

# Analyzing Teacher Mobility and Retention: Guidance and Considerations Report 1

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# Analyzing Teacher Mobility and Retention: Guidance and Considerations Report 1

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This applied research methods report is a guide for state and local education agency policymakers and their analysts who are interested in studying teacher mobility and retention. This report provides the foundational information needed to answer policy-relevant research questions related to teacher mobility and retention and presents the decision points and steps necessary for conducting basic mobility and retention analyses.

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# WHY THIS REPORT?

This report is designed to help educators and policymakers at the state and local levels use data to better understand teacher mobility and retention. It uses a series of examples (box 1) to demonstrate three steps that need to be taken before data analysis begins: stating research questions about teacher mobility and retention, determining administrative units (such as schools or districts) to be analyzed and the timeframe in which to do so, and creating operational definitions for the key concepts of mobility and retention. These foundational steps precede calculations and analyses. Involving both policymakers and data analysts in these steps ensures that the most policy-relevant and technically appropriate analyses are conducted. See box 2 for definitions of key terms used in the report.

This report provides guidance on how to articulate definitions of teacher mobility and retention that align with specified research questions. This step is critical given that definitions vary even in the most widely cited literature on these topics. State and local policymakers have an important role in this step, to ensure that their policy question is accurately translated into research questions and into the definitions of mobility and retention. Variation in definitions and subsequent calculations are due to differences in the studies' research questions, purposes, contexts, and analytic decision points.<sup>1</sup>

Lastly, this report introduces readers who are not typically involved in conducting data analyses to the methods used to calculate teacher mobility and retention rates. The report guides readers through the process of calculating mobility and retention rates, including key decision points. Using a practitioner-friendly approach and avoiding overly technical language, the report provides policymakers with a foundational understanding of how these rates are calculated so that they can accurately use the results.

This is the first of a two-report set called *Analyzing Teacher Mobility and Retention: Guidance and Considerations*. It provides the foundational information needed to analyze teacher mobility and retention.

Report 2 provides more detailed guidance on answering teacher mobility and retention research questions. Specifically, it addresses how to:

- Interpret differences in mobility and retention rates by teacher, school, or district characteristics.
- Analyze year-to-year trends in mobility and retention.
- Compare mobility and retention across districts or across states.
- Examine how the implementation of a state or district policy related to teachers might be associated with teacher mobility or retention.

Those familiar with frequently used definitions of mobility and retention and calculating such rates might opt to begin with report 2.

1. Definitions of mobility, retention, and attrition often vary because of differences in the purposes and contexts of studies and in the outcomes of analytic decision points used to create the definitions. For example, Gray and Taie's (2015) analysis of data from the National Center for Education Statistics Schools and Staffing Survey provides a national, longitudinal perspective on beginning teacher mobility and retention. That study provides information for stayers, movers, returners, and leavers. On the other hand, Boyd et al. (2008) examined attrition among first-year teachers. That study focused on stayers, city transfers, state transfers, and state leavers. Some studies classify teachers who leave the classroom to move into other roles as a separate category, such as role changers, but other studies include those teachers as part of the leaver group (for example, Sullivan et al., 2017).

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## Box 1. Example scenarios used in this report

The report uses three hypothetical scenarios as examples of common analyses that state and local departments of education might undertake. Although these scenarios do not constitute an exhaustive list, they include elements applicable to some of the most common questions policymakers have about teacher mobility and retention.

### Scenario 1: Mobility and retention among beginning teachers

Stakeholders from a small state (State A) want to understand the extent to which beginning teachers who completed a teacher preparation program in the state are moving between schools, staying in their initial school, and leaving teaching positions in the state public school system.

### Scenario 2: Mobility and retention in high-need schools

Board of education members in a large urban district in State B have heard anecdotal reports that teachers are leaving high-need schools at higher rates than they are leaving more affluent schools in the district. The board members ask the district's data analyst to investigate the issue.

### Scenario 3: Relationship between the institution where a teacher is prepared and teacher retention

Postsecondary and secondary school policymakers in a populous state (State C) are collaborating to better understand how teachers' preservice experience is related to their retention. The policymakers are particularly interested in whether teachers from the state's public institutions of higher education have higher retention rates than teachers from private institutions.

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## Box 2. Key terms

The following key terms are intentionally general and aim to provide an initial understanding of these concepts. This report provides additional information about how to develop more precise definitions of these terms based on the research questions to be addressed.

**Administrative unit.** The level at which a teacher might move or be retained, such as the school, the district, or the entire state public school system.

**Attrition rate.** The percentage of teachers who are leavers.

**Leavers.** Teachers who left their initial administrative unit in a given timeframe and did not enter another administrative unit during that timeframe.

**Mobility rate.** The percentage of teachers who are movers.

**Movers.** Teachers who moved from their initial administrative unit to a different administrative unit in a given timeframe. The administrative unit that determines whether a teacher is a mover might differ from the one used to determine whether a teacher is a leaver. For example, a mover might be defined as a teacher who moves between schools within a state, whereas a leaver might be defined as a teacher who is no longer teaching in the state.

**Retention rate.** The percentage of teachers who are stayers.

**Role-changers.** Teachers who changed roles from a classroom teaching position to another school-based, noninstructional position.

**Stayers.** Teachers who remained teaching in at least one of their initial administrative units in a given timeframe. For example, a teacher who splits time between two schools might be defined as a stayer if the teacher remains in one of the schools.

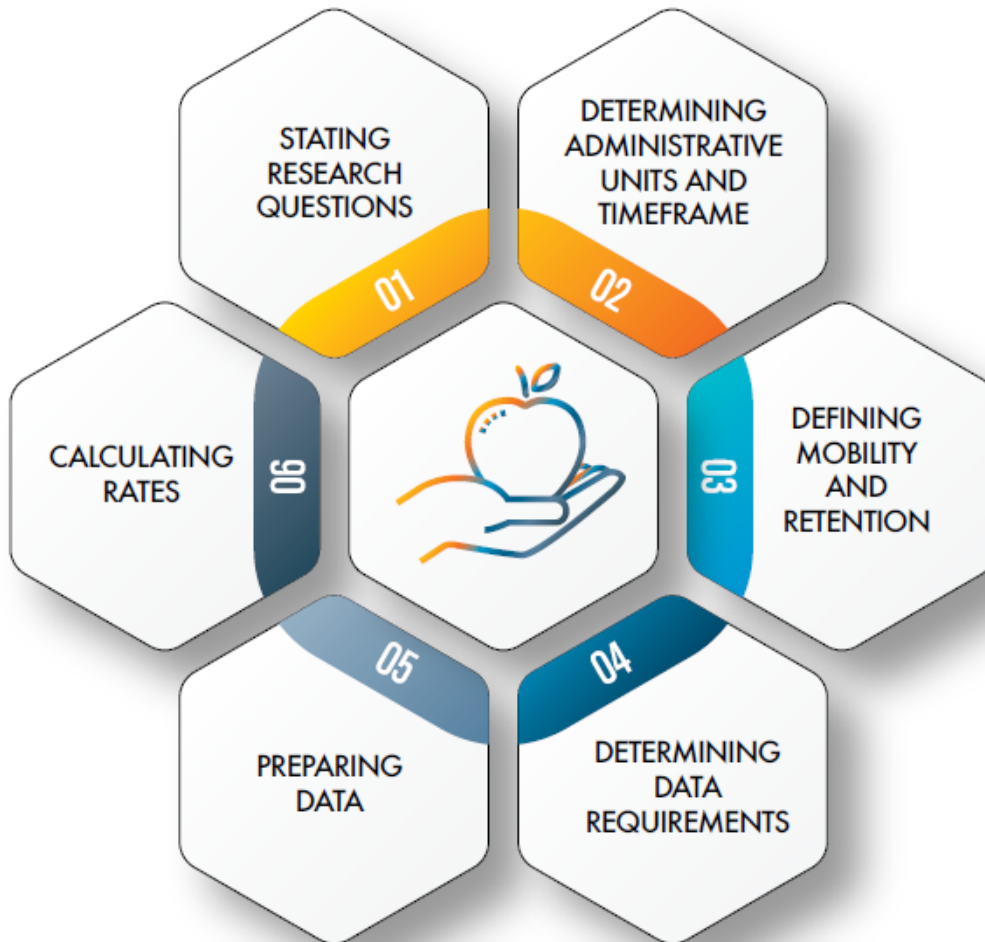
**Timeframe.** The duration of time across which mobility and retention rates will be calculated—for example, one year, three years, or five years.

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# ANALYSIS STEPS

This section presents six steps to define policy-relevant research questions related to teacher mobility and retention and to conduct basic mobility and retention analyses (figure 1). These steps were informed by more than two dozen studies on teacher mobility and retention (for more information on the methods used to inform this report, see box 3).

**Figure 1. Steps to conduct research on teacher mobility and retention**



Source: Authors' creation.

Policymakers and other stakeholders might find steps 1–4 helpful because the steps guide them through articulating policy-relevant research questions, determining the administrative unit of mobility and retention (for example, school level), defining those terms, and determining the data required for the analysis. Data analysts would also add an important perspective to the conversations that occur throughout these steps, and thus a collaborative approach is encouraged in this process.



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### Box 3. Methods used to inform this report

The study team conducted a literature scan to identify studies examining teacher mobility and retention. These studies were used to inform the methods presented and the examples included in this report as well as its companion report. The study team initially identified more than 40 widely cited studies related to this topic that were published within the past 15 years. The study team narrowed those down to approximately two dozen studies that were either Regional Educational Laboratory publications or peer-reviewed research articles; that had teacher rather than administrator mobility or retention as the key outcome; and that used a multidistrict, state, or larger sample. In addition, preference was given to studies that offered a unique perspective, such as a cross-state mobility study, or used relevant but not overly sophisticated methods, such as regression analyses.

Appendix A includes matrices of the research studies that informed this report (table A1) and the data elements they examined (table A2). Summaries of the studies are in appendix C.

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Steps 5 and 6 are particularly relevant to analysts but are also written for policymakers and other stakeholders who seek a basic understanding of how mobility and retention analyses are conducted or who are tasked with conducting such analyses. This knowledge will benefit readers without extensive research or data analysis experience. The steps provide an understanding of how mobility and retention rates are calculated and what contributes to those rates, such as which teachers are included and excluded. Novice data analysts can use these steps as a guide as they conduct analyses, while more advanced analysts might want to skip those steps and move on to report 2 in this set.



## Step 1. Stating research questions

*This step is relevant for both policymakers and analysts.*

State education agencies analyze teacher mobility and retention for accountability purposes, such as to report on teacher retention for Title II Part A of the Every Student Succeeds Act or to monitor equitable access to effective teachers. But state and local policymakers and other education stakeholders are often interested in understanding teacher mobility and retention in ways that go beyond what is required for accountability purposes. These stakeholders might have a particular question in mind or a more general topic on which they are seeking information. These topics are referred to as a “problem of practice.” A problem of practice is “a persistent, contextualized, and specific issue” that, when addressed, “has the potential to result in improved understanding, experience, and outcomes” (Buss & Zambo, n.d., pp. 5–6). Any education stakeholder, from policymaker to parent, can identify a problem of practice, which could be addressed, at least partially, through research.

Once a problem of practice has been identified, the problem should be posed as a question or a set of questions. This question or set of questions will serve as the focus of the research investigation and might require several rounds of conversation between stakeholders and the analyst to ensure that the question is researchable and will address the problem of practice. The focus of this report is empirical research questions, which are questions that meet two criteria: they can be answered with observable and measurable data, and they

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#### Box 4. Turning questions into empirical researchable questions

How a research question is phrased determines how easily it can be answered by collecting and analyzing data. Questions that are phrased in a value-laden way or that are of a philosophical nature cannot be answered with observable data alone. Researchable questions are phrased so that data can be collected to answer them.

##### Questions difficult to answer with data

- Why should parents and families worry about teacher retention?
- Do bad teachers have higher rates of mobility and turnover than good teachers?

##### Researchable questions more easily answered with data

- What are parents' and families' concerns regarding teacher retention in their children's schools?
- Do mobility and attrition rates vary by teachers' effectiveness ratings?

What makes the questions on the left difficult to answer with data? In the first example the helping verb “should” makes this a question of value that therefore does not have any observable reference. There is no way to know based on data whether something should or should not be done. Changing this to the rephrased question on the right makes it researchable because it can be answered with data.

In the second example the adjectives “bad” and “good” imply values and lack a precise definition. Instead, a better, non-value-laden question is the one on the right, which can be answered objectively with data.

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are phrased in a value-free manner—that is, without implying right or wrong or good or bad, which are defined by values. Although questions that do not meet either of these criteria, such as those that are inherently value-laden in nature (for example, “What is the purpose of education?”) cannot be answered with observable data alone, such data could help inform the answer. For examples of how to turn questions into researchable questions, see box 4.

