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Oklahoma Study of Educator Supply and Demand

Trends and Projections

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September 2015

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Executive Summary

In June 2014, the Oklahoma State Regents of Higher Education (OSRHE) commissioned American Institutes for Research (AIR) to conduct a study to better understand both historical and future predicted trends of educator supply and demand across Oklahoma. OSRHE commissioned the study in partnership with the Oklahoma Commission for Teacher Preparation (OCTP); the Oklahoma State Department of Education (OSDE); and the Oklahoma Association of Colleges for Teacher Education (OACTE). The study was to include primarily an examination of how patterns of supply and demand vary by teaching subject area and geographic location.

The representatives of all of these agencies wanted the study to address a total of 15 research questions. AIR addressed these research questions through a series of five separate analyses. These analyses include the following:

- Analysis 1: Trends in the educator pipeline
- Analysis 2: Trends in educator certification
- Analysis 3: Trends in educator mobility
- Analysis 4: Future projections
- Analysis 5: Additional analyses

The results of these analyses are contained within this report and the accompanying interactive data tables and charts.

Data Sources

Our research team worked closely with the client to identify data sources and obtain data necessary to complete the study analyses. Data came primarily from two of the agencies that commissioned the study, including the following:

- OSDE provided the majority of the data used to address the study research questions, including the *Oklahoma Cost Accounting System (OCAS) School Personnel Reports*, which are annual reports of personnel in the Oklahoma public education system. OSDE also provided data from the *Oklahoma Educator Credentialing System (OECS)*, which is a transactional database of certification records statewide, and the October 1st enrollment data, which includes school-level enrollment data by grade through fiscal year (FY) 2013–14.
- OSRHE provided data on the educator pipeline in Oklahoma and included data from the *Unitized Data System*, which is a panel data set with information on recent completers of educator-preparation programs. Data provided by OSRHE also included employment outcome data for recent education majors one year out from graduation.
- AIR also used additional data gathered through publicly available sources. These sources include the U.S. Department of Education National Center for Education Statistics (NCES) Common Core of Data (CCD), which includes locale and student demographic data, and data from the Oklahoma State Department of Health online resource

OK2SHARE, which includes Oklahoma birth count data at the county level. We also used NCES Comparable Wage Index (CWI) data, which measures how much more or less it costs to hire and retain comparable staff in different educational labor markets (Taylor & Fowler, 2006).[1] We also made use data from the College Board Annual Survey of Colleges to analyze the trends of average annual tuition and fees for public and private four-year universities in Oklahoma and its neighboring states during the period 2004–05 to 2014–15.[2] Finally, we used the Wage Competitiveness Index (WCI) included in the report *Is School Funding Fair: A National Report Card* published by the Education Law Center.

Research Questions

Analysis 1: Trends in the Educator Pipeline

- **Research Question 1.** What are the trends in the pipeline supply of educator preparation program completers in Oklahoma?
- **Research Question 2.** Does a systematic pattern in the pipeline of educators exist with respect to entrants into the education profession?
- **Research Question 3.** What are the trends in the Oklahoma educator preparation program completers who do not become certificated, who become certificated but not employed in Oklahoma PK-12 public school system, and those who obtain certification and do become employed in the system?

Analysis 2: Trends in Educator Certification

- **Research Question 4.** What are the overall trends in certification types obtained (i.e. emergency, provisional, standard, alternative, etc.) and areas of specialization among all certified individuals and for various subpopulations (i.e. by region, race, gender, etc.) over the past five years?
- **Research Question 5.** Do the trends in certification types and areas of specialization among active educators differ from individuals qualified to serve as educators, but not employed in the state's public education system (i.e. the reserve pool)?
- **Research Question 6.** What is the distribution of add-on certifications (i.e. an area in which an individual was not certified that was added when their certification was renewed) by certification area?
- **Research Question 7.** Based on the analysis of certification trends, what projections can we make about the future?

Analysis 3: Trends in Educator Mobility

- **Research Question 8.** What are the trends in educator mobility (i.e. counts of staff that moved with respect to either position or district location) over the past five years?
- **Research Question 9.** Do mobility trends differ by region, schooling level (e.g. elementary, middle, high), school enrollment, locale, gender, race, age, or primary

[1] The CWI and corresponding documentation are available on the NCES website at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007397

[2] The College Board makes these data publicly available on their website at http://trends.collegeboard.org/college-pricing/figures-tables/published-prices-state-region.

position (including assigned subject)? How have educator mobility trends changed following the moratorium on the Oklahoma Teacher Residency Program?

Analysis 4: Future Projections

- **Research Question 10.** How has the number of program completers in educator preparation programs changed over the past nine years and what are the projections of the number of program completers over the next five years?
- **Research Question 11.** How has the demand for educators changed between 2010 and 2014 by geographic region and primary position? Based on this, what projections can we make about future demand?
- **Research Question 12.** How has the supply of educators changed between 2010 and 2014 by geographic region, and primary position? Based on this, what projections can we make about future demand?
- **Research Question 13:** Based on the supply and demand projections, in what regions and primary positions are there expected to be shortages or surpluses?

Analysis 5: Additional Analyses

- **Research Question 14.** What are the relative costs of hiring and retaining educational staff in Oklahoma versus its surrounding states and what does this imply about the interstate competition for educators in the region? To what degree is there competition for trained educators from sectors outside of public education in Oklahoma? In what types of industries outside of education are educator candidates finding employment?
- **Research Question 15.** Over the last five years, what are the trends in employment outcomes of education majors?

Key Findings

Analysis 1: Trends in the Educator Pipeline

Research Question 1: Aggregate Pipeline Trends

- By examining the aggregate pipeline—or all individuals completing an Oklahoma educator-preparation program regardless of whether they become certificated or employed in the Oklahoma public education system—the research team found that from academic year 2009–10 to 2013–14, the top four producers of educator-preparation program completers were (1) Oklahoma University, (2) Oklahoma State University, (3) University of Central Oklahoma, and (4) Northeastern State University. Northeastern State University topped the list in the first three years and Oklahoma State University was on top for the most recent two years.
- In addition, we found that the three most common major fields of study for these individuals were elementary education and teaching, early childhood education and teaching, and noneducation majors.[3]

[3] Noneducation majors include any major field of study not falling into the Classification of Instructional Programs (CIP) code for Education (i.e. CIP code series 13). An individual does not need to be an education major to qualify

- Finally, we found that although Oklahoma was the most common home state of residence among these individuals, and Texas was the most common home state among those not originating from Oklahoma.

