

**The Unpacking is Underway:
Current and Future Directions for Teacher Preparation Data Systems**

Matthew G. Springer, Kevin C. Bastian, and Christopher Brooks¹
University of North Carolina – Chapel Hill

¹ Matthew G. Springer is the Robena and Walter E. Hussman Distinguished Professor of Education Reform and chair of the Education Policy and Organizational Leadership area in the School of Education at the University of North Carolina – Chapel Hill. Kevin C. Bastian is a Senior Research Associate and the Director of Research with the Education Policy Initiative at Carolina (EPIC) in the Department of Public Policy at the University of North Carolina – Chapel Hill. Christopher H. Brooks, is a graduate research assistant in the School of Education at the University of North Carolina – Chapel Hill. The authors appreciate helpful teacher preparation insights from Diana Lys. The usual disclaimers apply.

Introduction

Each year, approximately 150,000 individuals complete traditional or alternative teacher certification programs at more than 2,100 preparation providers across the United States (U.S. Department of Education, 2019). We know very little about whether these program completers secure teaching jobs, how they perceive the quality of their preparation, if they are effective when they enter the classroom, and how long they stay in teaching. These are just some of the areas for which preparation program officials, K-12 personnel, and policymakers need answers. Suppose teacher preparation programs (TPPs) had management information systems that could track program completers into the teacher workforce and widely report on their graduates' impact. In that case, prospective teachers could make informed decisions about which preparation program to attend. K-12 officials could target their teacher recruitment and hiring efforts. Policymakers and accreditation agencies could hold programs accountable for meeting quality standards, and, perhaps most importantly, teacher educators could use evidence to improve their programs (Feuer, Floden, Chudowsky, & Ahn, 2013).

If the education sector wants to realize improved teacher preparation, it must have robust data and management information systems that connect program components and graduates to workforce outcomes. Unfortunately, such data systems are rare, and few TPPs have access to the rich data that fuels evidence-based decision making. This essay is an opportunity to shine a light on that problem and to offer promising strategies for creating such data and management information systems.

In the following sections, we (1) provide a case study from North Carolina, where preparation and workforce data are regularly connected to meet some of the needs of programs and policymakers; (2) suggest ways in which TPPs and states can build better systems to improve their programs; and (3) offer a research perspective on how these systems can advance the field. From this essay, we hope that states, TPPs, and their partners come together to overcome obstacles and construct robust data and management information systems that improve program practices, the quality of program completers, and K-12 officials' ability to recruit and hire highly effective teachers.

What is Possible? A Case Study from North Carolina

Over the last decade, a range of actors in North Carolina—university and state officials, teacher educators, researchers—have built a robust data system linking teacher preparation and K-12 workforce data. In this section we briefly introduce these actors, highlight the data available in North Carolina, and describe what has been done with these data. With this case study we hope to illustrate what is possible with a robust data system and to identify key conditions for establishing such a system. We elaborate upon those key conditions in the following section.

North Carolina's teacher preparation data system is rooted in its "culture of data". The state was an early adopter of statewide end-of-grade and end-of-course tests—first given to students in the 1992-93 school year—and has a long history of making K-12 education data available to researchers within and outside North Carolina. Building on this data infrastructure, leadership in the state, notably UNC System President Erskine Bowles, made purposeful efforts to improve teacher preparation by expanding and utilizing data collection, analysis, and dissemination.

Bowles placed an immediate priority on teacher preparation after becoming the UNC System president in 2005. In an interview shortly after he became system president, Bowles stated:

We have a crisis in our public schools... If you look at the thing that's hampered our growth and our ability to produce people with the right kind of skills, it's that we can't attract the right kind of people to go in the teaching profession. We can't attract enough teachers and we can't attract enough teachers with math and science skills (Withers, 2006).

In the same interview, Bowles referenced a lack of data structure on teacher preparation as a major barrier to understanding where the best teachers are coming from, stating “the data is available, but you can't get to it” due to the diffuse and inaccessible data management used across the state at the time (Withers, 2006).

As system president, Bowles took action to address these issues by incentivizing college students to become teachers and by prioritizing new teacher preparation data systems. This included helping to create a pilot program in Guilford County schools that used financial incentives to recruit math and reading teachers into high need schools, and, in partnership with the Burroughs Wellcome Fund, establishing scholarships for STEM majors at four UNC system schools to complete education courses and become STEM teachers in the state (Shaw, 2007). Most importantly, in 2008, Bowles and the academic affairs office of the UNC System initiated efforts to assess the performance of UNC System teacher preparation programs (McDiarmid, 2019).

