overlapping systemic barriers.
3. **Evidence-Based Workforce Alignment:** By linking K-12 participation directly to early workforce outcomes (wages and employment in CS industries), this study provides fiscal justification for CS education investments. It offers policymakers empirical

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evidence on which secondary school experiences (e.g., AP participation, course persistence) yield the highest economic returns for Maryland's economy.															
Explain why this research requires longitudinal cross-sector data?															
This research requires longitudinal cross-sector data for two reasons. First, the central aim is to relate Grade 6–12 CS participation to educational and labor-market outcomes that occur years later - postsecondary enrollment, persistence, CS credential attainment, CS-related employment, and early-career earnings. Establishing this temporal sequence requires longitudinal records in which CS participation is measured before the outcomes it is hypothesized to be associated with. Second, the relevant predictors and outcomes sit in different administrative sectors - K–12, postsecondary, and workforce. The MLDS cross-sector linkage allows the same student to be followed across these sectors, connecting early CS participation to later enrollment, persistence, credential attainment, employment, and earnings. Single-sector datasets show only one stage of the pipeline and cannot support these analyses.															
Proposed Center Output (Typical products for the MLDS Center include a research series presentation to stakeholders and a research brief in the MLDS Center template).															
Consistent with MLDS Center standards, the primary outputs of this research will be: A Research Series Presentation: A comprehensive presentation for the MLDS Center research series. This presentation will visually map the possible "leakage points" across the K–12 to workforce pipeline and present key disparity metrics (e.g., Disparity Indices for intersectional groups) to inform state-level strategic planning. A Research Brief: A concise, policy-focused brief using the official MLDS Center template.															
Timeline for the proposed project (identify major deliverables and approximate dates)															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Action Item</th><th style="width: 40%;">Timeline</th></tr> </thead> <tbody> <tr> <td>Presentation to the MLDS Research and Policy Advisory Board</td><td>Feb 2026 or March 2026 (Estimated)</td></tr> <tr> <td>Analytic data file construction and descriptive statistics</td><td>Feb 2026 – March 2026</td></tr> <tr> <td>Data analysis and summarize findings</td><td>March 2026 - April 2026</td></tr> <tr> <td>Present preliminary findings to MLDS Center stakeholders</td><td>May 2026</td></tr> <tr> <td>MLDS Center research series presentation</td><td>June 2026 (Estimated)</td></tr> <tr> <td>Further development</td><td>May 2026– Ongoing</td></tr> </tbody> </table>		Action Item	Timeline	Presentation to the MLDS Research and Policy Advisory Board	Feb 2026 or March 2026 (Estimated)	Analytic data file construction and descriptive statistics	Feb 2026 – March 2026	Data analysis and summarize findings	March 2026 - April 2026	Present preliminary findings to MLDS Center stakeholders	May 2026	MLDS Center research series presentation	June 2026 (Estimated)	Further development	May 2026– Ongoing
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Plans for further development (i.e. journal submission, etc)	
Plans for further development include a dissertation manuscript, conference presentations (such as the American Education Research Association), and journal article publication (in journals such as Computer Science Education, Computers & Education, and AERA Open Special Journals).	

Section 3. MLDS Center [Research Agenda](#)

Does your project relate to one of the following areas which the General Assembly has specifically directed the MLDSC to study:	Yes	No
The impact of a State or federal education program? ¹	X	
The performance of educator preparation programs?		X
Best practices regarding classroom instruction?		X
The impact of child welfare programs on the educational and economic outcomes of students?		X
An analysis of social determinants, provided by State agencies ² and appropriate local agencies, that impact education performance of students and indicate the need for wraparound services for students.		X
Does your project use State or Federal financial aid ³ data?		X
If you are requesting to use FAFSA data please explain how this research will benefit the administration of Title IV federal financial aid.		
Research Agenda Category (page 2 of the Research Agenda) – Which category does the project address? Please explain.		
● Pathways & Pipelines RQ1 and RQ2 descriptively map entry, transition, and exit points along the Grade 6 to early-workforce CS pipeline - identifying where participation gaps emerge, widen, or narrow across grade-to-grade progressions, and which demographic and intersectional groups (gender, race/ethnicity, FARMS, ELL, SpEd) experience the largest disparities. The aim is to identify patterns and leakage points in the pipeline, not to estimate causal effects, consistent with the descriptive orientation of this category. ● Educational, Service & Workforce Outcomes RQ3 examines how student-level characteristics - specifically, Grade 6–12 CS participation patterns (timing, intensity, persistence, and course quality) - are associated with later outcomes: postsecondary CS engagement and CS major attainment at Maryland public		

¹ All projects must relate to a state or federal education program. If you are not sure, please contact ross.goldstein@maryland.gov.

² State agencies include: Maryland Department of Health, Department of Human Services, and Department of Juvenile Services

³ Financial aid data derived from the FAFSA may only be used in research to improve the administration of federal financial aid programs.

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institutions (RQ3a), CS-related industry employment and early-career earnings from Maryland UI records (RQ3b), and how these associations vary by race/ethnicity and FARMS (RQ3c). This category fits RQ3 because it concerns the importance of student-level characteristics in predicting later outcomes.

Research Agenda Themes (page 2-3 of the [Research Agenda](#)) - Which cross cutting theme is incorporated in the project? Please explain.