In addition to being researchable, strong research questions are reasonable, appropriate, answerable, and specific (Institute of Education Sciences, 2018):

- **Reasonable.** This means that exploring the research questions is doable, given the time and budget available.
- **Appropriate.** This means that the research questions fit with the program or issue being studied; in this case, the questions fit with the goals or purpose.
- **Answerable.** This means that appropriate data can be gathered that will actually answer the questions.
- **Specific.** This means that the research questions include clearly defined and measurable indicators of success or the desired outcome. For example, the question specifies the outcome being measured, such as the retention rate.

These criteria are important to keep in mind when writing research questions related to teacher mobility and retention. The worksheet in box 5 incorporates these criteria and can serve as a useful tool for writing researchable questions. For additional examples of researchable questions that meet these criteria, see the example scenarios in box 6.

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## Box 5. Formulating research questions

Use this worksheet to formulate a research question, facilitating movement from a problem of practice to a strong research question.

1. **Reasonable:** My justification for investigating this problem of practice, and for why it is a worthwhile area of study, is:

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2. **Appropriate:** My problem of practice related to teacher retention, mobility, or attrition is:

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3. **Answerable:** The data that I will use to answer the questions are:

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4. **Specific:** The key terms in the problem or question that are not clear and need to be defined are:

- a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_

5. My research question related to teacher retention, mobility, or attrition is:

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### Example

1. My justification for investigating this question, and for why it is a worthwhile area of study, is: Recent analyses of state A's mobility and attrition rates for beginning teachers who were teaching in 2011/12 revealed that 28 percent moved between schools and 22 percent were no longer teaching in the state's public schools by 2015/16. Stakeholders would like to know whether these findings are similar when looking only at teachers prepared in the state.
2. My problem of practice related to teacher retention, mobility, or attrition is: State A stakeholders want to understand the extent to which beginning teachers who were prepared in the state are moving between schools, staying in their initial school, or leaving teaching positions in the state public school system.
3. The data that I will use to answer the questions are: Data from state employment records and course assignment records for the last several years.
4. The key terms in the problem or question that are not clear and need to be defined are:
- a. beginning teachers  
b. prepared in State A  
c. moving, staying, and leaving
5. My research question related to teacher retention, mobility, or attrition is: What percentage of beginning teachers prepared in State A move to another school, stay in their school, or leave teaching in State A public schools?
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## Box 6. Sample research questions for the example scenarios

This box presents research questions for each example scenario.

### Scenario 1: Mobility and retention among beginning teachers

State A stakeholders want to understand the extent to which beginning teachers who were prepared in the state are moving between schools, staying in their initial school, and leaving teaching positions in the public school system. The stakeholders articulate the research question as follows:

What percentages of beginning teachers prepared in State A move to another school, stay in their school, and leave teaching in State A public schools?

### Scenario 2: Mobility and retention in high-need schools

Board of education members in District 1 in State B have heard anecdotal reports that teachers are leaving high-need schools at higher rates than they are leaving more affluent schools in the district. The board members ask the district's data analyst to investigate the issue. The board articulates the research questions as follows:

What are the teacher mobility and retention rates in District 1 for the past five years?

How do the rates compare between teachers in high-need schools and teachers in non-high-need schools?

### Scenario 3: Relationship between the institution where a teacher is prepared and teacher retention

Postsecondary and secondary school policymakers in State C are collaborating to better understand how teachers' preservice experience is related to their retention. The policymakers are particularly interested in whether teachers from the state's public institutions of higher education have higher retention rates than teachers from private institutions. The policymakers articulate the research question as follows:

Is there a relationship between the type of institution (public or private) where a teacher is prepared in State C and that teacher's likelihood of staying in or leaving the State C public school system?

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## Step 2. Determining administrative units and timeframe

*This step is relevant for both policymakers and analysts.*

After the state or local education agency team has posed a research question related to teacher mobility and retention, the next step is to further articulate the administrative units and timeframe for which mobility and retention rates will be calculated. This is a precursor to defining mobility and retention in step 3.

Administrative unit refers to the level at which a teacher might move or be retained, such as the school, the district, or the entire state public school system. State or local education agency officials might be interested in understanding the overall state retention rate and the rate for specific districts, whereas district education agency officials might be more interested in the rates for certain schools. Stakeholders might also be interested in examining retention in certain grades, such as those in which high-stakes assessments are administered, to explore whether teachers are moving from tested grades to nontested grades and subjects. The administrative unit needs to be explicitly mentioned in the definitions of mobility and retention. Some teacher movements are within the same district, others are between districts but within the same state, and still others are to out-of-state districts or otherwise out of the state public school system. For example, Podgursky et al. (2016) defined leavers as individuals who left to teach in another state, who left to work outside of education, or who withdrew from the workforce (including those who retired or died).

Timeframe refers to the amount of time that will be used to determine whether a teacher is a stayer, mover, or leaver. For example, for a district that is interested in the share of teachers who remain in a school after five years, the relevant timeframe is five years. State or local education agency teams often want to set a timeframe of one year to monitor trends or to study the short-term impact of a program. In other situations a longer timeframe is more informative, such as when studying retention among beginning teachers who participated in a mentoring program that spans their first two years. When stakeholders are interested in examining long-term retention, the timeframe can be even longer, such as 10 years. In some cases just a few months can affect retention rates. For example, measuring retention at the end of a teacher's second year can yield a different rate compared with measuring retention at the beginning of what would have been the teacher's third year (see DeCesare et al., 2017 as an example). For other examples of studies with various timeframes, see table A1 in appendix A, and for the administrative units and timeframes used in the example scenarios in this report, see box 7.

Though it might be tempting for stakeholders to request mobility and retention rates to be calculated for multiple administrative units and for multiple timeframes, the need for that information must be weighed against the burden on the analyst and the cost. The number of analyses required can increase quickly if mobility and retention rates are calculated at the school, district, and state levels for two, three, and five years. An examination of mobility and retention at the school and district levels for two and five years yields more than

a dozen analyses and sets of results. But the analyses might be worthwhile if they will be informative to stakeholders and can be easily summarized in a straightforward way. It is important to keep a record of the decisions on administrative unit and timeframe and the reasons they were made.

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### Box 7. Units and timeframes of example scenarios

This box describes the administrative unit and timeframe for each example scenario.

#### Scenario 1: Mobility and retention among beginning teachers

Stakeholders in State A are concerned about school-level mobility and retention rates and state-level attrition rates—that is, they would like to understand the percentages of teachers who are moving from school to school and who are remaining in their original school. In addition, they would like to know the percentages of teachers who remain in and who leave teaching in State A public schools. The administrative units are schools and the state, leading to school- and state-level mobility, retention, and attrition rates.

State A stakeholders are also concerned about beginning teachers prepared in State A, given their recent efforts to provide mentoring supports to new teachers. Therefore, they want to examine mobility, retention, and attrition rates for several cohorts of beginning teachers after one, three, and five years, which represent the timeframes of interest. This information will help stakeholders understand when they are losing the most teachers and how to better target their supports.

#### Scenario 2: Mobility and retention in high-need schools

Board of education members are concerned about teacher mobility and retention in their district (District 1 in State B) and in high-need schools. The administrative units of interest are schools and the district, leading to school- and district-level mobility and retention rates. The analyst will calculate an overall rate for the district, rates for each school in the district, and aggregate rates for high-need schools and non-high-need schools, which will address both research questions (see box 6).

To uncover any patterns in the data, the analyst plans to examine annual mobility and retention rates for the past five years. So, the timeframe is one year, and the rates using that timeframe (annual rates) will be calculated for each of the past five years.

#### Scenario 3: Relationship between the institution where a teacher is prepared and teacher retention

Postsecondary and secondary school policymakers in State C are concerned about whether there is a relationship between the type of institution in the state where an educator is prepared and that educator's likelihood of staying in or leaving the State C public school system. Therefore, the administrative unit of interest is the state, leading to state-level rates of retention and attrition by type of teacher preparation institution.

The state has a robust data system and can examine data for the past 10 years. To simplify the process, the state analyst plans to examine retention and attrition rates after 5 and 10 years. Depending on the results, the analyst might examine the rates over the period using a shorter timeframe, such as two years. For example, if the results show a large discrepancy between the 5- and 10-year rates, a shorter timeframe might reveal when the discrepancy occurred. This information, coupled with contextual information about the policies affecting educators in the state, such as the introduction of a new educator evaluation system, could be helpful for decisionmaking.



## Step 3. Defining mobility and retention

*This step is relevant for both policymakers and analysts.*

After the state or local education agency team has decided on the administrative unit and the timeframe for calculating mobility and retention rates, the next step is to define the terms used for the analyses. This concerns which teachers should be considered stayers, movers, or leavers. Mobility studies typically categorize teachers in one of three ways:

- **Stayers:** Teachers who remained teaching in at least one of their initial administrative units in a given timeframe.
- **Movers:** Teachers who moved from their initial administrative unit to a different administrative unit in a given timeframe.
- **Leavers:** Teachers who left their initial administrative unit in a given timeframe and did not enter another administrative unit during that timeframe. As discussed below, the administrative units that determine whether a teacher is a mover might differ from those that determine whether the teacher is a leaver (see box 9).

But before the teacher mobility and retention categories are defined, teachers have to be defined in the context of the analysis. This process involves identifying the population of interest by specifying the characteristics of teachers who will be included in the calculation of mobility and retention rates.

In short, step 3 includes two decision points:

- Which teachers should be included in the calculation of mobility and retention rates?
- Which teachers should be categorized as stayers, as movers, and as leavers?

### **Decision point 3.1: Which teachers should be included in the calculation of mobility and retention rates?**

A clear definition of the term “teachers” is important because it affects who will be included in the calculation of mobility and retention rates. Is an administrator considered a teacher? Even a term such as “classroom teacher” needs to be defined, documented, and accompanied by a set of inclusion and exclusion criteria. Are part-time teachers included? Or individuals who teach outside their certifications?

The definition of “teacher” must be closely aligned with the research question. If a state or local education agency team is interested in the retention of beginning teachers, it would not make sense to include veteran teachers in the calculation of retention. Furthermore, a narrower definition of “beginning teacher” is needed. The team must consider such questions as: After how many years of experience is a teacher still considered a beginning

teacher? And do years of experience in other states or districts matter? Table 1 contains examples of teacher characteristics for the team to consider to better align the definition of “teacher” with its research question.

**Table 1. Typical teacher characteristics to consider and their sample definitions**

Characteristic	Typical example	Sample definition
Experience	First-time, beginning, novice, early-career, probationary	Beginning teachers: “Teachers in their first five years of teaching employment” (Boe et al., 2006, p.3).
Certification in main teaching assignment	Fully certified, partly certified, not certified	“Teachers were classified as ‘fully certified’ if they held an advanced professional certificate, regular or standard state certificate, or a probationary certificate” (Boe et al., 2006, p. 6).
Type of preparation program	Traditional, alternative, Teach for America	“The route through which the teacher entered teaching (e.g., traditional program or alternative route) ...” (Ingersoll et al., 2014, p. 7).
College selectivity	A continuous variable ranking each teacher’s undergraduate institution using Barron’s five-category scale of college and university selectivity	“4 = the top two Barron’s categories—most competitive and highly competitive” (Ingersoll et al., 2014, p. 11).
Employment status	Regular, full time, part time	“...a school with one full-time teacher (1.0) plus one half-time teacher (0.5) would have 1.5 FTE [full-time equivalent] teacher...” (Hanson & Yoon, 2018, p. 3).  “When educators had multiple positions, the study team used the full-time equivalent in each position to identify whether the majority of their time was spent as classroom teachers” (Meyer et al., 2019, p. B-2).
Job title/ primary subject area assignment	Classroom teacher, principal, librarian, specialty teacher (for example, special education, English learner students), math	“...full-year classroom teacher, excluding teachers aide...” (Espel et al., 2019, p. 2).  “...teachers were considered to be special education or not special education teachers” (Espel et al., 2019, p. B-2).  “...Math: a dichotomous variable where 1 = degree in mathematics or mathematics education, and 0 = all other teachers” (Ingersoll et al., 2014, p. 10).
Grade level	Grades K–6, grades 7–12	“...Indicator for teaching more than half of classes in math or science in grades 7–12...” (Ondrich et al., 2008, p. 29).
Type of school	Public school teacher, teacher in a charter school	“...Traditional schools, charter schools, magnet schools, and alternative schools are included” (Hanson & Yoon, 2018, p. 5).

Source: Authors’ compilation.

The state or local education agency team must decide which teacher characteristics are relevant to the analysis and offer clear definitions of each. For example, if the intent is to study beginning teachers, this could be defined as “teachers with fewer than three years of classroom teaching experience.” Or if probationary teachers are the teacher group of interest, the definition could be “teachers with fewer than three years of experience in the district regardless of years of experience in other districts.” Team discussions on this topic can help ensure that the most policy-relevant and feasible approaches are taken. The team should clearly document the decisions made along with the reasons behind them. Such records are essential for appropriately interpreting results when writing a report or communicating the findings. See box 8 for how these terms were defined in the example scenarios.