These efforts to assess program performance were advanced through a partnership between the UNC System Office, the 15 UNC System institutions that prepare teachers, and the Education Policy Initiative at Carolina (EPIC), a research organization at UNC Chapel Hill. At the time, the UNC System was focused on preparing more and higher-quality teachers and wanted EPIC to assess the effectiveness of UNC System graduates at raising K-12 students' test scores. This early partnership work was a “proof of concept” whose success depended upon the following: (1) establishing agreements between the UNC System and the North Carolina Department of Public Instruction (NCDPI) for the exchange of K-12 workforce data; (2) having a common data access point (the UNC System Office) and consistent teacher preparation data for all 15 UNC System institutions; (3) creating unique identifiers that link preparation program and K-12 workforce data; and (4) instituting procedures and systems such that UNC System teacher educators developed trust in the EPIC researchers. These procedures included opportunities for program leadership to offer refinements to analytical approaches (e.g. suggesting comparison groups and variables to control for) and sharing results with institutions, privately, before broadly disseminating findings. Trust is easy to overlook but is essential to teacher educators' buy-in and use of data systems.

Since these initial analyses, the UNC System in collaboration with EPIC have considered a wider range of preparation components and a more comprehensive set of K-12 workforce outcomes. This expansion takes advantage of the rich preparation and K-12 workforce data in North Carolina. Data available from UNC System TPPs include identifiers for completers' program and program area (e.g. elementary education), candidates' demographic data (e.g. gender, race/ethnicity, date of birth), academic measures at program entrance (e.g. high school GPA and class rank, ACT/SAT scores) and program completion (e.g. cumulative GPA), identifiers for candidates' student teaching school and the name of their cooperating teacher, and candidates' edTPA and licensure exam scores.

Data available from NCDPI include a range of K-12 workforce outcomes. It is important that data systems incorporate a variety of workforce data given limitations in each outcome (Bastian, Patterson, & Pan, 2018; Floden, 2012; Henry, Kershaw, Zulli, & Smith, 2012) and the variation in program performance across outcomes (Goldhaber & Cowan, 2014). With certified salary files from NCDPI,

researchers can identify a range of employment and retention outcomes—whether an individual is employed as a teacher in North Carolina, the school(s) in which an individual is employed as a teacher, and whether that individual persists in teaching (in North Carolina, within the same district, and within the same school).

The UNC System, EPIC, and NCDPI also developed the New Teacher Preparation Survey, which assesses first-year teachers' perceptions of how well they were prepared to teach and their opportunities to learn key teaching skills during their program, and the Employer Survey, which assesses principals' perceptions of beginning teachers and their ability to successfully perform key teaching tasks. Lastly, two measures of teacher performance are available in North Carolina. As part of the state's evaluation system (NCEES), principals rate teachers on up to five professional teaching standards each year. These evaluation ratings cover a range of teaching tasks and are available for more than 90 percent of the teacher workforce. Teachers in tested grades and subject areas also receive value-added estimates (EVAAS estimates generated by SAS) based on their contributions to student achievement growth.

The value in these robust teacher preparation and workforce data is in connecting them to assess how preparation programs and preparation experiences predict teacher employment, performance, and retention. Because there is more variation in workforce outcomes within programs than between programs, it is particularly important to assess how variation in preparation experiences predict outcomes (Goldhbaer, 2019; Koedel et al, 2015; von Hippel & Bellows, 2018). Over the last decade, partnerships between the UNC System, EPIC, and NCDPI have yielded descriptive and regression-based analyses that assess program performance and variation in program experiences. Results from these analyses have been disseminated through presentations to program leadership and faculty and the release of research briefs and journal articles, which have helped inform decision-making.

Descriptively, the UNC System and EPIC link student teaching placement and K-12 workforce data to identify characteristics of placement schools (e.g., student demographics, school-value added, etc.) and cooperating teachers (e.g., cooperating teacher demographics, credentials, and prior performance measures). These data can help TPPs meet CAEP accreditation standards and think more critically about where they place student teachers. After student-teaching is completed, the percentage of program completers that secure a teaching position in North Carolina public schools is measured overall and broken out by program area, race/ethnicity, and academic credentials. Data are also available on the location and characteristics of those schools. Taken together, these data help identify potential leaks in the preparation-to-employment pipeline and provide UNC System TPPs with more granular information regarding the districts that hire their completers and the types of K-12 students their completers teach. Lastly, each UNC System institution receives summary data from the New Teacher Preparation and Employer Surveys. These data are at the program- and program-area-level (e.g. elementary education) and compare completers from a respective program to completers from other programs/preparation routes.