Equity and Inclusion. The central aim of the study is to document access and opportunity in CS for students who have been historically under-represented in the field. Using linked longitudinal records, the study quantifies CS participation gaps from Grade 6 through postsecondary education and into the early workforce — by gender, race/ethnicity, socioeconomic status (FARMS), English learner status (ELL), and disability status (SpEd) — and examines intersectional patterns at each stage of the pipeline (RQ1, RQ2). RQ3c then asks whether the association between Grades 6–12 CS participation and later postsecondary and workforce outcomes varies by race/ethnicity and FARMS, the two axes RQ1 and RQ2 identify as the largest sources of disparity.

Social Determinants. FARMS, ELL status, SpEd status, and school context (e.g., school-level CS course offerings, LEA) are treated not only as descriptive characteristics but as environmental conditions that plausibly shape CS participation and its returns. Reporting outcomes by these conditions surfaces how the surrounding learning context — not only individual student characteristics — is associated with CS opportunity in Maryland.

Secondary: Supports & Barriers. The project also examines structural progression points in the K–12 CS pathway — most notably, grade-to-grade course transitions (6→7, ..., 11→12) and patterns of CS course offerings within schools — that function as supports or barriers to continued CS participation. Identifying where the pipeline "leaks" between grades (RQ2a, RQ2b) provides direct evidence on the structural conditions that constrain or enable CS progression in Maryland public schools.

Section 4. Data and Cross Sector Analysis

Please review the MLDS Center [Data Inventory](#) and the MLDS Center [Data Gap Analysis](#) prior to completing this section.

Sectors* *The data falling within each sector is outlined below. The purpose of this section is to ensure the project is cross sector. Projects will not necessarily use all data elements within the sector (see methods section for definitions of measures).	X
Early Childhood Education Sector	
K-12 Education Sector	X
Adult Education Sector	
Justice Involved Youth Sector	
Child Welfare Sector	
Postsecondary Education Sector	X
Other Completions and Credentials Sector	
Workforce Sector	X

Put an 'x' next to each data sector your project will include. You must have at least 2 sectors.

Do you plan to request to include external data as part of your project?
No.

*Sectors

Early Childhood Education Sector

- PreK Academic Engagement

K-12 Public School Education Sector

- Enrollment and attendance
- Assessments
- Courses and grades
- Completions
- Discipline
- Public School Characteristics

Adult Education Sector

- GED/NEDP Exam Results
- Apprenticeship
- Adult Education
- Correction Education

Juvenile Justice Sector

- Juvenile Justice Records
- Juvenile Education Records

Child Welfare Sector

- Out-of-Home Placements

Postsecondary Education Sector

- College and University Enrollment
- College and University Courses, Credits and Grades
- College and University Degrees
- College and University Workforce Training
- Financial Aid

Other Completions and Credentials Sector

- Industry Certifications
- Licenses

Workforce Sector

- Public School Teachers
- Public School Staff
- Workforce visibility/participation
- Workforce Earnings
- Workforce Industry

Section 5. Financial Information

The MLDS Center incurs costs for every project related to: (a) IT support and infrastructure; (b) assistance from subject matter experts, (c) criminal history background checks; and (d) creation of an analytic data set. Average project costs are between \$1,000 and \$3,000. A detailed, customized estimate will be provided prior to project initiation. (Please indicate your answer with an "X")	
☐	I will reimburse MLDS Center for all applicable fees.
☐	I will only be able to provide partial reimbursement.
☒	I will need a waiver.
Grant Funding (indicate with an 'X')	
☐	This project has already received funding
☐	I plan to apply or am in the process of applying for grant funding
☒	No grant funding is planned
Name of Grantor	
RFP or Grant Program Information (you may provide a link to the grantor's website)	
Amount of grant funds sought or awarded.	
Grant Application Date	
Do you intend to proceed without grant funding?	
Are you receiving other funding for this proposed project? If yes, how much?	

Section 6. Special Considerations

Principal Investigators NOT affiliated with a Maryland College or University – please provide information on:

- a. Your familiarity with Maryland policies affecting your research topic; and**
- b. How your project meets a specific Maryland research need?**

Please also upload (with this form) any letters of reference or endorsement from a Maryland researcher or a State or local agency that vouches for your qualifications and expertise.

For projects that involve a small population, please confirm that you are aware of the MLDS Center's [data suppression policy](#) and explain how you will report your findings while conforming to the suppression requirements.

For projects that involve a single school system, university, or program, please explain the statewide implications of the project.

Please also upload (with this form) any letters of support from the subject (i.e. school system or university) of the study.

Section 7. Project Team

Project Team - Please list all members of the research team and indicate roles and responsibilities. - If the Principal Investigator listed in Section 1 above is NOT the primary point of contact for the project (including research, data access, and presentations to stakeholders), please indicate which team member is the primary point of contact and provide that individual's contact information.		
Name and Organization	Role	Is system access needed? (Yes/No)
Xiaoxue Zhou, University of Maryland College Park	PI	Yes, already have it
David Weintrop, University of Maryland College Park	Advisor	No
David Blazar, University of Maryland College Park	Co-Advisor	Yes, already have it

Section 8. Submission

Once this form is completed, please complete the online application ([here](#)) and upload this form, CVs for all members of the research team, and any other supporting materials.