### *Definition challenges*

Establishing decision rules for definitions is often straightforward, but challenges can arise for subsets of teachers. For example, some teachers might split their time between two schools, and others might split their time between administrator and teacher roles. These challenges are discussed in more detail in step 5. In other cases teachers might have been teaching before or during their preparation program, so they might not fit the definition of a beginning teacher despite having a recent program completion date. Analysts need to establish decision rules to handle exceptions to their definitions. For example, if a teacher starts midway through the school year, the state or local education agency team will need to decide whether to count the teacher as a stayer if the teacher remains in the school the following year. Additionally, analysts need to check the data to ensure that the data files include these joiners. Teachers who leave their initial administrative unit but return during the study timeframe can also present a challenge—should they be considered stayers even if they were not present in the same administrative unit each year? One solution is to count teachers as stayers only if they were present every year during the timeframe. Analysts can perform sample analyses to review the implications of defining the teacher population in different ways. Then, the team can discuss and decide which definition to use. As always, it is important to document these decisions to inform future analyses.

## Box 8. Sample definitions of “teacher”

This box provides definitions of the term “teacher” for each example scenario.

### Scenario 1: Mobility and retention among beginning teachers

State A stakeholders articulated their research question as: “What percentages of beginning teachers prepared in State A move to another school, stay in their school, and leave teaching in State A public schools?” To answer this research question, State A stakeholders might consider clearly defining the term “beginning teachers” with a focus on the experience, the job role, and the type of school. An example is “regular, full-time classroom teachers in their first year of teaching in the State A public school system, excluding those with an administrative position.”

### Scenario 2: Mobility and retention in high-need schools

Board of education members in District 1 in State B articulated their research questions as: “What are teacher mobility and retention rates in District 1 for the past five years? How do the rates compare between teachers in high-need schools and teachers in non-high-need schools?” To answer these research questions, District 1 stakeholders might consider defining teachers in high-need schools, with a focus on employment status, the job role, and type and locality of school. An example is “full-time classroom teachers and school administrators working for the lowest-performing schools or the schools with the highest percentages of students qualifying for the national school lunch program located in District 1.”

### Scenario 3: Relationship between the institution where a teacher is prepared and teacher retention

Postsecondary and secondary school policymakers in State C articulated their research question as: “Is there a relationship between the institution where an educator is prepared in State C and that educator’s likelihood of staying in or leaving the State C public school system?” To answer this research question, State C policymakers might consider the definition of educators prepared in State C, with a focus on the type of preparation program, the undergraduate institution attended, and the timeframe in school years. An example is “classroom teachers and school administrators of traditional preparation at public or private institutions of higher education in State C whose initial year of employment at state public school system falls between the 2000/01 and 2018/19 school years.”

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## Decision point 3.2: Which teachers should be categorized as stayers, movers, or leavers?

The terms “stayers,” “movers,” and “leavers” are commonly used in studies investigating teacher mobility and retention. The meaning of these terms appears straightforward: “stayers” means teachers who stayed in the same school or district, “movers” means teachers who transferred from one school or district to another, and “leavers” means teachers who left. However, a closer look shows that the terms can be confusing. For example, what should teachers who transferred from one school to another in the same district be called? From the state perspective they are stayers because their transfer did not affect the total state workforce. But from the district perspective they are movers because their transfer affects the distribution of the district workforce without changing its total. And from the school perspective they are considered leavers.

Defining which teachers are stayers, movers, or leavers is influenced by decisions made about the administrative unit and timeframe, as discussed in step 2, but also requires deciding how to handle teacher employment categories and changes in job roles.

Over the course of their tenure, teachers might change from one employment category to another, such as a preservice teacher to a certified teacher or from a probationary, nontenured position to a tenured position after a specific number of years. Depending on stakeholders’ interest, the analyst might need to consider a teacher’s employment category, such as distinguishing between teachers with and without tenure, when defining which teachers are stayers, movers, or leavers. For example, Lazarev et al. (2017) used a detailed definition of stayers in determining success in teacher recruitment: teachers who completed a probationary period of employment in a single district for three years and obtained tenure in their fourth year of teaching.

The definitions of terms will also be influenced by decisions about teachers who change roles—often referred to as role-changers. Specifically, the term “leaver” should include information that addresses a scenario in which a classroom teacher takes a nonteaching position in the same school or district (for an example, see Meyer et al., 2019). The analyst and the state or local education agency team will need to decide whether to count role-changers as leavers or in a separate category. See box 9 for how these terms were defined in the example scenarios.

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## Box 9. Sample definitions of “stayer,” “mover,” and “leaver”

This box provides definitions of “stayer,” “mover,” and “leaver” for each example scenario.

### Scenario 1: Mobility and retention among beginning teachers

State A stakeholders articulated their research question as: “What percentages of beginning teachers prepared in State A move to another school, stay in their school, and leave teaching positions in State A public schools?” These stakeholders are interested in examining mobility and retention after one, three, and five years because of their concerns about mentoring support. In answering this research question, State A stakeholders used the following definitions:

- **Stayers:** Beginning teachers who are at their original school of assignment at the beginning of their second, fourth, or sixth year of employment.
- **Movers:** Beginning teachers who are no longer at their original school of assignment but are still teaching at another public school in State A at the beginning of their second, fourth, or sixth year of employment.
- **Leavers:** Beginning teachers who are no longer teaching at a public school in State A at the beginning of what would have been their second, fourth, or sixth year of employment, focusing on the administrative unit, the time-frame of the movement, and the role change.

### Scenario 2: Mobility and retention in high-need schools

Board of education members in District 1 in State B articulated their research question as: “What are teacher mobility and retention rates in District 1 for the past five years? How do these rates compare between teachers in high-need and teachers in non-high-need schools?” To answer this research question, District 1 stakeholders calculated the annual rate of retention for each school for five years using the following definitions:

- **Stayers:** Teachers and school administrators who are in their original school of assignment after three years.
- **Movers:** Teachers and school administrators who are in a different school in the district from their original school of assignment after three years.
- **Leavers:** Teachers and school administrators who leave public schools in the district within three years, focusing on the administrative unit and the timeframe of the movement.

Because their interest is principally in the comparison between high-need and non-high-need schools, the stakeholders might consider disaggregating movers into four subtypes. These subtypes could represent a move from a high-need school to another high-need school, a move from a high-need school to a non-high-need school, a move from a non-high-need school to another non-high-need school, and a move from a non-high-need school to a high-need school.

### Scenario 3: Relationship between the institution where a teacher is prepared and teacher retention

Postsecondary and secondary school policymakers in State C articulated their research question as: “Is there a relationship between the institution where an educator is prepared in State C and that educator’s likelihood of staying in or leaving the State C public school system?” In answering this research question, State C policymakers used the following definitions:

- **Stayers:** Teachers and school administrators who are in the State C public school system for more than five years.
- **Leavers:** Teachers and school administrators who leave the State C public school system within five years of employment in the system.

These definitions focus on the administrative unit and the timeframe of the movement. Because interest was solely on the retention within the State C public school system, the category of movers could be effectively dropped in this case.



## Step 4. Determining data requirements

*This step is relevant for both policymakers and analysts.*

During this step the state or local education agency team—including both the program or policy staff and data analysts—will discuss and determine the data elements needed to conduct the analyses. This involves careful thought about the research question and what data will be needed to answer it. A team member should document the data elements in a table, such as table 2, or a similar spreadsheet.

### Data elements

The primary data elements needed to conduct teacher mobility and retention studies include teacher assignment data related to when teachers are or are not teaching as well as whether and when they changed schools, districts, or roles (table 2). These data are typically recorded annually by districts and states. Using this information, the data analyst can then create a teacher mobility variable that indicates whether the teacher is a stayer, mover, leaver, or role changer and that is aligned to the definitions agreed on by the analyst and state or local education agency team.

It is not uncommon for the team to realize at this point that some of the data elements in the list are not available. When such data elements are essential for answering a research question, it becomes necessary for the team to revisit the earlier steps. For example, the team might learn that the earliest cohort of beginning teachers with the necessary data is still in its fifth year of employment, so the initial timeframe of 10 years needs to be revised. Or the team might learn that the state does not keep records of whether teachers who are new to the state public school system previously taught in another state or in a private school, so the team needs to change the definition of beginning teachers.

It is important to remember that mobility and retention status is not contained in the source data but determined by comparing multiple years of teacher employment data. For that reason teacher mobility and retention data elements are not listed in the table.

A unique identifier for each teacher, such as state educator ID, is a crucial data element for comparing multiple years of employment data. Without it, tracking teacher mobility and retention will be extremely challenging. However, there are situations when an educator ID is not available for matching teacher records across years. For example, tracking teacher mobility across states could not rely on the use of a unique teacher identifier because each state has its own educator ID. That was the case in Podgursky et al.'s (2016) study of teachers' interstate mobility. To identify interstate movers, those researchers used teacher name and birthdate.

Additional data elements, such as teacher and preparation program characteristics, might be relevant to the research question and used to disaggregate the results, which means

**Table 2. Sample data elements for the three example scenarios**

Data element	Sample definition	Scenario 1: Mobility and retention among beginning teachers	Scenario 2: Mobility and retention in high- need schools	Scenario 3: Relationship between the institution where a teacher is prepared and teacher retention
<i>Educator level</i>				
Educator ID	Unique teacher identifier	✓	✓	✓
Teaching assignment(s) for each year	Teaching position = 0 Nonteaching position = 1	✓	✓	✓
Type of teacher preparation program	Traditional = 0 Alternative = 1			✓
Type of preparation institution (public or private)	Public = 0 Private = 1			✓
<i>School level</i>				
School ID(s) for each year	School identifier	✓	✓	✓
District ID(s) for each year	District identifier	✓	✓	✓
Locale (urban, suburban, or rural)	Rural = 0 Suburban = 1 Urban = 2		✓	
Percentage of students by race/ethnicity	A continuous variable of percentage		✓	
Percentage of students eligible for the national school lunch program	A continuous variable of percentage		✓	

Source: Authors' compilation.

summarizing results separately for groups of teachers who share those characteristics.<sup>2</sup> The most common teacher characteristic data elements in the studies reviewed for this report were educator ID, school ID, district ID, gender, race/ethnicity, birthdate, highest degree earned, salary, hire date, teaching certification status, job position, and teaching assignments (see table A2 in appendix A). An example of using preparation program characteristics is Ingersoll et al.'s (2014) study of the relationship between teacher preparation characteristics and beginning teacher attrition. It included the following data elements, which were used to examine differences in teachers' preparation program experiences in relation to their retention or attrition:

- A proxy measure of teachers' academic achievement ability: Barron's rankings of the selectivity and competitiveness of the college or university where teachers obtained their bachelor's degree.
- Whether teachers held a noneducation degree, an education degree, or both.
- Whether teachers held a graduate-level degree.

2. This report does not address the steps for how to disaggregate mobility, retention, and attrition rates by teacher or other characteristics, but those steps are covered in report 2 of this two-part report set.

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- Highest type of teaching certificate held.
- The route through which teachers entered teaching.
- The number of courses teachers completed in teaching methods or teaching strategies.
- The amount of practice teaching teachers underwent prior to teaching.

Analysts might want to include additional data elements related to teachers' preparation programs, such as whether teachers received their degree in-state or out-of-state. This could be necessary if the research question involved examining mobility and retention only for teachers trained in-state. These data could also be useful in a preliminary analysis of the percentage of teachers trained in-state that go on to teach in the state. Such an analysis could be useful contextual information for example scenarios 1 and 3, especially for states that train a high number of teachers who are presumed to go on to teach in other states or in private schools. It is very rare to have a dataset that tracks teachers' employment across states because different states have different unique identifiers for teachers, as already discussed, or to be able to access employment data from private schools.

Data elements addressing school characteristics can also be important to include when the research question requires disaggregating results across schools. The most frequently included data elements on school characteristics in the studies reviewed for this report were school ID, district ID, school location, school grade span, school proportion of students who are racial/ethnic minority students, and school proportion of students eligible for the national school lunch program (see table A2 in appendix A).

Sometimes a specific research question requires data elements that are not commonly included in teacher mobility and retention studies. For example, a district might be interested in the relationship between teacher attrition and student achievement, so the analysis would require such data elements as average student assessment scores, matched to each teacher in the data file. Outlining the procedures for how to match student achievement data to teacher records is beyond the scope of this report, but doing so is a complicated process that involves determining which teachers are responsible for which students. For examples of how this procedure was conducted in research on teacher attrition and student achievement, see Boyd et al. (2008), Ronfeldt et al. (2013), and Sorensen and Ladd (2020).

The state or local education agency team and data analysts should work together in this step to identify the data elements necessary to address the research questions. The team should aim to overidentify data elements and later exclude them rather than omit data elements that might be useful for analysis, because adding to the data files later in the process can be time-consuming.