Beyond descriptive reporting, the UNC System and EPIC have also played a key role in education policy decision-making by conducting rigorous studies that assess the contributions of preparation programs and preparation experiences to workforce outcomes. This work initially focused on which program completers were more effective at raising student test scores and then expanded to include teacher evaluation ratings and retention outcomes. Recent UNC System and EPIC studies have also assessed whether (1) characteristics of student teaching sites and cooperating teachers predict beginning teacher performance, as measured by value-added and evaluation ratings; (2) completers'

responses to the New Teacher Preparation Survey predict their performance and retention; and (3) candidates' edTPA scores predict their employment and performance in North Carolina public schools. These studies have direct policy implications and provide teacher educators with evidence to inform program practices and data use.

In recent years, the number of actors included in and the number of TPPs covered by North Carolina's data system has expanded. This growth is primarily due to legislation enacted by the state General Assembly that requires NCDPI, in collaboration with the State Board of Education and a new Professional Educator Preparation and Standards Commission, to create a TPP accountability system. The accountability system went through multiple rounds of feedback from relevant stakeholders—program leadership and faculty, state officials, researchers—and includes a range of program input (e.g. demographics of candidates), program completion (e.g. edTPA and licensure scores), and program K-12 workforce outcomes (e.g., completers' evaluation ratings and value-added estimates). Importantly, this accountability system includes all TPPs in North Carolina—public university, private university, and alternative entry/residency—and features external facing dashboards for data access and reporting. This accountability system is new, but it can deepen existing partnerships and improve upon North Carolina's teacher preparation data system.

Despite the progress made, there are still valuable opportunities for data system and preparation program improvement. These opportunities include sharing more actionable data with preparation programs, helping programs turn evidence into plans for improvement, and continuing research to identify efficacious preparation practices. One promising direction for data-driven TPP improvement is the development and use of accessible data platforms. In this space, the UNC System's Educator Quality Dashboard was a leader in making sure that data—e.g. admissions standards, enrollment and completion trends, value-added performance, details on university-school district partnerships—was widely accessible and easy to compare across UNC System institutions. NCDPI's new accountability dashboard serves a similar purpose for all preparation programs in the state. These dashboards are important because they signify collaboration between stakeholders and a deep interest in ensuring that teacher educators and policymakers have access to workforce data.

North Carolina exemplifies the power of collaborative teacher preparation data systems to inform decision making and drive research. Continued collaboration around new research, stakeholder engagement, and accessible data platforms can facilitate further improvement in teacher preparation practices and the quality of program graduates.

Enabling Conditions and Promising Practices for Building Robust Teacher Preparation Data Systems

In this section we describe three enabling conditions for the development and maintenance of data and management information systems. Beyond these enabling conditions, we highlight three promising practices for making data-driven program improvements.

The first enabling condition is the establishment of K-12 and TPP accountability systems. While accountability systems can be compliance-based and have unintended consequences, such systems *mandate* the collection and reporting of key data measures that may not otherwise be available or shared with TPPs. Quite simply, accountability systems create the need for widespread and common data measures. Naturally, establishing this condition is the role of state-level actors, typically through the

department of education, and requires that the data infrastructure exists to define, collect, store, and share accountability measures.²

The second enabling condition is partnerships between TPPs and key education stakeholders in the state. This includes TPPs having formalized partnerships with local education agencies/school districts, the state Department of Education, researchers, and other TPPs. These relationships do not necessarily need to be initiated and facilitated by individual TPPs. Instead, what is essential is that no TPP should have to ‘go it alone’. Engagement by and with all of the listed stakeholders is necessary. Developing a strong triad of engagement between researchers, state agents, and preparation programs ensures that data collection and sharing systems are structured in a way that maximizes data-driven collaboration and improvement.

The third enabling condition is that TPPs must develop robust *internal* data systems that collect data on the education, experiences, and performance of their candidates. These data link the unique characteristics of teacher candidates and their program experiences to their workforce outcomes and in doing so, can generate insights into the preparation practices that predict success. While developing these rich data systems can be challenging, TPPs typically provide their respective states with data on program completers annually. This practice offers a foundational point on which TPPs can build their data collection and then design management information system that support evidence-based decision-making.

Once these three enabling conditions are in place, the development of data-driven insights and improvement becomes possible. We now highlight three promising practices to generate data-driven improvements for TPPs.

The first promising practice is the sharing of individual-level teacher workforce data with TPPs. Generally, TPP accountability data is aggregated to the program-level. While these aggregated data can be used to generate insights for program improvement, such data are limited and do not acknowledge that there is more variation in outcomes within programs than between them. Therefore, sharing individual-level data is a promising frontier for teacher preparation improvement, as researchers and teacher educators could identify what elements of an individual’s preparation explain their outcomes as a teacher.

