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MEMORANDUM

TO: MLDS Governing Board

FROM: Ross Goldstein

DATE: June 3, 2019

SUBJECT: External Researcher and Grant Funded Projects

Purpose
The Center received an application under the *Policies and Procedures for External Researchers and Grant Funded Projects,* which requires Governing Board approval. There is also an update on a previously approved grant project.

Application
Project Title
Long-Run Relationships Between Teachers, Their Characteristics, and Student Outcomes: Data to Support School-Based Improvement Processes

Summary
The application is submitted by Dr. David Blazar, Assistant Professor of Education Policy and Economics at the University of Maryland, College Park. Dr. Blazar has received funding from the American Educational Research Association (AERA) and would like to use Center data for the project. The project involves research, in collaboration with MSDE, MHEC, and local education agencies, to examine the characteristics and skills of teachers that contribute to students' long-term outcomes, including academic, behavioral, and workforce outcomes. This research will help to identify policy initiatives around selective recruitment and retention of teachers and professional development for teachers to meet their specific needs. The grant award is for $35,000.

Review Process
The project was favorably reviewed by Center staff and was also presented to the Research and Policy Advisory Board at its May 2nd meeting. The RPB also favorably reviewed the project proposal and recommended it's referral to the Governing Board for final approval.

Recommendation
I recommend that the Governing Board approve this External Researcher and Grant Funded Project application. The research is cross-sector and is responsive to several of the Governing Board's Research Agenda Questions (see Research Agenda Questions 2 and 16). Dr. Blazar has the requisite expertise and experience to conduct the planned research and has shown the ability to work Center data. Finally, the proposed research addresses an important topic that may provide actionable information for state and local education practitioners and policy makers.

Update
At the Governing Board's March 2019 meeting, approval was given to Dr. Nancy Shapiro, along with Co-Principal investigators Dr. Henneberger, Dr. Blazar, Dr. Lincove and Mr. Goldstein, to proceed with an initial application to the National Science Foundation Mid-scale Research Infrastructure-1 (NSF

19-537). The initial application was favorably reviewed and Dr. Shapiro and team were invited to submit a full application, which was completed on May 20th. The grant application, with the revised project title of *Expanding the Capacity of Statewide Education, Human Capital, and Workforce Development Research: Building a Community Around Data Quality, Governance, and Privacy*. The project summary is provided below. Grant award notification should occur sometime in early fall of this year.

Overview:

Research institutions across the University System of Maryland are collaborating with the Maryland Longitudinal Data System Center on a Mid-Scale Research Infrastructure: Implementation Project, submitted to the Education and Human Resources (EHR) directorate. The integrated data system in Maryland will link individual student records for as many as 30 years, and across a broad range of sectors including K-12 education, child welfare, juvenile justice, higher education, and the workforce, thus providing the critical infrastructure for a new generation of education, human capital, and workforce development research. Given several technical, legislative, and social challenges needed to create this integrated data system, secure it, and expand access to it, we will draw on interdisciplinary teams to implement innovative privacy solutions, while also engaging key stakeholders in conversations regarding data ethics and privacy. Maryland is well situated to create and host an integrated data system that will be used by researchers and communities across the country. Through the current MLDS system, we have a fully operational Governing board, support from state leaders to add in new data elements, and relationships with similar institutions in surrounding states. Maryland also has a long history of implementing innovative policies that are of interest nationally and ripe for analysis. These analyses can support decision making elsewhere given that our state includes two of the largest school districts in the country, a large urban district, and several rural districts, which together capture diversity in terms of race/ethnicity and socioeconomic status.

Intellectual Merit:

Administrative data captured at the state level have become the backbone of education, human capital, and workforce development research, but still lack a critical combination of features that are necessary for driving the next generation of work in the social sciences. The integrated data system will be (i) comprehensive (i.e., cross sector), (ii) longitudinal (i.e., linking records for up to 30 years), (iii) microlevel (i.e., focused on individual records), and (iv) accessible to a broad group of researchers, leading to several critical lines of research not previously possible in systems that have just one or two of these features. For example, to date, academic research on STEM workforce development has focused on the link from high school to college and then to the labor market, but much less on STEM development at earlier ages. The integrated data system will allow researchers to examine student trajectories from early elementary school to the workforce, and the resources (e.g., high-quality and diverse teachers, advanced or remedial coursework) that best support students' development. The data system also will support research that examines differential access to STEM resources drawing not only on traditional markers of disadvantage (e.g., eligibility for free- or reduced-price lunch) -- which have known limitations -- but also on more detailed measures of disadvantage related to juvenile justice system placements or child protective services investigations.