## Data definitions

After the key data elements have been identified, the next step is defining each data element and values associated with that element to ensure that the state or local education agency team interprets the data provided correctly (see table 2). For example, an analyst who needs information on when a given teacher started working for a district to discern whether the teacher belongs to the 2010/11 or 2011/12 cohort might assume that the “date of employment” variable is the date a teacher was hired by the district. However, that variable could also be the date on which the district entered the teacher into its roster database. The data manager might advise the analyst to use a different variable, such as first day of teaching, instead. Thus, a data table with definitions can prevent confusion about the meaning of the data elements.

The information needed to define the data elements is often noted in state or local education agency data handbooks. In some instances the analyst might need to work with the state or local education agency data team to draft the definitions and values for each element. It is recommended that the analyst confer with the state or local data manager to learn what each variable represents. The data manager will likely be an indispensable guide for choosing the right variable for a given data element while advising of problems with a variable that might not be apparent. If there is no data manager, which might be the case in small districts, the analyst might need to speak to the staff member who administers teacher data files. Finally, other state or local education agency program staff, such as those with knowledge of teacher certification, might also contribute important knowledge to these conversations and should be involved as needed.

## Data requests

Analysts who are not working at a state or local education agency with direct access to required data will need to make a data request to the agency. This might involve drafting and executing a data-sharing agreement and securely transferring data to ensure the protection of potentially sensitive information. The U.S. Department of Education’s Student Privacy Resources (<http://studentprivacy.ed.gov>) and the National Forum on Education Statistics Forum *Guide to Supporting Data Access for Researchers: A State Education Agency Perspective* (U.S. Department of Education, 2012) provide guidance on data-sharing agreements. It is important to plan adequate time in advance to develop a data-sharing agreement because it could take several months or longer for all parties to review and finalize it (Shaw et al., 2018).



## Step 5. Preparing data

*This step is particularly relevant for policymakers and novice data analysts.*

After the data elements have been identified and data have been obtained, the next step is to prepare the data file for analysis. This process involves creating a single data file, often from multiple data files that have been generated in different formats. It is also common for those data files to be in different locations—for example, at the state department of education and at the district administrative office. Another complicating factor is that most data files contain flaws—some obvious, some hidden. All these factors make the data preparation step more involved than simply transferring the pertinent data files from the source and merging them into a single file. For detailed guidance on merging data files and cleaning data, see appendix B.



Although this section is written primarily for novice analysts without extensive experience in preparing data for mobility and retention analyses, it can be useful for other stakeholders who want to better understand how datasets are constructed in this context (see box 10 for sample data preparation techniques for the example scenarios). A strong understanding of the data can facilitate deeper communication between analysts and stakeholders.

## Determining teacher employment status

After merging and cleaning the data, the analyst structures the file. For nonanalysts the most intuitive structure might be one in which individual rows represent individual teachers, and each teacher has only one row entry. In this format the columns can represent a series of teacher characteristics that do not vary from year to year, called time-invariant variables, and teacher characteristics that vary from year to year, called time-variant variables. The most important time-variant variable for analyzing retention and mobility is teacher employment status. A set of these time-variant variables should be ordered by school year (table 3).

**Table 3. Example of common data structure for analyzing retention and mobility**

ID	Gender	Race	Cohort	Present in previous three years	Sch_2015-16	Dist_2015-16	Role_2015-16	Sch_2016-17	Dist_2016-17	Role_2016-17
1002345	Male	White	2015	No	122134	122	Teacher	122134	122	Teacher
1002346	Female	Black	2015	No	136334	136	Teacher	136321	136	Admin

Source: Authors' compilation.

In this example teacher #1002345 stayed in the same school from 2015 to 2016, as indicated by the same school identifier “122134” in columns “Sch\_2015–16” and “Sch\_2016–17.” On the other hand, teacher #1002346 moved from one school to another in the same district, as indicated by the different school identifier in columns “Sch\_2015–16” and “Sch\_2016–17” but the same district identifier in columns “Dist\_2015–16” and “Dist\_2016–17”; she also changed her role to administrator, as seen in columns “Role\_2015–16” and “Role\_2016–17.”

In this example each teacher is associated with only one school for a given year, but that is not always the case. Some teachers have appointments at two schools simultaneously, and others move between schools midyear. The analyst needs to create an explicit set of rules to handle such ambiguous cases. For example, the analyst might set a particular date, such as the date on which student enrollment is calculated for each year, as the date for which teacher employment status is defined.

Finally, it is important to consider how mobility and retention results might differ depending on the teacher’s full-time equivalent status, which refers to whether a teacher teaches full time, such as 100 percent, or less than full time. For teachers who teach in multiple schools and do not have full-time equivalent status at any one school, the analyst might decide to use the school where the teacher is assigned the most classes, to exclude teachers assigned to multiple schools from the sample, or to count a teacher more than once. Similar decisions apply when a teacher splits time between two roles, such as between a teaching position and an administrative position. For example, part-time teachers might have higher turnover

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rates than full-time teachers, but if the results are not disaggregated by full-time equivalent categories, such as full time and less than 50 percent time, retention rates will be understated, and attrition rates will be exaggerated. So it can be helpful to disaggregate results by full-time equivalent categories, when available, or to exclude part-time teachers from the sample if appropriate for the research question.

Conversations among the larger team of policymakers, program staff, and the analyst are advisable to ensure agreement on the most policy-relevant decisions and rules. Once the team makes these decisions, it is important to record them because future changes in those rules could change the substantive results of retention and mobility analyses. It is also wise to include the decisions in the discussion of the sample and in the interpretation of the findings.

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### Box 10. Samples of data preparation

This box shows how data were merged and prepared for each example scenarios.

#### Scenario 1: Mobility and retention among beginning teachers

To meet the request of the stakeholders in State A, the analyst must calculate school-level retention, in-state mobility, and attrition from the state public school system. The analyst also needs to be able to identify beginning teachers, their original school of assignment, and their job role. Finally, the analyst needs to follow beginning teachers for five years, which requires a sixth year of employment data. After merging multiple years of state teacher employment data files using teacher IDs, the analyst performs preliminary data analyses to identify data errors. The analyst notices duplicate records and eliminates them while recording the decision rules used. To identify beginning teachers, the analyst adds three preceding years of teacher data from employment data files to filter out teachers who appear at least once during those years. The analyst then adds a new variable—teacher cohort—to show each teacher’s first year of teaching.

#### Scenario 2: Mobility and retention in high-need schools

To meet the request of board of education members in District 1 in State B, the analyst must calculate school-level annual retention, in-district mobility, and attrition from the school district. The analyst also needs to disaggregate mobility and retention based on the type of school: high-need versus non-high-need. For this reason the analyst needs to merge the employment data and then add a variable showing the school type, high-need or non-high-need. To know individual teachers’ mobility and retention status after three years, the analyst needs to merge the first- through fourth-year employment data using the state teacher ID. Furthermore, those merged data need to be prepared separately for five cohorts of teachers. From the state teacher employment data file, the analyst selects data for 2010/11–2014/15, and for each year selects only teachers who were employed in District 1. The analyst then merges the three successive years of state employment data for each of the five cohorts separately. For example, for teachers in District 1 in 2010/11, state employment data are merged for 2011/12–2013/14. This enables tracking of District 1 teachers from 2010 to 2013. The analyst does the same for teachers in District 1 in 2011/12, and so on. After cleaning each of these five data files (see the section on cleaning data in appendix B for details), the analyst structures each data file so that the year-to-year employment status is grouped by the “xth year of teaching,” where xth has the value of first to fourth and then adds the school performance

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category (high-need or non-high-need) next to the school ID. For this analysis the analysis data file consists of five separate files, and a single teacher might appear in multiple files.

### **Scenario 3: Relationship between the institution where a teacher is prepared and teacher retention**

To meet the request of postsecondary and secondary school policymakers in State C, the analyst must calculate 5-year state retention, and possibly 10-year state retention. Because the policymakers are interested primarily in comparing the retention rate of teachers prepared at public institutions with that of teachers prepared at private institutions in the state, the retention rate will be calculated for multiple cohorts of newly prepared teachers from those institutions. To know individual teachers' retention status after five years, the first- to sixth-year state employment data, which are snapshot data taken in the fall of each school year, need to be merged using the state teacher ID. For retention after 10 years the 1st- to 11th-year employment data need to be merged. With that dataset information from the database that contains individual teacher's information on preparation then needs to be merged, again using the state teacher ID as the key for matching. The analyst starts by merging state employment data with data on teacher preparation consisting of year of preparation and ID for the institution of preparation. The analyst adds a variable identifying whether the institution of preparation is public or private. After merging and cleaning the data files, the analyst structures the data file so that the year-to-year employment status is grouped by the "xth year of teaching" where xth has the value of first to sixth (or 1st to 11th). The time-invariant variables for this analysis data file include the institution ID for teacher preparation, along with the variable showing whether the institution is private or public.

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## Step 6. Calculating rates

*This step is particularly relevant for policymakers and novice data analysts.*

In this final step the data analyst calculates the mobility and retention rates and shares the preliminary results with the larger team to review their accuracy. Mobility rate refers to the number of teachers who were classified as movers divided by the number of teachers in the sample. Retention rate refers to the number of teachers who were classified as stayers divided by the number of teachers in the sample. Attrition rate refers to the number of teachers who were classified as leavers divided by the number of teachers in the sample. These rates are calculated using the following equations<sup>3</sup>:

$$\text{mobility rate} = [\text{number of movers}] / [\text{number of teachers in sample}]$$

$$\text{retention rate} = [\text{number of stayers}] / [\text{number of teachers in sample}]$$

$$\text{attrition rate} = [\text{number of leavers}] / [\text{number of teachers in sample}]$$

### What should the numerator and the denominator be?

The equations for calculating the rates are straightforward. However, analysts must exercise care regarding both what to place in the numerator and the denominator and how to interpret the rates that are calculated. As discussed in steps 4 and 5, the numbers in the equations typically come from state or district employment data. For example, to calculate the district retention rate for a specific year, such as 2010/11, an analyst counts the number of teacher records in the 2010/11 district employment data that meet the inclusion criteria specified in step 3. That number constitutes the study sample and is the denominator.

The analyst then uses the following year's (2011/12) district employment data to generate the numerators for the retention and attrition rates. Teachers who are still in the district employment data and meet the inclusion criteria are counted as stayers; otherwise, they are counted as leavers. Depending on stakeholders' interest, the analyst might differentiate educators who leave the jurisdiction, whose records are missing from the following year's employment data, from role changers, whose records are present but no longer meet the inclusion criteria. The analyst then counts the number of stayers and places that number in the numerator in preparation for calculating the retention rate. Likewise, the analyst counts the number of leavers and places that number in the numerator in preparation for calculating the attrition rate.

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3. As discussed in step 2, depending on the administrative unit used, these three rates might not sum to 100 percent. For example, the average in-school retention rate for a district, the average in-school attrition rate for that district, and the within-district mobility rate for that district would not sum to 100 percent.

## What about the mobility rate?

As discussed in step 3, how individual teachers are categorized depends on the administrative unit. At the school level there is no mobility. Either teachers stay in the school and are counted as retained, or they leave the school and are counted as leavers. But attrition at the school level could mean retention, mobility, or attrition when the administrative unit is the district or state (table 4).

**Table 4. Example of attrition at different administrative units**

Teacher	School		District		State		Attrition		
	Beginning	Ending	Beginning	Ending	Beginning	Ending	School level	District level	State level
A	Richmond	Richmond	Newton	Newton	Connecticut	Connecticut	Stayer	Stayer	Stayer
B	Richmond	Alder	Newton	Newton	Connecticut	Connecticut	Leaver	Stayer: In-district mover	Stayer
C	Richmond	Tabor	Newton	Lexington	Connecticut	Connecticut	Leaver	Leaver	Stayer: In-state mover
D	Richmond	Groton	Newton	Salem	Connecticut	Vermont	Leaver	Leaver	Leaver

Source: Authors' compilation.

Decisions made during prior steps in this process will affect these calculations. As discussed in step 3, the administrative unit has implications for calculating mobility and retention rates. For example, whether the administrative unit is the district or state determines whether the calculated rate is a district retention rate or state retention rate. Likewise, as discussed in steps 2 and 3, it is imperative that the state or local education agency team specify the timeframe—for example, as a three-year school retention rate or five-year in-state mobility rate. In short, mobility and retention rates must always be accompanied by both the administrative unit and the timeframe (table 5). See boxes 11–13 for how retention rates were calculated for each example scenario used in the report.

**Table 5. Examples of retention and mobility rate at different administrative units and with different timeframes**

Retention or mobility rate	Administrative unit	Timeframe
1-year school retention rate	School level	1 year
3-year school retention rate	School level	3 years
3-year in-state mobility rate	State level	3 years
5-year in-state mobility rate	State level	5 years

Source: Authors' compilation.