Research Question 2: Effective Pipeline Trends

- Among those in the effective pipeline—or *recent* program completers (i.e., completed in the last nine years) entering the Oklahoma public education system as new educators from FY 2009–10 to FY 2013–14—the most common primary position was elementary teacher (61 percent). This position was followed by early childhood teachers (5 percent), with middle school and high school language arts teachers also relatively common (3 and 4 percent, respectively).
- We also examined other entries into the pipeline, including alternative routes to certification, emergency certifications, and out-of-state entrants. Specifically, we found that those entering the public education system as teachers with alternative certifications have declined over time (from 25.2 percent in 2009–10 to 12.6 percent in 2014–15), while the number of new teachers with only an emergency certifications has sharply increased in recent years (increasing 195.0 percent from 2012–13 to 2013–14 and 153.0 percent from 2013–14 to 2014–15). Finally, the percentage of new teachers entering with out-of-state experience has remained relatively constant (ranging from 17.9 percent to 13.3 percent).

Research Question 3: Trends in Workforce Entry

- To examine trends in workforce entry among those completing state educator-preparation programs, we considered the following employment step outcomes (i.e., *pipeline steps*) from academic year 2009–10 to 2012–13 for all those in the aggregate pipeline: (1) not certificated, (2) certificated but not employed in the Oklahoma PK–12 public school system, and (3) certificated and employed in the Oklahoma PK–12 public school system.[4] We found that among those graduating from the top producers of educator-preparation program completers identified in Research Question 1, the share of completers who have become certificated and employed in the state's public education system has grown over the period.
- We also found that a disproportionate share of program completers majoring in elementary and early childhood education and teaching have become certificated and employed, while those majoring in physical education teaching and coaching are underrepresented in this category.
- Finally, we found that program completers originating from a state other than Oklahoma commonly do not go on to become certificated or employed in the Oklahoma public education system—this was particularly true for those originating in Texas.

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as a program completer. For more information, see the Defining Educator Preparation Program Completer section of this report in Key Decisions and Assumptions.

[4] Membership in these categories is based on determining whether individuals graduating in the reported academic year were certified or employed in the following fiscal year. For example, we found that for academic year 2012–13, those in the *certificated and employed* category were employed in FY 2013–14. We chose to omit academic year 2013–14 from this analysis because of incomplete data.

Analysis 2: Trends in Educator Certification

Research Question 4: Trends in Certification

- When considering overall trends in certification, we found that the count of certificated educators actively employed in a given year has decreased 2 percent from FY2009–10 to FY2014–15, but the overall count of individuals with active certifications has gone up 6 percent during the same time period.
- From FY2009-10 to FY2014-15 we also found there was an increase in alternative certified educators actively employed of 11 percent, while emergency and provisionally certified educators increased by a factor of 7.4 (744 percent) and 2.6 (259 percent), respectively.[5] When the three certification type categories are taken as a group this equals a 32 percent increase over the period, with the sharpest growth occurring between 2011–12 and 2012–13. The certification data also showed growth in the numbers of employed individuals with paraprofessional and other certifications by a factor of 9.9 (985 percent) and 6.8 (678 percent), respectively during the six-year period. Taken collectively, the number of employed paraprofessionals and other certificate holders grew by a factor of 7.8 over the period, increasing an average of 52 percent each year.
- By examining these trends by region, we found that in FY2014-15 the central region made up about one third of all active educators, but had a disproportionate statewide share of the alternative certifications (38 percent); provisional certifications (38 percent); and especially emergency certifications (52 percent). In contrast, the northeast region also makes up about one third of all active educators, but accounts for just 11 percent of the emergency credentials across the state.
- When we examined these trends by locale, we found that nonstandard certifications are growing across all locales, in line with an earlier finding suggesting these types of certifications are becoming more common in general across the state.
- Finally, we examined trends in areas of certification from FY2009–10 to FY2014–15 among those employed as teachers in the Oklahoma public education system. We found that teachers held on average 1.77 unique certification areas. In comparison, all educators employed in the education system in a given year had on average 1.88 unique areas, while those in the reserve pool[6] had on average 1.81 unique areas. In addition, we found that the most common areas of certification in 2014–15, among all educators, were elementary, early childhood, and special education. This finding is different from 2009–10, when the most common areas were elementary, early childhood, and vocational education.

Research Question 5: Trends in the Reserve Pool

- By examining membership in the reserve pool over time, we found that the reserve pool, as a share of all individuals with active certifications, has risen slightly from 36 percent in

[5] Although the increases in emergency and provisional certifications are dramatic, this is deceptive (especially in the case of emergency certifications) because the underlying number of individuals with these types of certifications is smaller than for those with alternative certifications.

[6] The term *reserve pool* is being defined in this context and throughout the report as the pool of individuals who have an active certification but who do not hold a position in the Oklahoma public education system in a given year.

FY2009–10 to 41 percent in FY2014–15. This rise has been concentrated largely in individuals with nonstandard certification types, particularly alternative and provisional certifications. Specifically, nonstandard certifications made up 23.4 percent of the reserve pool in 2009-10 and 25.9 percent in 2014-15, while standard certifications made up 76.5 percent in 2009-10 and 74.1 percent in 2014-15.

- In addition, we found that the most common areas of certification in 2014–15, among educators in the reserve pool, were elementary, vocational education, and early childhood. This finding is different from in 2009–10, when the most common areas were elementary, vocational education, and social studies.

Research Question 6: Add-On Certification Areas

- We found in our analysis of add-on certification areas[7] that among those educators with two certifications after January 1, 2004, only about 3 percent had add-on certifications.
- In addition, we found that English language learner (ELL) and other[8] certification areas were most common, with about 10 percent of the educators adding these areas. The next most common area was science, with 3.6 percent of educators adding this area.

Research Question 7: Certification-Area Projections

- Based on our calculations of projected counts of certification areas from FY2015–16 to FY2019–20, we estimated that the annual count for most areas is not expected to change by more than 3 percent from year to year. The number of employed educators with certification areas in ELL, instructional support, and vocational education had the largest projected changes.
- From 2014–15 to 2019–20, we projected the annual count of ELL certification areas will grow about 50 percent, or from 820 to 1,229. But it is important to keep in mind that relatively few educators historically have had this certification area and therefore the total projected counts remain relatively low.[9] From 2014–15 to 2019–20 we project educators with instructional support or vocational education certification areas will shrink on average by 3.9 and 5.7 percent per year, respectively. Moreover, we project the annual counts in these areas to shrink by a total of 18.2 percent (from 2,882 to 2,470) for instructional support and 25.3 percent(from 6,247 to 4,668) for vocational education.