Broader Impacts:

The push for broader and more robust data infrastructures has a clear theory of action: comprehensive, longitudinal data that are accessible to researchers will produce rigorous research, drive evidence-based decision/policy making, and ultimately generate societal improvements. The data infrastructure we propose, and the questions it will allow researchers and policymakers to ask and answer, will lead to

significant broader impacts and societal benefit in several concrete ways. First, it will guide intervention for and analysis of students' college and career readiness and workforce development, particularly in STEM. More specifically, the data system will support research to guide decision making about when and how best to intervene to support students' long-term development. Second, the integrated data system will help researchers and policy makers to better understand inequitable access to resources and then to work to close these gaps. Additionally, in the course of creating this infrastructure, we will develop, use, and disseminate new methods to train the next generation of diverse scholars in data quality and use, governance and ethics, and privacy and security. Our project will support 20 to 30 students or postdoctoral fellows, who we will recruit from diverse communities, beginning first with women and racial minorities who often are underrepresented in data science and STEM fields.

[ERA-13] Long-Run Relationships Between Teachers, Their Characteristics, and Student Outcomes: Data to Support School-Based Improvement Processes

Created: 04/17/2019 Updated: 04/25/2019

Project Title:	Long-Run Relationships Between Teachers, Their Characteristics, and Student Outcomes: Data to Support School-Based Improvement Processes
Abstract or Brief Description:	This research will build on several conversations with stakeholders at the Maryland State Department of Education (MSDE), Maryland Higher Education Commission (MHEC), and local education agencies (LEAs) including Baltimore City, Montgomery County, and Prince George's County Public Schools regarding the pressing need to recruit, develop, and retain high-quality teachers who meet the diverse needs of students across our state. I will work collaboratively with MSDE, MHEC, and LEAs to engage in research that examines the characteristics and skills of teachers that contribute to students' long-term outcomes, including academic (e.g., test scores, college enrollment), behavioral (e.g., attendance), and workforce outcomes. This research will help, in particular, to identify policy initiatives around selective recruitment and retention (e.g., incentives to teachers with specific characteristics and skills), and development (e.g., targeted professional development and coaching tailored to teachers' specific needs).
Research Project Question:	What are the characteristics and skills of teachers, on average, that are most impactful to a range of long-term student outcomes in college and the workforce?
Research Agenda Questions:	2. Are Maryland students academically prepared to enter postsecondary institutions and complete their programs in a timely manner? 16. Are exiters of Maryland colleges successful in the workforce?
Benefit to the State of Maryland:	This project will benefit the State of Maryland in at least two ways: (1) Support future research using advanced statistical analyses, including impact evaluations of program efficacy. (2) Inform the development and implementation of future teacher-oriented policies and practices to improve education for Maryland teachers and students.
Explanation of Cross-Sector Qualities:	This project focuses on (a) K-12 education and (b) workforce (i.e., teachers).
Proposed Center Output:	White paper to be posted on MLDS website, as well as research seminar.
Estimated Timeline for the Proposed Project:	Two years, starting in summer 2019 (contingent on permission from MLDS).
Researcher Applicant Name:	Dr. David Blazar

Researcher Email Address:	dblazar@umd.edu
Researcher Organization:	University of Maryland College Park
Researcher Phone Number:	6175498909
Research Applicant Background and Qualifications:	Dr. Blazar is a member of the MLDS research team. He is an Assistant Professor of Education Policy and Economics at the University of Maryland College Park. He received his doctorate in Quantitative Policy Analysis in Education (focus in economics) at the Harvard Graduate School of Education.
Grant Funds:	Yes, grant funds have already been secured for this project.
Description of Grant Program:	With support from the National Science Foundation (NSF), the American Educational Research Association (AERA) Grants Program seeks proposals for Research Grants. The AERA Grants Program provides Research Grants to faculty at institutions of higher education, postdoctoral researchers, and other doctorallevel scholars. The program supports highly competitive studies using rigorous quantitative methods to examine large-scale, education-related data. This research and training program is designed to advance knowledge and build research capacity in education and STEM education and learning. Since 1991, this AERA Program has been vital to both research and training at early career stages. The Grants Program encourages the use of major data sets from multiple and diverse sources. It emphasizes the advanced statistical analysis of data sets from the U.S. Department of Education's National Center for Education Statistics (NCES), the National Science Foundation (NSF), and other federal agencies. The program also supports studies using large-scale international data systems (e.g., PISA, PIRLS, or TIMMS) that benefit from U.S. federal government support. In addition, statewide longitudinal administrative data systems (SLDS) enhanced through federal grants are also eligible for consideration. The inclusion of federal or state administrative information that further expands the analytic capacity of the research is permissible. The thrust of the analysis needs to be generalizable to a national, state, or population or a subgroup within the sample that the dataset represents. The Grants Program is open to field-initiated research and welcomes proposals that: develop or benefit from advanced statistical or innovative quantitative methods or measures; analyze more than one large-scale national or international federally funded data set, or more than one statewide longitudinal data system (SLDS) or incorporate other data enhancements; integrate, link, or blend multiple large-scale data sources; or