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### **Box 11. Calculating the retention rate for example scenario 1: Mobility and retention among beginning teachers**

State A stakeholders defined stayers as beginning teachers who are at their original school of assignment at the beginning of their second, fourth, or sixth year of employment; movers as beginning teachers who are no longer at their original school of assignment but are still teaching at another public school in State A at the beginning of their second, fourth, or sixth year of employment; and leavers as beginning teachers who are no longer teaching at a public school in the state at the beginning of what would have been their second, fourth, or sixth year of employment.

Using these definitions, the analyst can calculate one-, three-, and five-year school retention rates for the entire state. The rates can be calculated for each school year and for each cohort and tracked over time to see whether retention rates are increasing or decreasing. To calculate the three-year school retention rate for the 2015/16 cohort of beginning teachers, for example, the analyst counts the number of teacher records in the 2015/16 state employment data that meet the inclusion criteria specified in step 3—that is, a regular, full-time classroom teacher, not in an administrative position. That number constitutes the sample and is placed in the denominator.

The analyst then looks up the 2018/19 state employment data. Teachers who are still in the original school of assignment and meet the inclusion criteria are counted as stayers. The analyst then counts the number of stayers and places that number in the numerator to calculate the retention rate. Teachers who are no longer at the original school of assignment but are at another State A public school and meet the inclusion criteria are counted as movers. The analyst then counts the number of movers and places that number in the numerator to calculate the mobility rate. Finally, teachers who are missing from the 2015/16 state employment data or no longer meet the inclusion criteria are counted as leavers. The analyst then counts the number of leavers and places that number in the numerator to calculate the attrition rate. Because State A stakeholders excluded administrators from the definition of teachers, it is important to remove those role changers from the numerator in the calculation of both the retention rate and the mobility rate. Those cases are instead included in the numerator of the attrition rate.

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### **Box 12. Calculating the retention rate for scenario 2: Mobility and retention in high-need schools**

Board of education members in District 1 in State B defined stayers as teachers and school administrators who are in their original school of assignment after three years, movers as teachers and school administrators who are in a different school in the district from their original school of assignment after three years, and leavers as teachers and school administrators who leave public schools in the district within three years.

The retention rate calculated is the three-year school retention rate for District 1. It is calculated for each teacher cohort for each school for five years. To calculate the three-year retention rate for the cohort of teachers and administrators new to a given school in 2014/15, for example, the analyst counts the number of teacher records for the school in the 2014/15 district employment data that meet the inclusion criteria specified in step 3. That number constitutes the sample size and is placed in the denominator.

The analyst then looks up the 2017/18 district employment data. Teachers who are still in their original school of assignment and meet the inclusion criteria are counted as stayers. The analyst then counts the number of stayers and places that number in the numerator to calculate the retention rate for the school.

For each school a plot of three-year retention rates can be produced using the annual rate calculated for the previous five cohorts of teachers, to study the trend.

Teachers who are no longer at their original school of assignment but are at another public school in the district and meet the inclusion criteria are counted as movers. The analyst then counts the number of movers and places that number in the numerator to calculate the in-district mobility rate. Finally, teachers who are missing from the 2017/18 district employment data or no longer meet the inclusion criteria are counted as leavers. The analyst then counts the number of leavers and places that number in the numerator to calculate the district attrition rate.

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### Box 13. Calculating the retention rate for scenario 3: Relationship between where a teacher is prepared and teacher retention

Postsecondary and secondary school policymakers in State C defined stayers as teachers and school administrators who are in the State C public school system for more than five years and leavers as teachers and school administrators who leave the State C public school system within five years of employment in the system. In short, policymakers' interest is in the five-year state retention rate. They are also interested in the 10-year state retention rate.

Because the interest is mainly in comparing the retention rate between teachers prepared at public versus private institutions in State C, the five-year state retention rate is calculated for each cohort of newly prepared teachers from those institutions. To calculate the five-year state retention rate of teachers for the 2010/11 cohort, whose initial year of employment in the State C public school system was 2010/11, for example, the analyst counts the number of teacher records in the 2010/11 state employment data that meet the inclusion criteria (newly prepared teachers from the institutions of higher education in State C). That number constitutes the sample size and is placed in the denominator. This calculation of the denominator is done separately for teachers from public institutions and for teachers from the private institutions.

The analyst then looks up the state employment data for school year 2015/16. Teachers who are still in the state employment data and meet the inclusion criteria are counted as stayers. The analyst then counts the number of stayers and places that number in the numerator to calculate the retention rate. Teachers who are no longer in the state employment data or no longer meet the inclusion criteria are counted as leavers. The analyst then counts the number of leavers and places it in the numerator to calculate the attrition rate. Those calculations are done separately for public and for private institutions. Ten-year retention rates are calculated likewise.

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## Next steps

After steps 5 and 6 are completed and the final retention and mobility rates are calculated, they can be summarized in a format to share with others. The summary might include tables or figures that show how yearly rates have changed over time. Next, the analyst and the state or local education agency staff members should examine the results together and discuss implications while considering the original research questions. Additional research questions often arise during these discussions. For example, the stakeholders might want to know the characteristics of teachers with higher attrition rates or schools with higher retention rates. To answer those additional questions, the analyst would need to use some of the variables mentioned in step 4, such as teacher and school characteristics, or obtain and then merge additional data files with the analysis data file that was created. The analyst would then perform further statistical analyses.

Report 2 in this set addresses these topics. Specifically, it illustrates how mobility and retention rates might be used in four common analyses: interpreting differences in mobility and retention rates by teacher, school, or district characteristics; analyzing year-to-year trends in mobility and retention; comparing mobility and retention across districts or across states;



## Analysis steps

and examining how the implementation of state or district policy related to teachers might be associated with teacher mobility or retention. This process involves four steps:

- Step 1: Determine analysis method and data needed to address additional research questions.
- Step 2: Prepare data for analysis.
- Step 3: Produce frequencies and other descriptive statistics.
- Step 4: Examine relationships using regression models.

Report 2 starts where this report ends: determining the analysis method and data needed to address additional research questions. It presents some of the considerations for preparing data for such analyses. For example, it covers considerations for examining trends in mobility and retention rates, such as consistency in definitions and variables over time.

In terms of the analyses, report 2 covers how to produce frequencies and other descriptive statistics for disaggregating mobility and retention by teacher, school, and district characteristics. It also covers analyzing trends in mobility and retention and comparing mobility or retention across districts or across states. Finally, it covers how to use regression models to examine relationships in which the outcome is mobility or retention or to examine relationships between teacher, school, or district characteristics and retention.

# APPENDIX A. MATRICES OF RESEARCH ARTICLES AND DATA ELEMENTS

Table A1 presents a matrix of the 25 research articles reviewed for this report, organized by the target population, topic category, article type, analysis methods, data source, rates calculated, and timeframe. Table A2 presents an overview of the data elements used in each article. A summary of each article is in appendix C.

**Table A1. Analytic characteristics of the research articles reviewed for this report**

Characteristic	Boe et al. (2006)	Boyd et al. (2008)	Buckley & Shang (2004)	Clotfelter et al. (2007)	DeAngelis & Chen (2013)	DeCesare et al. (2017)	Djonko-Moore (2016)	Espel et al. (2019)	Glazerman et al. (2010)	Goldhaber & Cowan (2014)	Hansen et al. (2016)	Hanson & Yoon (2018)	Ingersoll et al. (2014)	Krieg (2016)	Kukla-Acevedo (2009)	Latham & Vogt (2007)	Lazarev et al. (2017)	Lochmiller, Adachi, et al. (2016)	Lochmiller, Sugimoto, & Muller (2016)	Meyer et al. (2019)	Ondrich et al. (2008)	Podgursky et al. (2016)	Ronfeldt (2012)	Sass et al. (2012)	Silva et al. (2015)	Number of articles with characteristic	
<i>Target population</i>																											
Beginning teachers	✓	✓			✓				✓	✓	✓	✓	✓											✓		✓	10
Public school teachers only		✓	✓	✓		✓	✓							✓	✓		✓								✓		10
<i>Category</i>																											
Teacher shortage												✓									✓						2
Teacher preparation	✓				✓					✓	✓		✓			✓								✓			7
Impact on teacher retention			✓	✓		✓		✓	✓				✓	✓	✓	✓	✓					✓		✓	✓	✓	14
<i>Article type</i>																											
Regional Educational Laboratory report						✓		✓				✓					✓	✓	✓	✓		✓					8
Peer-review journal				✓	✓		✓		✓	✓	✓		✓	✓	✓	✓						✓		✓	✓	✓	14
Others	✓	✓	✓																								3
<i>Analysis methods</i>																											
Descriptive analysis <sup>a</sup>			✓					✓				✓					✓	✓	✓	✓		✓	✓				9
Chi-square	✓		✓													✓											3
Regression (any type)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓				✓	✓	✓		✓		19

Characteristic	Boe et al. (2006)	Boyd et al. (2008)	Buckley & Shang (2004)	Clotfelter et al. (2007)	DeAngelis & Chen (2013)	DeCesare et al. (2017)	Djonko-Moore (2016)	Espel et al. (2019)	Glazerman et al. (2010)	Goldhaber & Cowan (2014)	Hansen et al. (2016)	Hanson & Yoon (2018)	Ingersoll et al. (2014)	Krieg (2016)	Kukla-Acevedo (2009)	Latham & Vogt (2007)	Lazarev et al. (2017)	Lochmiller, Adachi, et al. (2016)	Lochmiller, Sugimoto, & Muller (2016)	Meyer et al. (2019)	Ondrich et al. (2008)	Podgursky et al. (2016)	Ronfeldt (2012)	Sass et al. (2012)	Silva et al. (2015)	Number of articles with characteristic	
Survival analysis									✓	✓														✓		2	
Randomized controlled trial						✓			✓																		2
<i>Data source</i>																											
Schools and Staffing Survey and Teacher Follow-up Survey	✓												✓		✓												3
Survey data	✓		✓		✓		✓		✓		✓																7
Administrative data from state/city education agencies		✓		✓		✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓		✓		18
<i>Rates calculated</i>																											
Attrition rate	✓	✓					✓	✓		✓	✓	✓		✓	✓			✓	✓	✓	✓	✓	✓	✓			15
Retention rate		✓	✓	✓	✓	✓		✓	✓	✓	✓						✓	✓	✓	✓				✓		✓	14
Mobility rate							✓	✓		✓					✓			✓	✓	✓							7
Cross-state mobility																						✓					1
<i>Timeframe</i>																											
1 year			✓																						✓		2
2 years	✓				✓	✓		✓					✓	✓	✓					✓							8
3–5 years		✓		✓			✓		✓		✓	✓					✓	✓	✓			✓	✓				11
6–9 years															✓												1
More than 10 years										✓											✓			✓			3

a. Here “descriptive analysis” identifies studies that contained descriptive summary statistics on the sample, such as sample means, standard deviations, frequencies, and percentages.

Source: Authors’ compilation.

