PROS AND CONS OF NATIONAL AND STATE DATABASES: LEARNING MODALITY RETURN TO SCHOOL FOR STEM TEACHERS DURING COVID ERA

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Abstract

This paper is focused on utilizing a common language and is grounded in current research conducted through a Noyce track IV grant. The research project utilized large national and state data sets to select districts and determine impacts of modes of returning in Fall 2020 after the COVID-19 pandemic closure. During the process, the research team encountered unexpected barriers, including a lack of clear and operationalized terminology for defining high-need districts. Thus, this paper focuses on building a community of practice where the lack of clarity in the definition of high-need local educational agency (LEA) is addressed.

Keywords: High-need, Local Educational Agency, COVID-19 pandemic, Learning Modality, Operationalize

Introduction

The COVID-19 pandemic has had far-reaching effects on every aspect of society, including education. During the pandemic, nations worldwide developed lockdown measures to constrain the spread of the virus. As part of this national lockdown in the United States, schools shifted instruction online from traditional in-person learning in March 2020. According to the Centers for Disease Control and Prevention (CDC), during the school reopening in the Fall semester of 2020, there were three learning modalities used for instruction: online only, hybrid, and in-person only. As this event has had a profound impact on schools, classroom teachers, and students, it is important to understand how these different learning modalities have impacted STEM teachers' retention rates and STEM teachers' effectiveness as indicated by students' mathematics and science performance and graduation rates. This understanding can be used to inform policymakers and school leaders, preparing them for future emergencies and equipping them with adequate knowledge to manage similar situations effectively. We are interested in "high-need LEAs" in our study. However, as recipients of a Track IV Noyce grant, we found that many terms used by educators and included in state and national policy documents do not have well-defined meanings. Additionally, other relevant data (e.g., teacher retention rates, student

mathematics and science performance, graduation rates), although available to the public, are expressed in vague and varied language which is a challenge for those interested in education research or policy and advocacy.

Objectives of the Study

The study aims to understand how districts' decisions about school openings during COVID-19 impacted students, as well as science and mathematics teachers in high-need districts. The first goal of the project was to determine the learning modalities that were used by high-need LEAs beginning in fall 2020 through spring 2022. This will establish the experimental groups to examine the second goal of the project which is to determine how the utilization of different learning modalities within a COVID-19 dictated teaching environment contribute to STEM teachers' retention rates and STEM teachers' effectiveness indicated by student mathematics and science performances and graduation rates in high-need LEAs.

Related Literature

With the disruptive, entrenched, and ubiquitous impacts of COVID-19, there are aspects of teacher effectiveness and retention related to school district responses that need to be examined. The pandemic resulted in changes to the educational environment that were initially disruptive (e.g., internet access, loaner computers/tablets, parental communication, school/district communication, worsening digital divide) but, in the long-term, may be seen as enhancements (e.g., increased learning in a virtual environment, support to develop online modules/recorded lessons; Choate et al., 2021; de los Santos & Rosser, 2021; Kidd & Murray, 2020). STEM teachers who prepared and entered the profession before the 2020 pandemic were educated in practice-driven, face-to-face pedagogies. They were expected to use reform-based strategies (e.g., NGSS Lead States, 2013) when teaching in high-need schools which are known to impact teacher effectiveness and retention (e.g., Saka et al., 2013). However, by the end of March 2020, all public schools in the US had shut down in-person instruction and moved to various forms of remote instruction whereby teachers were required to move instruction to unfamiliar online platforms.

For this research, learning modality is defined according to the Centers for Disease Control and Prevention (CDC) HHS Public Data Hub and the National Center for Educational Statistics (NCES) as being in-person, remote, or hybrid (Department of Health & Human Services ArcGIS Online, 2022). School learning modality types are defined as follows:

- **In-Person:** All schools within the district offer face-to-face instruction five days per week to all students at all available grade levels.

- **Remote:** All schools within the district do not offer face-to-face instruction; all learning is conducted online/remotely to all students at all available grade levels.
- **Hybrid:** Schools within the district offer a combination of in-person and remote learning; face-to-face instruction is offered less than five days per week, or only to a subset of students.

In addition to learning modality, the research depends on selecting districts that meet the criteria set by the National Science Foundation (NSF) for Noyce projects which is based upon the Department of Education's definition of high-need local educational agencies (LEAs) by section 201 of the Higher Education Act of 1965 (20 U.S.C. 1021; 2000). This ability to verify the 'high-need' status of the districts was the necessary first step. There are national data sets with information about educational status as well as state and local data sets which were utilized as part of the selection process of high-need LEAs.