	undertake replication research of major findings or major studies using large-scale, federally supported or enhanced data. The Grants Program encourages proposals across the life span and contexts of education and learning of relevance to STEM policy and practice. The research may focus on a wide range of topics, including but not limited to such issues as student achievement in STEM, contextual factors in education, educational participation and persistence (pre-kindergarten through graduate school), early childhood education and development, postsecondary education, and the STEM workforce and transitions. Studies that examine issues of specific racial and ethnic groups, social classes, genders, or persons with disabilities are encouraged.
Name of Grantor:	American Educational Research Association (AERA)
RFP or Grant Program Information:	http://www.aera.net/Professional-Opportunities-Funding/AERA-Funding-Opportunities/Grants-Program/Research-Grants
Amount of Grant Funds Sought / Awarded:	$35,000

Long-Run Relationships Between Teachers, Their Characteristics, and Student Outcomes: Data to Support School-Based Improvement Processes

David Blazar
University of Maryland College Park
Maryland Longitudinal Data System Center Research Branch

Summary

This research will build on several conversations with stakeholders at the Maryland State Department of Education (MSDE), Maryland Higher Education Commission (MHEC), and local education agencies (LEAs) including Baltimore City, Montgomery County, and Prince George's County Public Schools regarding the pressing need to recruit, develop, and retain high-quality teachers who meet the diverse needs of students across our state. I will work collaboratively with MSDE, MHEC, and LEAs to engage in research that examines the characteristics and skills of teachers that contribute to students' long-term outcomes, including academic (e.g., test scores, college enrollment), behavioral (e.g., attendance), and workforce outcomes. This research will help, in particular, to identify policy initiatives around selective recruitment and retention (e.g., incentives to teachers with specific characteristics and skills), and development (e.g., targeted professional development and coaching tailored to teachers' specific needs).

Motivation

Decades worth of research identify teachers as the most important within-school factor that we can provide to students. Teachers vary considerably in their contributions to student outcomes, including test scores (Hanushek & Rivkin, 2010; Nye, Konstantopoulos, & Hedges, 2004), which in turn relate to long-term outcomes including teenage pregnancy rates, college attendance, and earnings in adulthood (Chetty et al., 2011; Chetty, Friedman, & Rockoff, 2014). Recognizing the multidimensional nature of student knowledge and skill, more recent work also has begun to show that teachers can contribute to a range of student outcomes beyond test scores, including self-reported measures of behavior, self-efficacy, and engagement (Blazar, 2018; Jennings & DiPrete, 2010; Kraft, in press), as well as observed school behaviors such as on-time grade progression, absences, and suspensions (Gershenson, 2016; Jackson, in press).

Identifying the characteristics and skills of teachers that contribute to student outcomes, both academic and behavioral, enables policy makers and practitioners to more effectively and efficiently implement interventions and match students to teachers. For example, the Obama administration used this line of research to justify new incentives to states to evaluate teachers through student outcomes, and to use these measures to make job decisions including tenure. However, these efforts have led to substantial pushback from teachers and teachers' unions (Jiang, Sporte, & Luppescu, 2015).

Aside from teacher evaluation, there are other – sometimes overlooked – uses of research connecting teachers, their skills, and their characteristics to student outcomes that fall within

and would enhance existing school practices. Specifically, the State of Maryland, districts, and schools require rich information on characteristics and skills of teachers in order to identify the supports and development strategies that need to be rolled out at scale. Bringing costly but effective development programs, such as teacher coaching (Kraft, Blazar, & Hogan, 2018), to scale requires at least two key pieces of information that can be provided by data- and research-based estimates of the characteristics and skills of teachers that contribute to student outcomes. First, it would be useful to know which types of teachers require immediate support in order to allocate professional development dollars to these types of teachers, as opposed to investing in lower-cost but less-effective programs that reach all teachers. Second, the individualized nature of coaching and related development programs require that school leaders know teachers' individual strengths and weaknesses in order to facilitate appropriate teacher-coach or teacher-team matches, where members have complementary skill sets (Papay et al., 2016). Research can support practice in this area by identifying the teacher characteristics and skills that are most predictive of long-term student outcomes and, thus, narrowing in on the skills that could/should be a focus of this work.