Analysis 3: Trends in Educator Mobility

Research Question 8: Overall Mobility Trends

- By examining overall trends in educator mobility, we found that from FY2006–07 to FY2014–15 the proportion of all educators leaving the Oklahoma public education

[7] The term *add-on certification area* is being defined in this context and throughout the report as areas in which individuals were not certified that they added when they renewed their certification. A more detailed explanation of this analysis can be found in the Defining Add-On Certifications section of this report in Key Decisions and Assumptions.

[8] The *other* certification area category includes areas such as yearbook and journalism. A list of all consolidated variables and the corresponding components is included in Appendix C.

[9] It also is important to keep in mind that areas with smaller numbers of historical counts are more susceptible to projection error.

system each year has grown gradually, increasing by 2 percent. During the same period, the proportion of new educators entering the Oklahoma public education system sharply decreased (from 2009–10 to 2010–11), and then gradually increased thereafter. Despite this gradual increase in the number of new educators, however, we found it has not been enough to offset the number of educators who have left the system (*leavers*).

- When comparing those educators staying in the same primary position and same district from year to year (stayers) to those educators changing either position, district, or both (movers), we found that in general between 2006–07 and 2014–15 trends in the two categories mirrored each other.

Research Question 9: Disaggregated Mobility Trends

- When we examined mobility trends by region, we found that the gap between new teachers and leavers occurring in 2010–11 seems to have affected the central region the least. By bringing in more new teachers than those leaving over the next four years, this region was able to overcome this gap. But three of the other five regions have been unable overcome it and for the southwest region, this remaining gap is particularly stark. When we examined mobility trends by locale, we also found that the turnover rate for educators employed in city locales has been consistently higher and has risen faster than in other locales.
- We also considered mobility trends before and after the moratorium of the Oklahoma Teacher Residency Program in 2010. As we found in our analysis of overall mobility trends, a sharp increase occurred in teachers leaving Oklahoma between FY 2009–10 and FY 2010–11 and a corresponding decrease in new teachers occurred during the same time period. This period also happens to be the first transition to a new school year in which the Teacher Residency Program was not being implemented because of the moratorium. While it would be inappropriate to draw causal conclusions (i.e., that the decrease in new educators was necessarily caused by the program moratorium), the apparent correlation between the observed shocks and the moratorium warrants further investigation.

Analysis 4: Future Projections

Research Question 10: Program-Completer Projections

- Based on historical trends and calculated projections in the number of educator preparation-program completers, we expect the number of program completers to decline during the next five years. We noted specifically that this number declined 24 percent between 2005–06 and 2013–14. If this trend continues, we expect the number to decline further by 22 percent between 2013–14 and 2018–19.

Research Question 11: Demand Projections

- Based on historical trends and calculated projections of student enrollment, we expect statewide enrollment to increase over time at a declining rate. Specifically, we project this enrollment will grow by 1 percent each year on average, but we expect year-over-year growth to slow down from 1.1 percent in 2014–15 to 0.5 percent in 2018–19.

- By examining the average pupil-educator ratios for each primary position from FY2009–10 to FY2013–14, we found that ratios generally have increased over time, growing on average about 8.1 percent during this time period. Specifically, between 2009–10 and 2013–14, the primary positions with the largest absolute relative changes in pupil-educator ratios included educators in *other positons*[10] (growing 33.5 percent); charter teachers (growing 16.6 percent); librarians (growing 13.7 percent); and high school social studies teachers (growing 11.7 percent).
- Based on the projected student enrollments and pupil-educator ratios in 2013–14 for each primary position, we have calculated demand projections for 2014–15 through 2018–19. We found that overall statewide educator demand is expected to increase gradually over time, but at a decreasing rate. Specifically, we expect demand to grow an average of 0.5 percent annually statewide between 2014–15 and 2018–19, but we expect year-over-year growth to increase from 2014-15 to 2015-16 (from 0.3 to 0.8 percent) and then decline from 0.8 percent in 2015–16 to 0.4 percent in 2018–19.

Research Question 12: Supply Projections

- Based on a five-year average year-over-year relative change in the supply of educators, we calculated supply projections for 2014–15 to 2018–19. Although we project that statewide supply will increase gradually in future years, we also project that supply fluctuations—including both increases and decreases—will occur in the different regions. We project that supply in the northwest and central regions will increase from 2013-14 to 2018-19 (2.6 and 6.6 percent respectively), for example, but we project that supply in the southwest and southeast will experience slight declines over the same time period (1.9 and 2.2 percent respectively). In addition, we expect that the northeast region will decrease in supply 0.6 percent from 2014–15 to 2016–17 that will generally level out in 2017–18 and increase slightly (0.1 percent) in 2018–19.

Research Question 13: Comparing Supply and Demand

- Through a comparison of projected supply and demand, we found that all year-over-year increases in demand are larger than the corresponding projected increases in supply, with an average statewide annual relative shortage of 0.62 percent (i.e. available supply was 0.62 percent less than demand).
- When we considered this by region and among only teachers, we found that in the northwest, southwest, and southeast regions, an expected shortage exists in 2014–15 that we project will grow during the projected five years. We also found an expected shortage in the northeast region, though this finding was more mixed. Finally, in the central region, we project that the shortage in 2014–15 will become a slight surplus in 2016–17 and we expect this surplus will grow in the final three projected years.

[10] The other positions category includes job, subject, and site codes not fitting any other primary position. Please see Appendix C for additional details.

- We also identified projected shortages in the following primary positons:
  - Districtwide staff
  - Language arts teachers
  - Arts and music teachers
  - Social studies teachers
  - Foreign language teachers (high school only)
  - Math teachers
  - Science teachers
  - Vocational education teachers (high school only)
  - Other teaching positions (middle school only)
- These projected shortages are greatest for districtwide staff and teachers in language arts, social studies, and science. Moreover, shortages among high school teachers are generally larger than those among middle school teachers.

Analysis 5: Additional Analyses

Research Question 14: Comparative Salary Analysis

- By considering the National Center for Education Statistics (NCES) Comparable Wage Index (CWI), we found that in general the cost to hire and retain educators in the states surrounding Oklahoma were higher from 1997 to 2013, with Texas having the highest cost of the neighboring states. The implication of this is that these higher cost states represent competition for education staff in the region. Both the magnitude of the cost differential and length of the shared border with Texas suggest that this state presents the most competition for educators among all of Oklahoma's neighboring states.