A second promising practice involves building organizational buy-in for data-driven, evidence-based decision making at TPPs. Peck and colleagues (2015) highlight that the most successful data-driven TPPs engage faculty on data-driven practices in the organization. Holding regularly scheduled meetings where data is shared with faculty, creating opportunities for input on methods of program improvement, integrating language around data-based practices in normal organizational routines, and making data accessible and understandable to faculty through training, can all lead to better organizational buy-in for improvement efforts. Transitioning from the development of robust data

² Another avenue is federal accountability systems for TPPs. In October 2016, after years of negotiation, the Obama administration released rules for federal TPP accountability. Despite its promise, the Trump Administration quickly cast it aside. If federal accountability for TPPs existed, it would prompt states to create TPP accountability systems if they didn’t already have them. If the incoming Biden Administration identifies teacher preparation accountability as a policy priority, this type of system could come through the reauthorization of the Higher Education Act, notably Title II.

systems to using data to improve teacher preparation is challenging. Still, these practices for developing organizational buy-in can make innovation and improvement easier.

A third promising practice for maximizing the utility of robust teacher preparation data systems is structuring ongoing engagement between all data-stakeholders. Establishing regular meetings between TPPs, state officials, and researchers gives all actors opportunities to share perspectives on what new measures might be needed, how data is currently being utilized to make improvements, and the barriers and facilitators of change occurring at TPPs. By gathering a range of perspectives from various stakeholders, TPP data systems can continue to develop and be better used for making innovative data-driven improvements.

How Research and Data Systems Can Advance the Field

There is an undeniable need for states and TPPs to have better data tracking and reporting systems. We know that early-career teachers vary considerably in their effectiveness and attrition rates and that this variance makes a significant impact on school and student outcomes. But university and state officials, teacher educators, and researchers are limited in understanding what mechanisms drive these differences, especially since current data systems generally only start collecting data when teachers enter the field. By tracking potential teachers throughout their preparation programs and connecting these data to workforce measures, as EPIC has done in North Carolina, one expands the timeframe available to researchers for understanding teacher outcomes. With this additional time, teacher educators and researchers can devise interventions that may improve teacher preparation, and subsequently, the quality of the teacher workforce.

Recent research has begun to demonstrate the usefulness of integrating teacher preparation data with early career teacher information. For instance, by linking student teaching and K-12 workforce data, Ronfeldt (2015) finds that early-career teachers are more effective if they student taught in a school with more teacher collaboration and student achievement growth. These results have important implications for TPPs' placement practices and state policies on placement requirements. Goldhaber and Cowan (2014) offer another good example of research using TPP data, finding that there is considerable variation in the placement of teachers and attrition across different preparation programs. Better understanding this heterogeneity could potentially lead to interventions that improve teacher preparation and increase the rates of effective teachers staying in the profession.

But the circumstances of data availability that enabled the above insights are the exception rather than the rule. As Goldhaber (2019) notes in his review of TPP research, "data often do not permit connections between TPP features and teacher workforce outcomes... feedback loops that could theoretically provide TPPs with actionable information about program design typically do not exist." Until it is common for data on TPPs to be systematically collected, the efficacy and impact of TPPs remains largely unknown. The works described above exemplify, but do not exhaust, the insights that could be generated if preparation programs better tracked and managed information on teacher candidates *and* states/districts made K-12 data available to TPPs and researchers. While North Carolina offers a strong example of what is possible with regard to partnerships between policy, practice, and research, there is still considerable room for growth.

Looking ahead, the diversity of the teaching profession is one area where more robust data management and information systems could potentially lead to new and relevant policy insights. The teacher workforce is disproportionately white (NCES, 2020), and recent research demonstrates the

measurable impact that a more racially diverse teaching workforce could have on student outcomes. For instance, Lindsay and Hart (2017) found that Black students taught by Black teachers experienced lower rates of exclusionary discipline and other discretionary disciplinary referrals. Gershenson and colleagues (2018) also find that exposure to same-race teachers has long-term impacts, with Black students exposed to just one Black teacher in grades 3-5 being significantly less likely to drop out of high school and more likely to aspire to attend college. Prior research has also found that the lack of awareness of student identities could potentially lead to teachers reinforcing negative perceptions of marginalized communities and failing to recognize the strengths of students of color in their classrooms (Samuels, 2018).

Given these findings, it is apparent that increasing the racial diversity and cultural competency of the teacher workforce is a pressing policy issue. More robust data systems would allow researchers to identify best practices for promoting the recruitment, development, and placement of non-white teachers. Additionally, a greater understanding of how preparation programs can prepare teachers using an equity-based pedagogical framework could lead to a teacher workforce better prepared to promote the academic success of traditionally marginalized groups. This is simply one example of how a robust teacher preparation data system could advance key goals for our schools and students.

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