Methodology

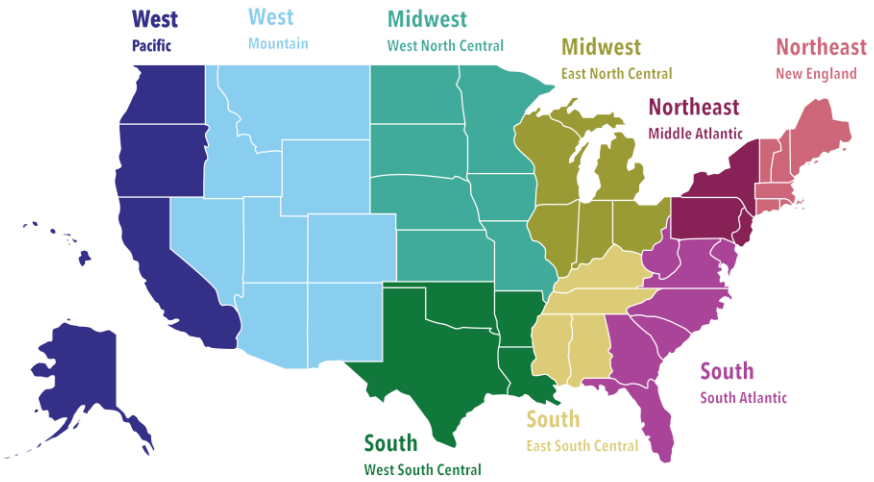
This paper addressed the first goal of the project through secondary analysis of publicly available national, state, and local data sets.

Sample Selection

Thirty-six (36) high-need LEAs were selected to answer the first research question (What learning modalities were used by high-need LEAs beginning in fall 2020 through Spring 2022). Exclusion criteria for LEAs in this project included services agency listings, independent charter districts, districts that did not serve all grades K-12, and districts that did not report their learning modalities to the CDC during the COVID-19 pandemic. The sample includes 18 high-need LEAs from districts designated as being part of the Small, Rural School Achievement Program (SRSA; OESE, n.d.a) or the Rural or Low-Income School Program (RLIS; OESE, n.d.b) as identified on the US Department of Education Office of Elementary and Secondary Education website and 18 high-need LEAs from programs eligible for Title I funding from the US Department of Education ESEA Title I website (n.d.). Four districts within these programs were randomly selected from each of the nine US Census divisions (Figure 1).

Figure 1:

US Census Bureau Divisions from which districts were randomly selected



Identification of Learning Modality

The learning modalities used by these high-need LEAs was reported in the HHS Protect Public Data Hub (2023) website. This public data set was developed to ensure that COVID-19 data would be readily shared and available to researchers. The data set reports on the initial re-opening learning modality utilized and how they were implemented over time.

Verification of High-need Status

After the 36 LEAs were selected, they were verified as meeting criteria for being a high-need district as defined in section 201 of the Higher Education Act of 1965 (20 U.S.C. 1021). This definition is multi-faceted and for simplicity's sake will be discussed as having two primary components. Component A focuses on students living in circumstances of poverty or in rural areas. Component A states that at least one school within the agency must meet one of the following: (a) greater than 20% of students from low-income families, or (b) greater than 10,000 students from low-income families, or (c) eligible for funding under the SRSA or the RLIS. Therefore, the 18 LEAs selected from the SRSA or RLIS programs, automatically meet criteria of Component A. However, it was more challenging to verify the 18 districts that were selected from the Title I program because there was no definition given of low income. For this project, low income was defined by a component of the Department of Education's Title 20 program which uses several of measures of poverty including the one that we selected "percentage of students eligible for a free or reduced-price lunch under RBR National School Lunch Act." We selected this measure of poverty because it is directly related to education and because this data is readily available on the National Center for Education Statistics (NCES) website. The NCES site is publicly available and was used by the project to gather other educational data related to the LEAs. One LEA did not meet criteria under Component A and was replaced with another one

randomly selected from within the same US Census division from which it had been selected. Component B focuses on teacher data and states that the LEA must also meet at least one of the following criteria: (a) high percentage of teachers teaching in the academic subject areas or grade levels in which they were trained to teach, (b) high turnover rate or high percent of teachers with emergency, provisional, or temporary certification of licensure. This begs the question of how various states and districts define out-of-field and what percentage of turnover or challenges with certification or licensure constitutes a high percentage. Additionally, the type of turnover is not operationalized and may be related to turnover within a grade, a school, the districts or even the profession.

We used multiple approaches to attempt to define or calculate these numbers including the following: 1) asking other Track 4 grantees how they defined Component B; 2) exploring professional literature; 3) exploring NCES and similar websites; 4) exploring local (e.g., State Department of Education and districts) definitions; and 5) directly asking the districts. Tremendous variations in approach were revealed and responses that we received generally asked us what benchmarks we were using. There was minimal to no quantifiable data available, even at the local level, and no consistent data at the national level. Therefore, Component B was not utilized for the verification process. Thus, the methodology produced a sample representing different kinds of communities across the nation which were verified for inclusion by student economic circumstances.