- By considering data spanning 2004-05 through 2014-15 from the College Board Annual Survey of Colleges, we found that the average annual tuition and fees for both public and private four-year universities in Oklahoma have traditionally been lower compared to the surrounding states. It is notable that Texas is among the states with a high cost differential. To the extent that educator training and certifications are portable between Oklahoma and Texas, this finding coupled with the fact that educators in Texas tend to get paid more suggests that Oklahoma may be at risk of not only providing a relatively cheap avenue for Texas residents to obtain educator training, but also of losing these trained educators back to their home state.

- Finally, using the Wage Competiveness Index (WCI) data (see Baker, Sciarra and Farrie, 2015) from 2007 to 2012 to examine the average differential salary between teachers and similar workers in the same labor markets, we found that over the study period teachers in Oklahoma have earned on average between 75 and 85 percent of what their similar non-educator counterparts have earned, with the index clearly trending downward due to

shocks in 2008 and 2012. These results suggest that there exists competition for educators from other sectors within the state that deserves consideration when formulating policy.

Research Question 15: Employment Outcomes of Education Majors One Year After Graduation

- By considering the employment outcomes of education majors one year following graduation over academic years 2007–08 through 2011–12, we consistently found that the majority of education majors graduating during this period were consistently employed one year after graduation. Specifically, on average, 87.4 percent of graduates were employed one year out from graduation while 12.6 percent did not yet obtain employment.
- Of those education majors found to be employed one year following graduation, the majority found work in the education sector (77.3 percent on average), primarily in elementary and secondary schools. The second most common sector of employment was health care and social assistance (4.8 percent on average), followed by retail trade (3.6 percent on average).

Data Recommendations

In addition to the key findings herein, we have made some recommendations for improving data quality and documentation of databases that we accessed for this study. By implementing these recommendations, the Oklahoma agencies that have partnered on this project would be better able to analyze educator staffing data at a lower cost in the future. We recommend the following:

Recommendation One: Readily Available Codebooks

- Perhaps the most important document that accompanies any data source is the codebook and corresponding documentation. We recommend that codebooks be compiled, improved upon, and made readily available for the various sources used in this study that are maintained by the client and its partners. Though documentation exists in some form for most data sources there may be a need for improvement. Once comprehensive codebooks are in place it is our assertion that they will improve the efficiency of any future study or analysis of supply and demand.

Recommendation Two: Annual Certification Reports

- In order to consider trends in certification by year it was necessary for us to convert the received data into annual reports of "active" certifications. This required preparing the data to be at the individual level, and determining how best to define "active" certification annually. We recommend that OSDE consider creating an annual report of active certifications at the individual level each year. This would allow for easier analysis of certification trends in combination with other sources of data, especially the personnel data.

Recommendation Three: Create Policies to Allow Regular Data Sharing

- Many of the analyses contained in this report would not have been possible without the use of data sources collected and maintained by different state agencies. With this in mind, we recommend that the client and its partners consider establishing formal policies to allow for regular data sharing, to the extent this is not already in place.

Introduction

Across the country, concerns have been growing that not enough educators exist—especially teachers—to meet demand in schools and districts. In Oklahoma, this issue has reached a breaking point. In a recent *Education Week* article, State Superintendent Joy Hofmeister summed up the situation by saying, "You can have the highest standards in the world, but if you don't have the teachers to teach them, what good are they?"[11] Foreshadowing this contention, the OSDE convened a task force in 2013 composed of a variety of stakeholders that recommended a study of educator supply and demand be conducted to "identify areas of shortage and apply the [task force recommendations] to the areas of most critical need (OSDE, 2014)."

The recommended study would not be the first of this kind conducted in Oklahoma. Since 1992, OSRHE has conducted multiple studies to determine future supply and demand of educators. Past studies have found that while no shortage exists in the production of educators, shortages existed in the number of individuals appropriately qualified to be educators (i.e., the number having appropriate certification) that were actually recruited to serve in public education. In June, 2014, OSRHE—in partnership with OCTP, OSDE, and OACTE—commissioned AIR to conduct a study to understand the extent to which educator supply and demand are in equilibrium for particular subjects and geographic regions, including an analysis of historical trends and future predictions. We present the data sources, conceptual methods, and findings of this study in this report.

Primary Objective and Key Study Phases

The primary objective of this study is to document historical educator staffing trends and determine future trends in educator supply and demand to better inform policy moving forward. In undertaking this work, the research team was required to complete the following three key study phases:

> **1. Data preparation.** The sources of educator supply and demand data are many; multiple data sets collected by multiple agencies (including especially OSRHE and OSDE) over several years were made available to the research team. To prepare these data for the purpose of completing the study's primary objective, the research team cleaned and prepared the data for analysis, including identifying indicators that most accurately capture teacher supply and demand. In addition, the research team created interactive tools that allow the client and its partners to review and analyze these data.
>
> **2. Assessment of data adequacy.** Having prepared the data, the research team assessed the adequacy of available data and identified data challenges (i.e., challenges in combining disparate sources of data). Such challenges may impede stakeholders from regularly and systematically analyzing the available data to

[11] Camera, L. (2015, September). A "tremendous teacher shortage" in Okla. confronts first-year chief. *Education Week.* Retrieved from http://blogs.edweek.org/edweek/state_edwatch/2015/09/a_tremendous_teacher_shortage_in_okla_confronts_first-year_chief.html?cmp=eml-enl-cc-news3

support making sound policy decisions related to educator supply and demand. By identifying these challenges, and offering recommendations, we hope not only to explain limitations of the current study, but also help the members of the task force improve the overall coherence and accessibility of available supply and demand data.

3. Analysis to address research questions and write-up of findings. The client and its partners require a clear and accurate picture of past and future trends in educator supply and demand. Understanding this overall picture will help guide targeted action to attract and retain teachers in the Oklahoma classrooms where they are needed. The research team used the data available to draw conclusions about expected areas of shortage and the factors that may contribute to the shortages.

Research Questions

Analysis 1: Trends in the Educator Pipeline

- **Research Question 1.** What are the trends in the pipeline supply of educator preparation program completers in Oklahoma?
- **Research Question 2.** Does a systematic pattern in the pipeline of educators exist with respect to different subpopulations (e.g., by race, gender) of entrants into the education profession?
- **Research Question 3.** What are the trends in the Oklahoma educator preparation program completers who do not become certificated, who become certificated but not employed in Oklahoma PK-12 public school system, and those who obtain certification and do become employed in the system?