**Table A2. Data elements of the research articles reviewed for this report**

Data element	Boe et al. (2006)	Boyd et al. (2008)	Buckley et al. (2004)	Clotfelter et al. (2007)	DeAngelis & Chen (2013)	DeCesare et al. (2017)	Djonko-Moore (2016)	Espel et al. (2019)	Glazerman et al. (2010)	Goldhaber & Cowan (2014)	Hansen et al. (2016)	Hanson & Yoon (2018)	Ingersoll et al. (2014)	Krieg (2016)	Kukla-Acevedo (2009)	Latham & Voegt (2007)	Lazarev et al. (2017)	Lochmiller, Adachi, et al. (2016)	Lochmiller, Sugimoto, & Muller (2016)	Meyer et al. (2019)	Ondrich et al. (2008)	Podgursky et al. (2016)	Ronfeldt (2012)	Sass et al. (2012)	Silva et al. (2015)	Number of articles with characteristic	
<i>Educator level</i>																											
Educator ID	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	24
Date of birth	✓		✓	✓	✓			✓			✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	14
Gender	✓		✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	19
Race/ethnicity	✓		✓	✓	✓		✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	17
Highest degree earned	✓				✓	✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓		✓				14
Salary				✓			✓	✓		✓					✓		✓	✓	✓	✓							8
Teaching experience							✓			✓		✓		✓			✓	✓	✓			✓			✓		8
Teaching assignment	✓	✓		✓	✓								✓				✓	✓	✓	✓	✓						9
Full-time or part-time							✓					✓					✓	✓	✓	✓							5
Years at same school	✓	✓	✓	✓	✓	✓	✓	✓			✓							✓	✓	✓							9
Years at same district	✓	✓		✓	✓	✓	✓	✓			✓								✓	✓							8
School ID		✓		✓		✓	✓	✓										✓	✓								7
District ID		✓		✓		✓	✓	✓						✓				✓	✓								8
Certified or not	✓			✓			✓		✓				✓				✓	✓	✓	✓	✓						8
Type of teaching certification (regular or probationary)	✓		✓	✓			✓		✓			✓					✓	✓	✓		✓						10
<i>School level</i>																											
School ID	✓			✓	✓							✓			✓		✓	✓	✓	✓				✓	✓	✓	11
District ID	✓											✓			✓		✓	✓	✓				✓	✓	✓	✓	8
School size					✓					✓			✓		✓		✓	✓	✓	✓							7
Class size													✓		✓		✓	✓	✓		✓						4
Locale (urban, suburban, town, or rural)	✓				✓		✓		✓			✓			✓		✓	✓	✓		✓						9
Grade served		✓			✓		✓		✓						✓		✓	✓	✓				✓	✓			10

Data element	Boe et al. (2006)	Boyd et al. (2008)	Buckley et al. (2004)	Clotfelter et al. (2007)	DeAngelis & Chen (2013)	DeCesare et al. (2017)	Djonko-Moore (2016)	Espel et al. (2019)	Glazerman et al. (2010)	Goldhaber & Cowan (2014)	Hansen et al. (2016)	Hanson & Yoon (2018)	Ingersoll et al. (2014)	Krieg (2016)	Kukla-Acevedo (2009)	Latham & Vogt (2007)	Lazarev et al. (2017)	Lochmiller, Adachi, et al. (2016)	Lochmiller, Sugimoto, & Muller (2016)	Meyer et al. (2019)	Ondrich et al. (2008)	Podgursky et al. (2016)	Ronfeldt (2012)	Sass et al. (2012)	Silva et al. (2015)	Number of articles with characteristic
Percentage of students by race/ethnicity	✓	✓		✓	✓					✓					✓		✓	✓	✓		✓		✓		✓	12
Percentage of students eligible for the national school lunch program	✓	✓		✓	✓			✓				✓	✓	✓			✓	✓	✓		✓	✓	✓		✓	15
School math/English language arts proficiency		✓						✓	✓			✓					✓					✓			✓	7
<i>Student level</i>																										
Student ID		✓				✓				✓																3
Gender		✓				✓				✓																3
Race/ethnicity		✓				✓				✓																3
Eligible for the national school lunch program		✓				✓				✓																3

Source: Authors' compilation.

# APPENDIX B. PREPARING DATA

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This appendix provides detailed information on how to prepare data for analysis, specifically on merging data files and cleaning data.

## Merging data files

To merge data files into a single analysis data file, all the files must have a common unique identifier that can be used as the merge key. Each file to be merged should be checked for duplicate values prior to the merge, and any duplicates should be flagged for further investigation.

One teacher-level data file is merged with another teacher-level data file by performing a one-to-one merge using the unique teacher identifier. This is called a one-to-one merge because the key variable, teacher ID, is associated with a single record in both of the datasets. In contrast, merging a teacher-level data file with a school-level or district-level data file involves performing a one-to-many merge. It is called a one-to-many merge because the key variable, in this case the school or district ID, is associated with a single record in one dataset but many records in the other. In other words, a given school or district ID identifies a single record in the school-level or district-level dataset but is associated with multiple records in the teacher-level dataset for teachers who are in the same school or in the same district. Both of these merge options are available in most standard statistical analysis packages.

For example, suppose the analyst obtained annual teacher employment data files from the state that include school name and ID, district name and ID, and job role, starting in 2010/11 and ending in 2014/15. Then, suppose the analyst obtained a separate data file from the state containing information about teacher preparation, such as the name and institution ID from which individual teachers received a teaching diploma. To compile an analysis data file, the analyst needs to merge those multiple teacher-level data files—five annual employment data files and one data file on teacher preparation—into a single analysis data file. To do so, the analyst uses the unique teacher identifier as the merge key and performs a one-to-one merge multiple times until all the files are merged together. This produces a unified data file that contains all pertinent information on individual teachers, including school, district, and role by school year, and name of institution of higher education where they obtained their teaching diploma.

If the planned analysis involves school- or district-level data that are typically publicly available on the state department of education website, the analyst downloads the necessary data and uses the school or district identifier as the merge key and performs a one-to-many merge using the unified data file constructed from the above steps (see box 10). The analyst might include school or district characteristic data from one school year, such as the baseline year of the specified timeframe, or from each year of the specified timeframe, which would require conducting the merge multiple times.

## Cleaning data

After all pertinent data files have been merged into a single data file, the analyst runs preliminary data analyses, such as summary descriptive statistics for each data element in the data file. These analyses typically include checking data format, value range, frequencies, mean and standard deviation, missing values, duplicates, or anomalies. These steps are referred to as cleaning data.

Data format refers to the way a data element is coded in the data file. For example, a data element “First day of teaching” might be coded using a date format or using a string format. If this data element is used to select the teacher cohort, for example, it needs to be converted from a string format to a date or numeric format first. The analyst ensures that all data elements are coded in a format that allows later analysis and the ability to recode data elements into the right format when needed. For instance, the analyst encodes any string demographic variables to categorical or numeric variables for group analysis. A string variable is one that is not coded as a number, such as labeling gender as “female” and “male.” Converting this to a numeric variable involves, for example, recording female as “1” and male as “0.”

Value range refers to the minimum and the maximum value for each data element. Checking the value range gives the analyst an initial sense about the presence of data error. For example, if a data element “Years at same school” has a range of 4 to 80, it likely has data error. Looking into specific cases of teachers with suspected out-of-range values often results in the identification of records that were included by mistake or that suffer from data input error. The analyst then decides whether to delete the records or to attempt to correct data errors. The decision often requires discussing the suspect records with another data team member with knowledge of the data to determine whether the records represent actual errors or unusual yet valid cases. Importantly, each of those decisions, along with their justifications, should be documented.

Checking frequencies is often a quick and easy way for the analyst to find out whether the merging process introduced data error. These checks include counting the number of unique IDs, the number of school IDs, and the number of subgroups, such as those defined by race/ethnicity or gender, and summarizing them in frequency tables. The analyst can check whether those numbers match external data on district or state statistical profiles on state education department websites. The analyst can confer with other data team members or district data managers to address any discrepancies.

Checking the mean and standard deviation for data elements in a numeric format is also useful for detecting data errors, including those arising from merging data files. For example, if the average for “Years of teaching experience” is 3.2 for the entire district, the analyst might suspect a data error because of the low value. This appraisal is often followed by a review of source data and the merging procedure to identify the origin of the error.

Detecting missing values for data elements is generally part of the preliminary analysis, such as when examining data frequencies, because statistical applications automatically report the number of missing values along with information on data format, value range, and mean and

standard deviation. Ideally, a data element contains no missing values, but this is not always the case. When the number of missing values is small, the analyst might go to the teacher records that contain the missing value to investigate what is causing the problem. But when the number of missing values is large, the analyst might resort to additional analyses to uncover patterns of missingness. Doing so typically involves comparing the characteristics of teachers with missing values and teachers without missing values. The current guidelines from U.S. Department of Education (2019) state that when less than 85 percent of a key variable has data, the analyst should conduct a nonresponse bias analysis to examine whether there is potential bias between sample members with data on the key variable and those with a missing value.<sup>4</sup> After those initial investigations, the analyst can discuss the results with the data manager. Through such conversations, the analyst might be able to find and complete the missing information. For example, the data manager might conclude that for 2012/13, missing information about the number of mentoring sessions might mean that no mentoring sessions were conducted.

After investigating what a missing value might represent and replacing missing values with proper values where possible, the analyst might deal with the remaining missing values by using advanced statistical techniques, such as imputation, that fall beyond the scope of this report. An alternative and simpler option that is commonly used is listwise deletion, in which teachers with missing data on key variables are dropped from the subsequent analysis. Because this procedure results in the analysis using only teachers with complete data on key variables, it is also referred to as “complete case analysis.” Regardless of whether imputation or listwise deletion is used, the analysts should document the extent of data missingness, such as the percentage of records that have missing data, and note it as a limitation in any reports or presentations of the findings.<sup>5</sup>

If there are duplicate records in which all data elements are identical for a unique identifier, these records can be deleted. A more challenging situation arises when two records with the same identifier contain conflicting information. For example, the analysis data file might have two records with the same teacher ID, with two different district names for the year. These cases are sometimes legitimate; for example, the teacher worked for two districts simultaneously in a given year or moved from one district to another midyear. In these instances the cases should remain in the file and the analyst and state or local education agency team would need to address such instances in the definitions for stayers, movers, leavers, administrative unit, and timeframe. But sometimes these records represent errors—for example, the data were entered with an incorrect teacher ID. In addition to necessitating a discussion with the data manager, the handling of these errors often involves some statistical analysis to uncover a pattern that would explain the error. For example, the analyst might compare the two records in question in terms of the presence of missing values, out-of-range values, and other values that potentially signal a data quality issue. The analyst could then discard the record that was determined to be of questionable quality. Importantly, such decisions must be documented to facilitate corrections if the decision turns out to have been incorrect.

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4. For more information on how to conduct a nonresponse bias analysis, see the National Center for Education Statistics Statistical Standards guidance at [https://nces.ed.gov/statprog/2002/std4\\_4.asp](https://nces.ed.gov/statprog/2002/std4_4.asp).

5. All approaches to dealing with missing data have advantages and disadvantages. A comprehensive review of this topic is beyond the scope of this report. For more information on how to address missing data, see a resource such as Enders (2010).



# APPENDIX C. SUMMARIES OF RESEARCH ARTICLES

**Boe, E. E., Cook, L. H., & Sunderland, R. J. (2006). *Attrition of beginning teachers: Does teacher preparation matter?* Center for Research and Evaluation in Social Policy. University of Pennsylvania, Philadelphia.**

Research questions/ study purpose	Is the percentage of beginning teachers retained a direct function of the amount of teacher preparation?
Population	Beginning teachers
Definitions of terms	Leaving teaching employment at the kindergarten through 13 grade levels, in either public or private schools, is called exit attrition and is distinguished from other forms of attrition such as school attrition (leaving teaching in a particular school) and teaching-area attrition (leaving a teaching assignment in elementary education for some other teaching assignment).
Data source	National Center for Education Statistics Schools and Staffing Survey and Teacher Follow-Up Survey
Findings	Extensive teacher preparation contributed to a more stable and qualified teaching force and to a reduction in the demand for a fresh supply of beginning teachers to replace those who would otherwise have left teaching employment.

**Boyd, D., Grossman, P., Lankford, H., Loeb, S., & Wyckoff, J. (2008). *Who leaves? Teacher attrition and student achievement* (NBER Working Paper No. w14022). National Bureau of Economic Research.**

Research questions/ study purpose	The goal of this paper was to determine whether and how the effectiveness of teachers differed by their retention status by looking specifically at how differential attrition varied across schools and grade levels during a teacher's first three years of teaching and by following teachers who transferred to assess the extent to which more and less effective teachers sort systematically into different types of schools.
Population	First-, second-, and third-year teachers in grades 4–8
Definitions of terms	Cumulative transition rates were calculated for entering cohorts of New York City teachers in grades 4–8 who started teaching between 2000 and 2003 and who transferred to another school within the city, who transferred to another public school district in New York State, or who left the New York State public school system.
Data source	New York City Department of Education New York State Education Department
Findings	First-year teachers identified as less effective at improving student test scores had higher attrition rates than did more effective teachers in both low-achieving and high-achieving schools. The differences among first-year teachers were meaningful in size, but the pattern was not consistent for second- and third-year teachers.

**Buckley, J., Schneider, M., & Shang, Y. (2004). *The effects of school facility quality on teacher retention in urban school districts*. National Clearinghouse for Educational Facilities.**

Research questions/ study purpose	What is the effect of school facility quality on teacher retention?
Population	Not defined, but descriptive statistics imply more experienced teachers
Definitions of terms	Attrition is defined more narrowly than a departure from the profession—but retaining teachers is essential to the functioning of any given school and ultimately to meeting the mandate of No Child Left Behind.
Data source	Survey of teachers in the District of Columbia
Findings	Facility quality was an important predictor of teachers' decision to leave their current position.