Proposed Study

With this background and motivation in mind, I propose a research project to better understand the multiple dimensions and characteristics of teachers who contribute to student academic and behavioral outcomes. As described above, the research literature already has strong causal estimates on the multi-dimensional nature of teachers, their skills, and their characteristics in the short term (e.g., Blazar, 2018; Kraft, in press). However, we know much less about which of these measures and characteristics are most impactful for students in the long-term.

Recent work (Jackson, in press) linked teachers to ninth grade students' test scores and other observed school behaviors (e.g., absences, suspensions) and then to outcomes at the end of high school. However, by stopping at the end of high school, this study was not able to examine the measures and characteristics of teachers that best prepare students for college and the workforce. There also are concerns regarding "selection" and "omitted variables" bias, as ninth grade students work with multiple teachers in a given year, making it difficult to parse the contribution of one teacher and her/his characteristics to student outcomes from the contribution of another teacher with whom a student also worked in the same year. This study contributes to the prior literature by using linked administrative data from the MLDS to examine the teacher characteristics that are associated with students' long-term behavioral and academic outcomes, including college and career outcomes.

To fill this gap in the literature and to support school-based improvement efforts, I ask: *What are the characteristics and skills of teachers, on average[1], that are most impactful to a range of long-term student outcomes in college and the workforce?*

[1] This study only is interested in estimating relationships between teacher characteristics and student outcomes *on average*. This study will not generate estimates for individual teachers.

To answer this question, I will use linked data from the Maryland Longitudinal Data System (MLDS) Center, including data from K-12 schooling environments, college, and the workforce. Key dependent/outcome variables include: college enrollment, college persistence (i.e., credits earned at specific ages), college graduation, workforce industry, and wages (i.e., one, two, and five years after college graduation). Key independent variables include characteristics and skills of students' teachers. In this work, I will focus primarily on characteristics determined prior to teachers' entering the classroom for two reasons. First, this work is meant to inform the allocation of resources to teachers and students (e.g., which types of teachers should be assigned to specific groups of students), rather than the effect of additional resources (e.g., additional training) on outcomes. Second, focus on pre-determined characteristics is more likely to support causal conclusions. I need to account for the non-random sorting of teachers to students (see below for additional details), but not the non-random allocation of resources to teachers. Characteristics determined prior to entering the classroom that have been shown in prior work to impact short-term student outcomes include: demographic characteristics (e.g., race/ethnicity, gender; Dee, 2004, 2005); academic characteristics (e.g., highest degree earned and course taking in specific content areas; Rice, 2003), and experience in the classroom (Papay & Kraft, 2015)[2].

My research design must account for the non-random sorting of students to teachers, which is standard practice in most U.S. schools (Clotfelter, Ladd, & Vigdor, 2006). Several recent experiments indicate that controlling for students' prior test scores accounts for sorting bias, at least when current test scores are the outcome of interest (Kane et al., 2013; Kane & Staiger, 2008). In prior experimental work, I also found that controlling for prior academic performance can eliminate sorting bias when replacing current test scores with some self-reported measures of students' attitudes and behaviors (Blazar, 2018). Because no work to date has examined the validity of non-experimental research designs that examine the relationship between teachers and longer-term student outcomes, I will test the robustness of results to additional methods for accounting for non-random sorting. One method includes leveraging within-school, between-cohort variation in teacher characteristics (Blazar, 2015). Where feasible, I also will focus on cohorts of upper-elementary students in order to avoid instances in which students worked with multiple teachers in a given year. For some key outcomes, including post-college wages, there currently is not a long enough panel of data in the MLDS to link upper-elementary students to later outcomes. In these instances, the latter research design – leveraging within-school, between-cohort variation in characteristics – makes most sense, as teacher characteristics are averaged within school-by-grade cells.

This study adds to the research literature in several unique ways. First, it would be among the first studies to examine how *multiple* teacher characteristics relate to student outcomes. Second, it would be among the first studies to examine how teacher characteristics relate to

[2] Teaching experience is not determined prior to teaching, per se. But, this measure advances for all teachers in the same manner (i.e., one additional year of experience year academic year), which I contrast to other characteristics such as additional training that vary considerable across teachers and generally are self-selected.

long-term student outcomes, including workforce industry and wages earned. These findings are particularly important to help decision makers (1) sort students into schools and classrooms based on teacher characteristics; and (2) develop, refine, and implement teacher interventions, such as coaching.

Data Elements

This project is interested in the relationship between teachers, their characteristics, and student outcomes. Therefore, key data elements include:

- Labor market outcomes:
    - Quarterly wages
    - industry
- College outcomes:
    - Enrollment in college
    - Number of credits completed
    - Degree and date
- Student-to-teacher links from course files
- Student test scores
- Student demographic information
- Teacher demographic information
- Teacher certification and degrees
- Teacher experience