Analysis 2: Trends in Educator Certification

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Analysis 3: Trends in Educator Mobility

- **Research Question 8.** What are the trends in educator mobility (i.e., counts of staff that moved with respect to either position or district location) during the past five years?
- **Research Question 9.** Do mobility trends differ by region, schooling level (e.g. elementary, middle, and high), school enrollment, locale, gender, race, age, or primary position (including assigned subject)? How have educator mobility trends changed following the moratorium on the Oklahoma Teacher Residency Program?

Analysis 4: Future Projections

- **Research Question 10.** How has the number of program completers in educator-preparation programs changed during the past nine years and what are the projections of the number of program completers during the next five years?
- **Research Question 11.** How has the demand for educators changed between 2010 and 2014 by geographic region and primary position? Based on this, what projections can we make about future demand?
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Analysis 5: Additional Analyses

- **Research Question 14.** What are the relative costs of hiring and retaining educational staff in Oklahoma versus its surrounding states and what does this imply about the interstate competition for educators in the region? To what degree is there competition for trained educators from sectors outside of public education in Oklahoma? In what types of industries outside education are educator candidates finding employment?
- **Research Question 15.** During the last five years, what are the trends in employment outcomes of education majors?

Study Limitations

Given the current context in Oklahoma and the concerns expressed by key stakeholder groups, the research team made a priority of ensuring the data were fully understood and properly reviewed, cleaned, and prepared before proceeding with the analysis. Through this comprehensive process, in partnership with the client and its partners, the team identified some limitations in the available data and constraints on what could be analyzed with existing data.

In particular, the research team identified inconsistencies in the certification data, and varying amounts of missing values in the data. These are described in more detail in the Data and Methods section of this report as well as Appendix A.

Through comprehensive testing of available methods of projecting supply and demand, researchers identified some additional limitations. In particular, projections based on observational units with small counts in historical years are more prone to error. This issue has been documented previously in a report using data from Washington state that noted projections based on counts of 1,000 or less, particularly 100 or less, are problematic (Berk & Hodgins, 2008). This specific limitation also is discussed in more detail in Appendix A.

Oklahoma Supply and Demand Interactive Tables and Charts

In addition to the present report, we will provide the client and its partners with five Microsoft Excel files that allow the user to produce interactive tables and charts using the underlying data. Each of these are described here and referred to throughout the Results section of this report as follows:

- *Aggregate Pipeline:* Includes data used for the aggregate educator pipeline analysis that addresses Research Questions 1 and 3.
- *Effective Pipeline:* Includes data used for additional analyses of the educator pipeline, specifically those conducted to address Research Question 2.
- *Certification:* Includes data used for the analysis of certification trends that addresses Research Questions 4–7.
- *Mobility:* Includes data used for the analysis of trends in educator mobility that addresses Research Questions 8 and 9.
- *Supply and Demand:* Includes the supply and demand projections calculated to address Research Questions 11–13.

Report Organization

The remainder of the report is organized as follows:

Section 1 outlines the conceptual approach AIR's research team took and a description of the data sources used to complete the study analyses. The section also includes a description of the key analytic methods. Section 2 includes all key findings for each research question in the study and potential policy implications of the reported results. The final section of the report includes specific recommendations for the client and its partners to consider for improving overall coherence and accessibility of the databases relevant to the analysis of educator supply and demand.

Section 1. Data and Methods

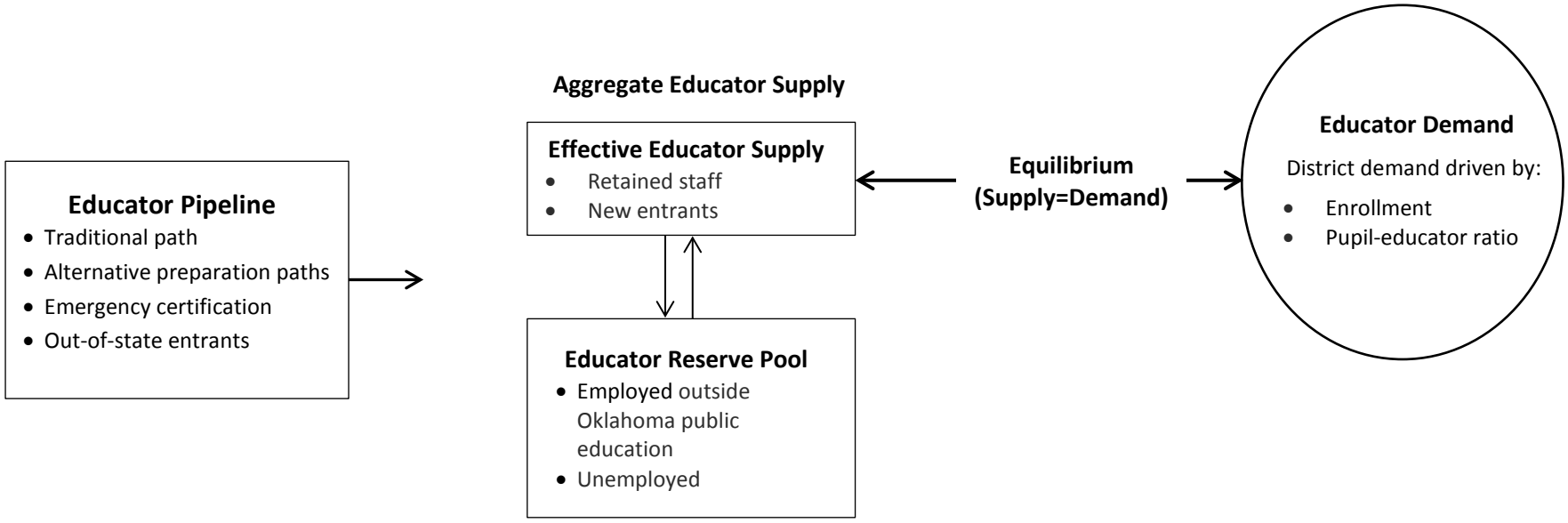
Conceptual Approach

Before delving into the data and methods we used for this study, it is important to have an understanding of the basic conceptual approach the research team took in studying the supply and demand of Oklahoma educators. We began by considering the components of supply and demand and how they each contribute to an overall understanding of whether the supply of educators is meeting demand. Specifically, we considered the following four broad categories of supply and demand components:

- **Educator Pipeline:** This includes all individuals recently prepared by programs housed in Oklahoma Institutes of Higher Education to enter the state's education workforce, and those entering the workforce from an alternative route to certification, through an emergency certification, or from out of state. By analyzing the pipeline component, one can identify trends in those who choose to complete an educator-preparation program and their entrance into the workforce.
- **Active Educators:** This is the current pool of educators actively certified and employed in Oklahoma's public schools. This pool of educators includes both those retained from the previous year and those newly entering the workforce.
- **Reserve Pool:** Among those with an active certification in a given year, only a subset is employed in the Oklahoma PK-12 public education system (hereafter referred to as the "state's public education system"). Those who are not represent a reserve pool of actively certified individuals who could *potentially* be recruited to join the education workforce.
- **Educator Demand:** This is the number of educators that the state's public education system requires, which is dictated by the number of students enrolled and the ratio of pupils to various types of staff.