## Appendix C

<b>Clotfelter, C. T., Glennie, E. J., Ladd, H. F., &amp; Vigdor, J. L. (2007). Teacher bonuses and teacher retention in low-performing schools: Evidence from the North Carolina \$1,800 teacher bonus program. <i>Public Finance Review</i>, 36(1), 63–87.</b>	
Research questions/ study purpose	The goal of this study was to measure the probability of in-school teacher retention upon receipt of an \$1,800 bonus for teaching at a high-poverty secondary school.
Population	Secondary math, science, and special education teachers who participated in the program
Definitions of terms	Retention is a binary outcome indicating whether a teacher remained teaching in the same subject at the same school from one year to the next
Data source	North Carolina Department of Public Instruction
Findings	Even with the use of the most optimistic results from the analysis of teacher retention rates, the effects of the teacher bonus program on achievement were too small to detect.
<b>DeAngelis, K. J., Wall, A. F., &amp; Che, J. (2013). The impact of preservice preparation and early career support on novice teachers' career intentions and decisions. <i>Journal of Teacher Education</i>, 64(4), 338–355.</b>	
Research questions/ study purpose	This study used survey and administrative data to examine the effects, including interactions, of preservice preparation and early career support on new teachers' career intentions and decisions.
Population	Beginning teachers
Definitions of terms	The intentions item asked: "How long do you plan to remain in teaching?" Those who indicated no plans to leave their school in the near or longer term were identified as stayers, those who indicated plans to remain in teaching but in a different school or district were identified as movers, and those who indicated plans to leave teaching in the near or longer term were identified as leavers. The study also used employment data to distinguish among teachers who remained in the same school, teachers who changed schools within the same district or in a different district, and teachers who left the state public school system altogether.
Data source	State employment records and survey data
Findings	There was a direct association between perceived preparation quality and leaving teaching. Moreover, the quality and comprehensiveness of mentoring and induction were related to teachers' intentions and decisions.
<b>DeCesare, D., McClelland, A., &amp; Randel, B. (2017). <i>Impacts of the Retired Mentors for New Teachers program (REL 2017–225)</i>. U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central.</b>	
Research questions/ study purpose	What is the impact of the Retired Mentors for New Teachers program on elementary school students' scores on math and reading, teacher evaluation ratings, and teacher retention? What is the association between hours of mentoring and teacher retention?
Population	Probationary teachers in the Aurora Public School District who are in their first three years in the district, regardless of their prior teaching experience.
Definitions of terms	Retention is defined as teachers still teaching in the district at the start of the following school year, even if they changed grade levels or schools (measured at the beginning of the second year and at the beginning of the third year).
Data source	Student outcomes: NWEA's Measures of Academic Progress Teacher retention: Data from the Aurora Public School District's human resources department Teacher evaluation: Evaluation data from the Aurora Public School District
Findings	Math achievement was higher among students taught by teachers in the program group than among students taught by teachers in the business-as-usual group at the end of the first year. Although the differences were not statistically significant, reading achievement was higher among students taught by teachers in the program group than among students taught by teachers in the business-as-usual group. The program's effect on teacher evaluation ratings and teacher retention after two years was not significant.

## Appendix C

<b>Djonko-Moore, C. M. (2016). An exploration of teacher attrition and mobility in high poverty racially segregated schools. <i>Race Ethnicity and Education</i>, 19(5), 1063–1087.</b>	
Research questions/ study purpose	Do the profiles of school setting characteristics, teacher characteristics, and teachers' perceptions of school climate predict an increase in the odds of teacher attrition and mobility in high-poverty racially segregated (HPRS) schools? Do interactions among teachers' perceptions of satisfaction, control, principal and colleague support, students, and the school community increase the odds of teacher attrition and mobility in HPRS schools?
Population	Regular, full-time K–12 public school teachers.
Definitions of mobility and other terms	Teacher attrition refers to the permanent exit of a teacher from the teaching profession. Teacher mobility refers to the movement of a teacher from one school to another school, typically with a change in setting (for example, Title I school to non–Title I school).
Data source	2007–2008 Schools and Staffing Survey and 2009 Teacher Follow-Up Survey
Findings	School climate variables predicted increased odds of mobility, and teacher characteristics, school setting, and teachers' perceptions of school climate predicted increased odds of teacher attrition.
<b>Espel, E. V., Meyer, S. J., &amp; Weston-Sementelli, J. L. (2019). <i>Factors related to teacher mobility and attrition in Colorado, Missouri, and South Dakota</i> (REL 2019–008). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central.</b>	
Research questions/ study purpose	From 2015/16 to 2016/17, to what extent were characteristics of teachers, schools, and districts in Colorado, Missouri, and South Dakota related to the likelihood of teachers moving to a different school and taking a nonteaching position or leaving the state public school system altogether?
Population	Classroom teachers
Definitions of terms	Teacher attrition refers to classroom teachers who take a nonteaching position or leave a state public school system for any reason (leavers). Teacher mobility refers to classroom teachers who move to a classroom teaching position in a different public school or district in the same state public school system for any reason (movers). Teacher retention refers to classroom teachers who remain in a classroom teaching position in the same school (stayers).
Data source	State education agencies in Colorado, Missouri, and South Dakota National Center for Education Statistics Elementary/Secondary Information System
Findings	Movers were more likely than stayers to be a special education teacher, to have been teaching in the same school for fewer years, to be younger, or to be in a school with a low accountability rating or one that paid a lower average teacher salary. Leavers were more likely than stayers to be older, to work less than half time, to have been teaching in the same district for fewer years, to earn a lower salary, or to be in a school that had a low accountability rating, paid a lower average teacher salary, or had a higher proportion of racial/ethnic minority students.

## Appendix C

Glazerman, S., Isenberg, E., Dolfen, S., Bleeker, M., Johnson, A., Grider, M., & Jacobus, M. (2010). *Impacts of comprehensive teacher induction: Final results from a randomized controlled study* (NCEE No. 2010-4027). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.

Research questions/ study purpose	What is the impact of comprehensive teacher induction on the types and intensity of induction services teachers receive, relative to the types and intensity of services they receive from the district's current induction programs? What impacts does comprehensive induction have in the classroom? Specifically, what are the impacts on teachers' classroom practices and student achievement? What impacts does comprehensive induction have on the teaching workforce? Specifically, what are the impacts on teacher attitudes, teacher retention, and composition of the teaching force?
Population	In each study school all eligible teachers participated if they were new to the profession, taught in grades K-6, and were not already receiving induction support from a teacher preparation or certification program.
Definitions of terms	School stayer and district stayer refer to teachers who remained in their original school or district, respectively, after three years. (All school stayers are, by definition, district stayers as well.) Mover refers to teachers who, after three years, left the district but remained in teaching, and leaver refers to teachers who, after three years, were no longer teaching.
Data source	Teacher practices were measured via classroom observations conducted in spring 2006. Data on teacher retention were collected via surveys administered in fall 2006, 2007, and 2008. Student test scores were collected from district administrative records for the 2005/06, 2006/07, and 2007/08 school years.
Findings	For teachers who received one year of comprehensive induction, there was no impact on student achievement; for teachers who received two years of comprehensive induction, there was no impact on student achievement in the first two years. In the third year there was a positive and statistically significant impact on student achievement. Neither exposure to one year nor exposure to two years of comprehensive induction had a positive impact on retention or other teacher workforce outcomes.

Goldhaber, D., & Cowan, J. (2014). *Excavating the teacher pipeline: Teacher preparation programs and teacher attrition. Journal of Teacher Education, 65*(5), 449-462.

Research questions/ study purpose	The purpose of the study was to examine the length of time teachers from various preparation programs spend in the profession and to link retention to prep programs.
Population	Beginning teachers
Definitions of terms	Attrition occurred when teachers left Washington Public Schools (exit) or their current school (move building).
Data source	Washington State administrative databases
Findings	There were substantial differences in mobility and attrition rates associated with different preparation programs. However, much of the variation in teacher mobility was limited to smaller programs in the sample. Although there was statistically significant variation in the rates at which teachers left the public school system among the largest programs in the state, which collectively train nearly half of new teachers, there was not a statistically significant variation in the rate at which alums of the largest programs exited their school.

## Appendix C

<p><b>Hansen, M., Backes, B., &amp; Brady, V. (2016). Teacher attrition and mobility during the Teach for America clustering strategy in Miami-Dade County Public Schools. <i>Educational Evaluation and Policy Analysis</i>, 38(3), 495–516.</b></p>	
Research questions/ study purpose	This study examined the extent to which a clustering strategy affected teacher mobility—particularly retention of Teach for America (TFA) corps members—in low-performing schools.
Population	TFA beginning teachers
Definitions of terms	Teachers' retention status was coded based on two subsequent year observations. Teachers observed in the same school for both years were flagged as being retained (that is, they did not exit the district or the school during the period). Teachers who were observed to have changed schools between those year observations were coded as having exited the school (though retained in the district). Those who did not return to the administrative data in a subsequent year were coded as having exited both the school and the district.
Data source	Administrative data TFA alumni survey
Findings	The increased concentration of TFA corps members in schools was associated with a reduction in TFA mobility across schools after the first year of service, but it did not affect the overall retention of corps members in the district after the two-year commitment.
<p><b>Hanson, H. J., &amp; Yoon, S. Y. (2018). <i>Idaho's educator landscape: How is the state's teacher workforce responding to its students' needs?</i> Education Northwest.</b></p>	
Research questions/ study purpose	This report describes statewide data from the 2011/12–2016/17 school years on changes in student enrollment and demographics, teacher preparation, the composition of the teacher workforce, and teacher turnover.
Population	Novice teachers (less than one year of experience) and early-career teachers (one to three years of experience)
Definitions of terms	Teacher turnover rate is the percentage of teachers who did not return to their school in the following school year.
Data source	Idaho State Department of Education U.S. Department of Education Title II reports
Findings	About 20 percent of Idaho teachers on average did not return to their school the following year. More than 20 percent of teachers did not return to low-performing and high-poverty schools.
<p><b>Ingersoll, R., Merrill, L., &amp; May, H. (2014). <i>What are the effects of teacher education and preparation on beginning teacher attrition?</i> (Research Report #RR-82). Consortium for Policy Research in Education, University of Pennsylvania.</b></p>	
Research questions/ study purpose	How do the attrition rates of new teachers coming from traditional teacher education programs compare with those of teachers entering teaching through alternative routes and programs? Are there differences in the attrition of new teachers who have an education degree compared with the attrition of teachers who have other degrees? Do the amounts of practice teaching, preparation in pedagogy, and courses in teaching methods that new teachers receive prior to teaching have any bearing on their attrition?
Population	New teachers in math and science
Definitions of terms	Attrition refers to teachers who left after their first year on the job.
Data source	National Center for Education Statistics 2003–2004 Schools and Staffing Survey and its supplement, the 2004–2005 Teacher Follow-up Survey
Findings	There were large differences in the types and amounts of education and preparation that teaching candidates received. Math and science teachers were more likely than other teachers to have graduated from highly selective colleges and universities and were more likely to have a noneducation degree, but they tended to have less pedagogical preparation than other teachers. These differences in education and preparation were significantly related to the degree to which teachers leave teaching. However, these relationships varied by the type of education and preparation. Those teachers with more pedagogy were far less likely to leave teaching after their first year on the job.

## Appendix C

<b>Krieg, J. M. (2006). Teacher quality and attrition. <i>Economics of Education Review</i>, 25(1), 13–27.</b>	
Research questions/ study purpose	The purpose of this work was to investigate the impact of quality on the decision to leave the profession, using the previous year's value added as the measure of teacher quality.
Population	Grade 4 public school teachers in Washington
Definitions of terms	Teachers who did not teach in either the 2002/03 or 2003/04 school years are categorized as "left teaching in the Washington public school system."
Data source	Washington Office of Superintendent of Public Instruction student data files (to estimate teacher value-added) Washington Assessment of Student Learning, Iowa Test of Basic Skills, and social data Teacher data files
Findings	Higher-quality female teachers were less likely to leave the profession. Teacher quality did not impact attrition of male teachers.

<b>Kukla-Acevedo, S. (2009). Leavers, movers, and stayers: The role of workplace conditions in teacher mobility decisions. <i>Journal of Educational Research</i>, 102(6), 443–452.</b>	
Research questions/ study purpose	The purpose of this study was to explore the effects of administrative support, classroom control, and behavioral climate on teachers' decisions to quit teaching or switch schools.
Population	All full-time public school teachers who completed the 2000–2001 National Center for Education Statistics Teacher Follow-Up Survey (TFS)
Definitions of terms	Mover refers to teachers who moved schools. Leaver refers to teachers who left the teaching profession.
Data source	National Center for Education Statistics Schools and Staffing Survey and TFS
Findings	Two of the three workplace conditions were strongly related to the mobility decisions of first-year teachers, whereas experienced teachers were not strongly influenced by workplace conditions. Workplace conditions had different effects on movers and leavers, suggesting the importance of modeling these two groups separately.

<b>Latham, N. I., &amp; Vogt, W. P. (2007). Do professional development schools reduce teacher attrition? Evidence from a longitudinal study of 1,000 graduates. <i>Journal of Teacher Education</i>, 58(2), 153–167.</b>	
Research questions/ study purpose	The purpose was to determine the impact, if any, of preparation method (professional development school [PDS] vs. non-PDS preparation) on teacher attrition rates while various individual characteristics were controlled for.
Population	Teachers from PDSs
Definitions of terms	The main outcome variable was the number of years teachers taught. Because teachers in the sample entered the profession in different years, the number of years they taught was compared with the number of years they could have been employed.
Data source	Information maintained by the Illinois State University's Teacher Certification Center and its Department of Curriculum and Instruction. State of Illinois Teacher Service Records prepared by the Illinois State Board of Education Student demographic and descriptive information maintained centrally by the university.
Findings	Even when important student background and cognitive characteristics were controlled for, education in a PDS appeared to significantly foster graduates' entry into and persistence in teaching. The effect sizes, although statistically significant, were small to moderate.