Results and Discussion

For the 36 districts selected as meeting the inclusion criteria, learning modalities are listed (Table 1). Among the 36 selected LEAs, more than half returned with the hybrid learning mode, while the remaining LEAs were almost equally split between in-person and online-only modes (Figure 2). The predominance of the hybrid model suggests that most LEAs aimed to balance the benefits of face-to-face interaction with the safety offered by remote learning. Next steps include determining how these different learning modalities contribute to educational outcomes and teachers' effectiveness. Understanding the impact of each learning modality can provide valuable insights into best practices for future educational planning and crisis response.

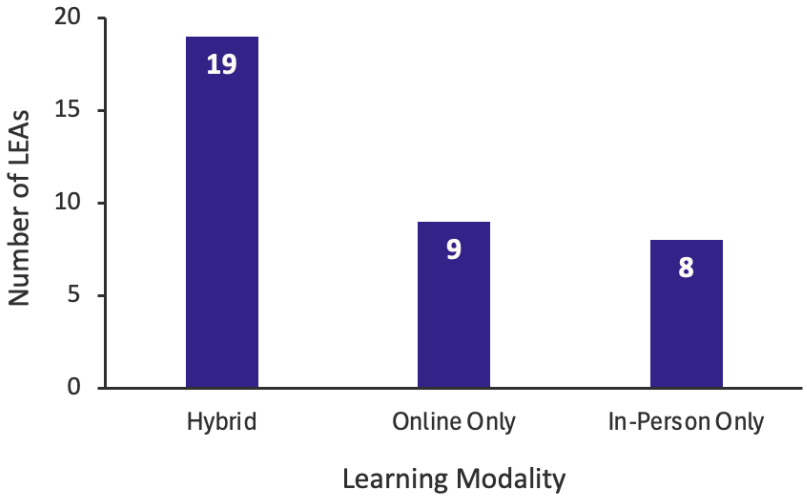
Table 1:

Learning Modality by LEA in the Fall of 2020

LEA #	State	Learning Modality		LEA #	State	Learning Modality
01	AL	Online Only		19	MO	Hybrid
02	AL	Hybrid		20	MS	Hybrid
03	AR	Hybrid		21	NC	Hybrid
04	CA	Online Only		22	NC	Online Only
05	CA	Online Only		23	NM	Online Only
06	CO	Online Only		24	NY	Hybrid
07	CO	In-Person Only		25	NY	In-Person Only
08	CO	Online Only		26	NY	Hybrid
09	FL	Hybrid		27	OH	Hybrid
10	GA	Hybrid		28	OH	In-Person Only
11	KY	Hybrid		29	OH	Hybrid
12	MA	Hybrid		30	OR	Hybrid
13	ME	In-Person Only		31	OR	Online Only
14	ME	Hybrid		32	PA	Online Only
15	ME	In-Person Only		33	SD	Hybrid
16	MI	Hybrid		34	TX	Hybrid
17	MO	Hybrid		35	TX	In-Person Only
18	MO	In-Person Only		36	TX	In-Person Only

Figure 2:

Learning Modalities by LEA in the Fall of 2020



Note: Two LEAs did not publicly report data due to the small number of students (in-person only n = 1; hybrid n = 1).

Implications

There are several barriers to finding and using data from public sites to conduct research on high-need LEAs. First, the definition of 'high-need' has two components with terms that are not operationalized. Second, the definition mandated on many federally funded education research projects focuses on high-need LEAs and not high-need schools. In fact, the definition only requires that one school within the district meet the circumstances of poverty for the entire LEA to be defined as high-need even though for many districts there is a large disparity between schools. This becomes a challenge for understanding the research that might be better focused on high-need schools that are defined by their own circumstances and not by those of their districts. This also has implications for the placement of students who may either be interested in teaching in high-need schools or whose teacher preparation program has a commitment to placing students in high-need schools during their student teaching and other mentored teaching opportunities.

Furthermore, although many datasets are public, they are housed within different local and state agencies and under different classifications. Thus, finding both selection and outcome data can be time-consuming, and attempts at making the data uniform across districts and states are challenging to impossible. This is even more problematic for research being conducted within science teacher preparation since without a clear definition of these various terms and outcome measures, the ability to compare across teacher preparation programs is impossible. Since projects are forced to individually choose how to operationalize terms, there are inconsistencies across studies, making it impossible to compare findings, resulting in uncertainty about the methods used in published works. Additionally, these vaguely defined terms will generate barriers to conducting educational research as time and resources will be used to operationalize terms.

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