The first three components are all part of the supply (or potential supply) of educators. Specifically, this includes the pool of educators in each of these three components and the flow between them. For example, individuals in the pipeline may flow into the pool of active educators. On the other hand, individuals in the reserve pool may flow from and to the pool of active educators. By comparing the pool of active educators, or effective supply, one can assess whether a shortage exists (i.e., demand is higher than supply) or whether a surplus exists (i.e., when supply is higher than demand). The reserve pool of educators represents an unknown in the supply-and-demand equation. Reserve pool members' entry (or reentry) into the educator workforce is dependent on their availability and motivation, neither of which can be assessed at this time using available data. Exhibit 1 illustrates the various components of educator supply and demand and how they relate to one another.

Exhibit 1. Conceptual Framework of Educator Supply and Demand



The analyses conducted by the research team addresses the research questions by looking at different aspects of each of the educator supply and demand components listed in Exhibit 1 as well as an overall comparison of supply and demand.

Data

We used several data sources to address the research questions of this study. The majority of these are from databases that OSDE maintains, including the following:

OCAS School Personnel Reports

We received the OCAS data, referred to hereafter as *personnel data*, in the form of OSDE annual reports for FY 2005–06 through FY2014–15. Each observation in the raw data represented a staff assignment and we included all educators employed in the state's public education system. The main categories of information contained in these reports include characteristics of educators (e.g., race or ethnicity, gender); characteristics of the assignment (e.g., subject, job category); and information about the site of the assignment (e.g., school, district, county).

For the purposes of this study, we aggregated the data to the individual level to make each observation represent an individual educator and staffing assignment with no duplication. To do this, we had to identify the primary position of the educator based on the maximum full-time equivalent (FTE) among the staffing assignments for that individual in the raw data.[12] In addition, we specified this primary position using a combination of the job category, subject (primarily for teachers), and schooling level of an individual's maximum FTE assignment. Specification of the primary position is described in more detail in the Methods section of this report. We also consolidated a variety of variables pertaining to subject, region, and age into more manageable numbers of coherent categories to better facilitate the analysis and cleaned the data to ensure accuracy and consistency across years.[13]

OECS

We received the OECS data, referred to hereafter as *certification data*, as output from a transactional database that OSDE maintains with information for all available years provided in a single file, rather than in an annual report. The raw data included information on certifications with effective dates as far back as 1957. But due to technical issues uncovered through the process of cleaning and preparing the data for analysis, we could use only FY 2009–10 and later.[14] For this study, we used certification type (e.g. standard, alternative, provisional); subject area of certification (e.g., mathematics, science, language arts); and the certification period to analyze trends in certification over time.

[12] For example, for an individual with three assignments in a given year with the FTEs 0.1, 0.1, and 0.8, we included only the assignment with 0.8 FTEs for this individual in that year. This is similar to the approach taken in the 2002 study (Data and Decision Analysis, Inc., 2002).
[13] Additional details on these consolidated variables can be found in the Methods section of this report and in Appendix C.
[14] Additional details on this issue and the steps taken to resolve it are summarized in Appendix A.

To prepare these data for analysis, we used the unique educator identifier (known as the *educator number*) to create an annualized individual-level file which reported in a single observation the active certifications and certification areas that an individual held in a given year. Details regarding the definition of an active certification can be found in the Methods section of this report. In addition, we consolidated a variety of variables in the raw certification data into a more manageable number of categories to better facilitate the analysis and cleaned the data to ensure accuracy and consistency across years.[15]

October 1st Enrollment Data

We received the October 1st enrollment data, referred to hereafter as *enrollment data*, in the form of OSDE annual reports for the FY 2005–06 through FY2013–14. The data include enrollment figures for each grade and each racial or ethnic category at the school level. For this study, we used all enrollment data provided to address study research questions.

We prepared these data in several formats to be used in various analyses. Specifically, we aggregated it to the school and district levels to allow for analysis of historical trends in the Oklahoma educator workforce by school and district size. We also used enrollment data by race or ethnicity to calculate school- and district-level percentages of minority pupils as well as quartiles of this metric. In addition, for the purpose of generating enrollment projections, we aggregated grade-level enrollments to the regional level.

OSRHE Unitized Data System

We received the OSRHE Unitized Data System data, referred to hereafter as *pipeline data*, in a panel data file at the individual level (i.e., each sheet in the file showed all completers by institution for a given year between academic year 2005–06 and 2013–14).[16] Each panel contained information on graduating institution of higher education (IHE); major field of study; original state of residence; and characteristics of completers.

We consolidated several variables in the raw data into a more manageable number of categories to better facilitate the analysis and cleaned the data to ensure accuracy and consistency across years.[17]

OSRHE Employment Outcome Data

The research team also received OSRHE data on the employment outcomes of recent education majors, hereafter referred to as *employment outcome data*. These data were produced by matching OSRHE postsecondary education background data for education majors with (1)

[15] Additional details on these consolidated variables can be found in the Methods section of this report and in Appendix C.
[16] *Program completer* was defined as a graduate who had taken the required courses to complete an educator-preparation program and be recommended for certification as an educator in Oklahoma public schools. OSRHE staff compiled these data. Additional details on this definition can be found in the Methods section of this report.
[17] Additional details on these consolidated variables can be found in the Methods section of this report and in Appendix C.

Employment Security Commission (ESC) and (2) Tax Commission data, respectively.[18] For each file, individuals identified in the OSRHE data as graduating one and five years prior to the report year were merged with ESC quarterly records, including the reporting quarter and the four prior quarters, to determine whether the individual was employed.