Appendix C

<p><b>Lazarev, V., Toby, M., Zacamy, J., Lin, L., &amp; Newman, D. (2017). <i>Indicators of successful teacher recruitment and retention in Oklahoma rural schools</i> (REL 2018–275). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.</b></p>	
Research questions/ study purpose	What are the patterns of teacher mobility in rural and nonrural school districts in Oklahoma? Which factors predict the successful recruitment (defined as completing a probationary period of employment in a single district for three years and obtaining tenure in the fourth year of teaching) of teachers in rural school districts in Oklahoma? Which factors predict the continued retention of tenured teachers in rural school districts in Oklahoma?
Population	Research question 1: all teachers from 521 school districts in Oklahoma. Research questions 2 and 3: teachers from rural districts in Oklahoma.
Definitions of terms	Retention is defined as teachers' probability of remaining employed in the same school district in Oklahoma for a given number of years—in other words, the proportion of teachers who remained in the district after one year of employment, two years of employment, and so on.
Data source	Oklahoma State Department of Education School Personnel Records Oklahoma Office of Educational Quality and Accountability U.S. Census Bureau Google Maps
Findings	From 2006/07 to 2011/12, rural school districts had consistently lower rates of success in recruiting teachers than did nonrural school districts. Teachers who are male, those who have a higher postsecondary degree, and those with more teaching experience are harder than others to recruit and retain in rural school districts. For teachers in rural school districts, higher total compensation and increased responsibilities in job assignment were positively associated with successful recruitment and retention.

<p><b>Lochmiller, C. R., Adachi, E., Chesnut, C. E., &amp; Johnson, J. (2016). <i>Retention, attrition, and mobility among teachers and administrators in West Virginia</i> (REL 2016–161). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Appalachia.</b></p>	
Research questions/ study purpose	What were the average retention and attrition rates among teachers and administrators in West Virginia public school districts between 2008/09 and 2012/13? How did average retention and attrition rates vary by district, teacher or administrator characteristics, and district characteristics? What were the average mobility rates among teachers and administrators in West Virginia public school districts between 2008/09 and 2012/13? How did average mobility rates vary by teacher or administrator characteristics and district characteristics? What were the annual and overall average attrition rates among beginning teachers employed in West Virginia public school districts between 2008/09 and 2012/13?
Population	Public school teachers and administrators
Definitions of terms	Mobility refers to moving from one West Virginia public school district in one academic year to a different West Virginia public school district in the next academic year. Average mobility rate refers to the average percentage of teachers or administrators who moved to a different school district in the West Virginia public school system from the baseline year to the follow-up year across each of the four periods observed. Retention refers to staying in the same West Virginia school district from one year to the next. Average retention rate refers to the average percentage of teachers or administrators who stayed in the same school district from the baseline year to the follow-up year across each of the four periods observed. Attrition refers to leaving the West Virginia public school system and not returning to the public school system in any of the follow-up years. Average attrition rate refers to the average percentage of teachers or administrators who left the system during those years.
Data source	West Virginia Department of Education for teacher-level data National Center for Education Statistics Common Core of Data for school- and district-level data
Findings	On average, 90 percent of teachers and 88 percent of administrators stayed in the same West Virginia school district from one year to the next; 9 percent of teachers and 11 percent of administrators left the West Virginia public school system. Of teachers with zero years of experience who began teaching in the West Virginia public school system in 2008/09, 32 percent had left by 2012/13.

## Appendix C

<b>Lochmiller, C. R., Sugimoto, T. J., &amp; Muller, P. A. (2016). <i>Teacher retention, mobility, and attrition in Kentucky public schools from 2008 to 2012</i> (REL 2016–116). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Appalachia.</b>	
Research questions/ study purpose	<p>What percentages of teachers in the Kentucky public school system stay in the same school, move to a different school in the Kentucky public school system, and leave the Kentucky public school system from one school year to the next, on average?</p> <p>How do rates of teachers who are classified as stayers, movers, and leavers vary based on various personal, professional, and school characteristics?</p> <p>Do the rates of stayers, movers, and leavers differ between Appalachian and non-Appalachian districts in Kentucky?</p>
Population	Teachers in prekindergarten–12 public schools in Kentucky
Definitions of terms	Teachers who remained in a school from one year to the next are called stayers, those who moved from one school to another in the Kentucky public school system are called movers, and those who left the public school system are called leavers.
Data source	<p>State-level data provided by the Kentucky Center for Education &amp; Workforce Statistics for school years 2008/09–2011/12.</p> <p>Data on schools were obtained from the National Center for Education Statistics Common Core of Data.</p>
Findings	On average, 86 percent of classroom teachers in the Kentucky public school system during four recent school years stayed in the same school from one year to the next, 6 percent moved to a different school in the system, and 8 percent left the system. Teachers age 31 or younger and teachers age 50 or older left the Kentucky public school system at higher rates (13 percent and 9 percent) than teachers ages 32–49 (5–7 percent). Teachers in public schools serving a larger proportion of students eligible for the national school lunch program moved to a different school at a higher rate (8 percent) than teachers in schools where a smaller proportion of students were eligible (5–6 percent). Teachers left the Kentucky public school system at a similar rate regardless of the characteristics of the schools in which they were employed.

<b>Meyer, S. J., Espel, E. V., Weston-Sementelli, J. L., &amp; Serdiouk, M. (2019). <i>Teacher retention, mobility, and attrition in Colorado, Missouri, Nebraska, and South Dakota</i> (REL 2019–001). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central.</b>	
Research questions/ study purpose	<p>What proportions of teachers were stayers, movers, and leavers? What proportions of stayers had the same grade-level assignment, and what proportion had a different grade-level assignment? What proportion of movers remained in the same district, and what proportion transferred to a different district? What proportion of leavers took a nonteaching position, and what proportion left their state public school system?</p>
Population	Classroom teachers
Definitions of terms	Teacher attrition refers to classroom teachers who take a nonteaching position or exit a state public school system for any reason. Teacher mobility refers to classroom teachers who transfer to a classroom teaching position in a different public school or district in the same state public school system for any reason. Teacher retention refers to classroom teachers who remain in a classroom teaching position in the same school.
Data source	Administrative data from state education agencies in Colorado, Missouri, Nebraska, and South Dakota
Findings	Among Colorado, Missouri, Nebraska, and South Dakota teachers, between 2015/16 and 2016/17: 82 percent remained in a classroom teaching position in the same school, 8 percent transferred to a classroom teaching position in a different school or district, and 10 percent took a nonteaching position or left their state public school system. The proportion of stayers was similar in rural schools (83 percent) and nonrural schools (82 percent).



## Appendix C

<b>Ondrich, J., Pas, E., &amp; Yinger, J. (2008). The determinants of teacher attrition in upstate New York. <i>Public Finance Review</i>, 36(1), 112–144.</b>	
Research questions/ study purpose	What are the impacts of teacher and job characteristics on teacher attrition in upstate NY: salaries relative to alternative opportunities, certifications and teaching grade levels, school demographics in terms of percentages of racial/ethnic minority students and of students in poverty?
Population	Teachers in large upstate New York districts
Definitions of terms	Two definitions of attrition were used: first, leaving a given school district while remaining a teacher in New York State; second, leaving teaching in New York State. Teachers are defined as leaving teaching if they are absent from the data for at least one year.
Data source	New York State Education Department
Findings	Teachers in districts with higher salaries relative to nonteaching salaries in the same county were less likely to leave teaching, and teachers were less likely to change districts when they taught in a district near the top of the teacher salary distribution in that county. The impact of salary on the probability of leaving teaching was small, and very large salary increases would be required to offset the impact of concentrated student disadvantage on the attrition of female teachers.
<b>Podgursky, M., Ehlert, M., Lindsay, J., &amp; Wan, Y. (2016). <i>An examination of the movement of educators within and across three Midwest Region states</i> (REL 2017–185). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest.</b>	
Research questions/ study purpose	What were intrastate mobility rates for teachers, principals and assistant principals, and district superintendents and assistant superintendents in Iowa, Minnesota, and Wisconsin between 2006/07 and 2010/11? Did mobility rates differ by administrative level, the subject area that a teacher taught, or region within the state? Were mobility rates reliably predicted by educator or school characteristics? What were interstate educator mobility rates between 2005/06 and 2011/12 among Iowa, Minnesota, and Wisconsin?
Population	Teachers, principals, assistant principals, and district superintendents and assistant superintendents in Wisconsin, Iowa, and Minnesota
Definitions of terms	Individuals in a professional position in a given year ( $t$ ) and in a professional position in the next year ( $t + 1$ ) are classified as stayers in the state's professional educator workforce.  Individuals in a professional position in year $t$ who never again appeared in available data for the state's professional educator workforce are classified as leavers from the state's professional educator workforce. As such, the leavers group includes individuals who left to teach in another state, who left to work outside of education, and who withdrew from the workforce (including those who retired or died). Individuals in a professional position in year $t$ who did not appear in year $t + 1$ but did appear in a later year in a professional position are classified as stop-outs.
Data source	State education agencies
Findings	An average of 7–9 percent of teachers and administrators in Iowa, Minnesota, and Wisconsin moved to a different school in the same state each year between 2006/07 and 2010/11. Less than 0.1 percent of the educator workforce in these three states moved to a school in another state between 2005/06 and 2011/12. Teachers were more likely to move to another school if they had less teaching experience; were in an urban school; or taught in a school with lower average academic performance, fewer students, or more economically disadvantaged students.

## Appendix C

<b>Ronfeldt, M. (2012). Where should student teachers learn to teach? Effects of field placement school characteristics on teacher retention and effectiveness. <i>Educational Evaluation and Policy Analysis</i>, 34(1), 3–26.</b>	
Research questions/ study purpose	The purpose of this study was to examine the effect of field placement during preservice on teacher retention and student achievement.
Population	Beginning teachers
Definitions of terms	Stay ratio: the number of teachers who stayed in the same school (stayers) and the number of teachers who moved to a new school (movers) from one year to the next. In its simplest form, the stay ratio is the proportion of stayers in the combined total of stayers and movers, averaged over five school years (2003/04–2007/08). After a teacher was coded as having left New York City schools, the teacher was dropped from subsequent years in the sample. Those who took leave (paid or not), became substitute teachers, or were of unknown status were also dropped from the sample.
Data source	Administrative and survey data
Findings	Learning to teach in easier-to-staff field placement schools had positive effects on teacher retention and student achievement gains, even for teachers who end up working in the hardest-to-staff schools. The proportion of poor, racial/ethnic minority, and low-achieving students in field placements was unrelated to later teacher effectiveness and retention, suggesting that something beyond student populations explains these results.

<b>Sass, D. A., Flores, B. B., Claeys, L., &amp; Pérez, B. (2012). Identifying personal and contextual factors that contribute to attrition rates for Texas public school teachers. <i>Education Policy Analysis Archives</i>, 20(15), 1–30.</b>	
Research questions/ study purpose	Do survival functions differ across teacher/personal characteristics (beginning teaching age, gender, race/ethnicity, subject area, and testing era)? Moreover, are these relationships moderated by other variables included in the model? Do survival functions differ across school characteristics (teaching assignment, school type [charter vs. noncharter], school accountability rating, and population served). Moreover, are these relationships moderated by other variables included in the model?
Population	Public school teachers in Texas
Definitions of terms	Attrition is defined as leaving the teaching profession and never having worked as an administrator.
Data source	Texas Education Agency database
Findings	Teacher attrition was greater during the high-stakes testing era, at low-performing schools, and for charter schools; however, beginning teacher age, gender, and school level moderated several attrition rates.

<b>Silva, T., McKie, A., &amp; Gleason, P. (2015). <i>New findings on the retention of novice teachers from teaching residency programs</i> (NCEE No. 2015–4015). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.</b>	
Research questions/ study purpose	What are the retention rates of novice Teacher Residency Program (TRP) teachers and other novice teachers? What are the characteristics of schools that novice TRP teachers leave and enter?
Population	First-year and second-year teachers, half TRP and half non-TRP
Definitions of terms	District retention is based on whether teachers remained in the same district, even if they changed schools, and school retention is based on whether they remained in the same school.
Data source	District administrative data.  Data on schools were obtained from the National Center for Education Statistics Common Core of Data.
Findings	TRP teachers were more likely to remain teaching in the same district than non-TRP teachers with similar teaching placements. School retention rates were similar between the two groups of teachers. TRP teachers who moved to different schools in the same district tended to join ones where a similar proportion of students were from low-income families, a lower percentage were Black, and achievement was higher.

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