NCES CCD

NCES annually collects these data (referred to hereafter as *NCES data*), which contain fiscal and nonfiscal data on U.S. public schools.[19] This information is obtained primarily through administrative data that state education agencies maintain and NCES reports at both the school and district levels. For this study, we used data on the school- and district-level locale codes and the percentage of students eligible for free or reduced-price lunch as contrasts for the analysis of historical trends of educator supply. To prepare these data for analysis, we first cleaned the data and imputed all relevant missing values using a variety of methods, which are described in detail in Appendix A.

OK2SHARE Data

We retrieved the OK2SHARE data, referred to hereafter as birth data, to create the enrollment projections from OK2SHARE publicly available data reports. Specifically, we retrieved total county-level birth counts from 2002 through 2013.[20]

Comparative Salary Analysis Data

We made use of three data sources to complete the comparative analysis of salary and higher education costs. These include the Comparable Wage Index (CWI), a data product originally developed for the NCES, which allows comparisons of the differential costs of hiring and retaining educators in different labor markets throughout the country (Taylor & Fowler, 2006).[21] We also made use data from the College Board Annual Survey of Colleges to analyze the trends of average annual tuition and fees for public and private four-year universities in Oklahoma and its neighboring states during the period 2004–05 to 2014–15.[22] Finally, we used the Wage Competitiveness Index (WCI) included in the report *Is School Funding Fair: A National Report Card* published by the Education Law Center. This index estimates the average salary differential within states between teachers and other similar workers using data from the U.S. Census. Values of the WCI represent the average differential salary between teachers with workers in the same labor market that are of a similar age, higher education degree level, and working the same number of hours.[23]

Exhibit 2 illustrates which data sources we used to address specific analyses we conducted for this study.

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[18] The only data from the Tax Commission notes whether an individual not found in the ESC data was observed in the TC database.
[19] Additional information on these data can be found at https://nces.ed.gov/ccd/aboutCCD.asp
[20] Additional information on these data can be found at http://www.ok.gov/health/pub/wrapper/ok2share.html
[21] The CWI and corresponding documentation are available on the NCES website at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007397
[22] The College Board makes these data publicly available on their website at http://trends.collegeboard.org/college-pricing/figures-tables/published-prices-state-region.
[23] More detail on the WCI can be found in the report *Is School Funding Fair? A National Report Card* (4th ed.) by Baker, Sciarra, and Farrie (2015), available at http://www.schoolfundingfairness.org/.

Exhibit 2. Data Sources by Study Analysis

Research Question	Personnel Data	Certification Data	Enrollment Data	Pipeline Data	NCES Data	Birth Data	Salary Data	Employment Outcome Data
Research Question 1: What are the trends in the pipeline supply of educator preparation program completers in Oklahoma?				•				
Research Question 2: Does a systematic pattern in the pipeline of educators exist with respect to different subpopulations (e.g., by race, gender) of entrants into the education profession?	•			•				
Research Question 3: What are the trends in the Oklahoma educator preparation program completers who do not become certificated, who become certificated but not employed in Oklahoma PK-12 public school system, and those who obtain certification and do become employed in the system?	•			•				
Research Question 4: What are the overall trends in certification types obtained (e.g., emergency, provisional, standard, alternative) and areas of specialization among all certified individuals and for various subpopulations (e.g. by region, race, gender) during the past five years?	•	•	•		•			
Research Question 5: Do the trends in certification types and areas of specialization among active educators differ from individuals qualified to serve as educators, but not employed in the state's public education system (i.e., the reserve pool)?	•	•	•		•			

Research Question	Personnel Data	Certification Data	Enrollment Data	Pipeline Data	NCES Data	Birth Data	Salary Data	Employment Outcome Data
Research Question 6: What is the distribution of add-on certifications (i.e. an area in which an individual was not certified that was added when their certification was renewed) by certification area?		•						
Research Question 7: Based on the analysis of certification trends, what projections can we make about the future?		•						
Research Question 8: What are the trends in educator mobility (i.e., counts of staff that moved with respect to either position or district location) during the past five years?	•							
Research Question 9: Do mobility trends differ by region, schooling level (e.g. elementary, middle, and high), school enrollment, locale, gender, race, age, or primary position (including assigned subject)? How have educator mobility trends changed following the moratorium on the Oklahoma Teacher Residency Program?	•		•		•			
Research Question 10: How has the number of program completers in educator preparation programs changed during the past nine years and what are the projections of the number of program completers during the next five years?				•				
Research Question 11: How has the demand for educators changed between 2010 and 2014 by geographic region and primary position? Based on this, what projections can we make about future demand?	•		•			•		

Research Question	Personnel Data	Certification Data	Enrollment Data	Pipeline Data	NCES Data	Birth Data	Salary Data	Employment Outcome Data
Research Question 12: How has the supply of educators changed between 2010 and 2014 by geographic region and primary position? Based on this, what projections can we make about future demand?	•							
Research Question 13: Based on the supply and demand projections, in what regions and primary positions are shortages or surpluses expected?	•		•			•		
Research Question 14: What are the relative costs of hiring and retaining educational staff in Oklahoma versus its surrounding states and what does this imply about the interstate competition for educators in the region? To what degree is there competition for trained educators from sectors outside of public education in Oklahoma? In what types of industries outside education are educator candidates finding employment?							•	
Research Question 15: During the last five years, what are the trends in employment outcomes of education majors?								•

Methods

The following section describes the methods the research team used to prepare the data files, the metrics that we created to facilitate the analyses, and the methodology we used in these analyses.

Data Preparation

To complete the first phase of this study, the research team took a variety of steps to clean and prepare the data for analysis of historical trends. In addition to the preparation described in the Data section of this report, we took some additional steps as part of this study phase.

Constructed Metrics

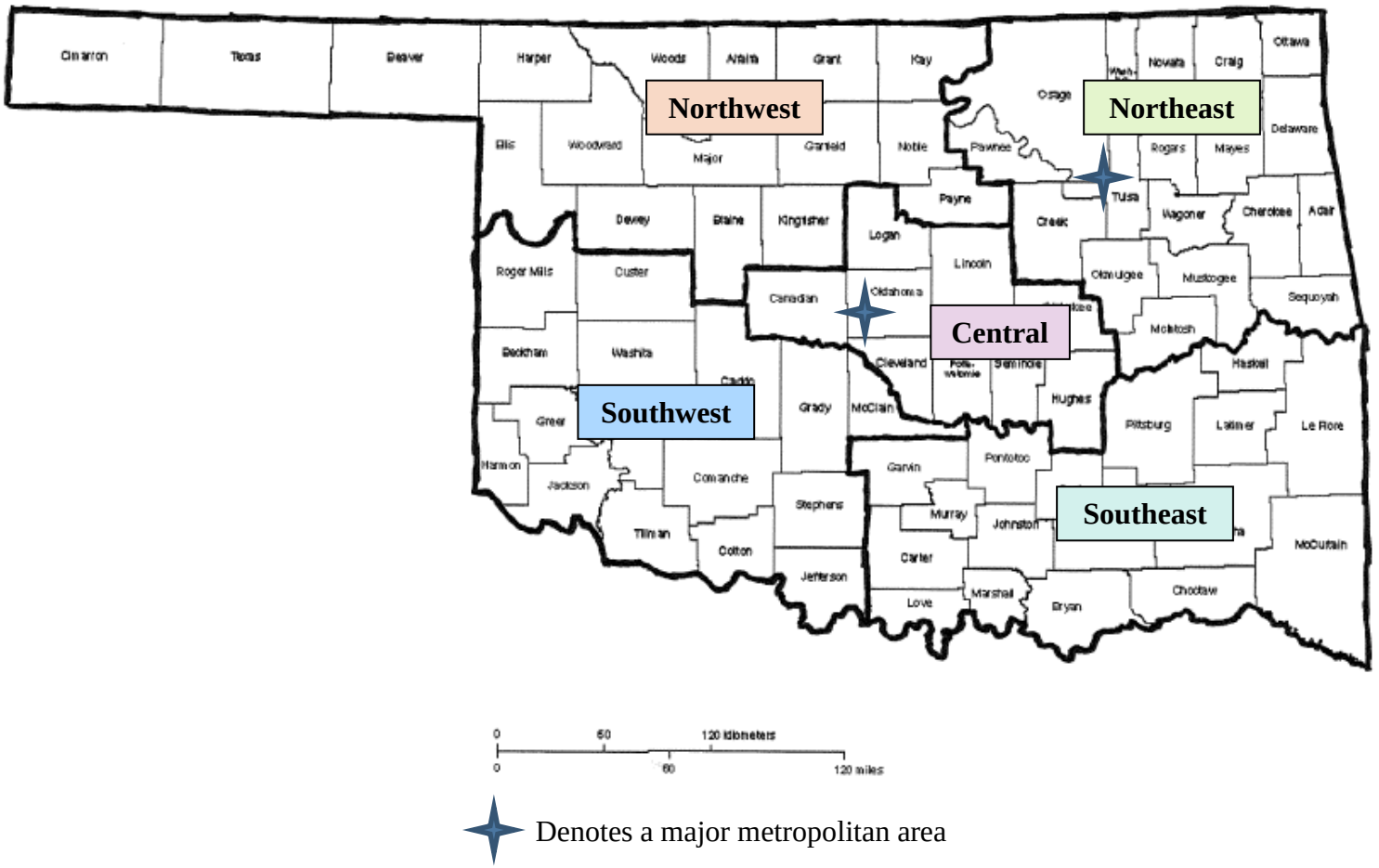
Once the research team had assessed and cleaned the data fully, the team identified all indicators necessary for the analysis of educator supply and demand. In some cases, a relevant metric was not directly available, but could be constructed using other variables. In the following list, we summarize all constructed metrics used to complete the study analyses:

- **Region Metric.** In consultation with the client, we based our regions on a consolidated version of the Oklahoma Workforce Investment Areas (WIAs).[24] These included northwest, northeast, southwest, southeast, and central regions. Exhibit 3 displays a map of the regions we used in this study. A full list of counties by specific region can be found in Appendix C.
- **Age Metric.** We coded educator age into five categories based on those used in the 2002 study: 31 and younger, 32–53, 54–59, 60–61, and 62 and older (Data and Decision Analysis Inc., 2002).
- **Consolidated Variable Metrics**. To facilitate data analysis, we consolidated codes of the following variables:
    - *Certification Area Code.* We created 15 consolidated categories of certification areas, including three associated with administration, 11 that are specific to instructional subjects, and one for all other areas. Note that we generally designed these consolidated categories to align with the subjects in the 2002 study (Data and Decision Analysis Inc., 2002).
    - *Certificate Type Code.* Consolidation resulted in seven broad categories of certification types used in the analysis (e.g., standard, alternative, provisional), and one category for individuals with multiple active certification types in a given year.
    - *Personnel Data Subject Code.* We created 16 consolidated categories of staff assignment subjects, including four associated with administration (nonsubject) positions and 14 for assigned subjects (e.g., mathematics, science, language arts). Note that, as with the certificate area consolidation, we generally designed these consolidated categories to match those used in the 2002 study (Data and Decision Analysis Inc., 2002).

A list of all consolidated variables and the corresponding components is included in Appendix C.

[24] A description of the Oklahoma WIAs and a map of these areas by county can be found at https://www.ok.gov/oesc_web/Services/Find_Labor_Market_Statistics/WIA/wiahp.html

Exhibit 3. Oklahoma Educator Supply and Demand Study Map of Regions



Source: The regions presented here are based on a consolidation of the Oklahoma WIAs.

- **Primary Position Metric.** To facilitate analysis of historical trends in the Oklahoma education workforce, we created a primary position metric. We based identification of the an individual's primary position on the following factors:
  - *Maximum FTE:* Using the FTE field in the personnel data, we preserved only the position associated with an educator's maximum FTE for analysis under the assumption that this would constitute the majority of an individual educator's time and thus be a primary position. In cases of a tie, we chose the preserved position at random.
  - *Subject, Job, and Site Level:* We determined the details of an individual's primary position by combining the consolidated subject code, job code, and site level of the individual's maximum FTE assignment. For example, if an educator's maximum FTE had the job code "TEACHER," the subject code "MATHEMATICS," and the site level of "HIGH SCHOOL," then this individual's primary position would be "high school math teacher."

  A complete list of these positions and the corresponding components is included in Appendix C.
- **Mobility Categories.** To analyze mobility of the educator workforce, we created a mobility category variable. We constructed this variable by comparing educators we found in two consecutive years of available data, including year-over-year comparisons from 2005–06 to 2006–07 through 2013–14 to 2014–15. We defined the following six categories of mobility:
  1. *Leavers:* Includes individuals we found working in the public education system in the first year, but not the second.
  2. *New:* Includes individuals we found working in the state's public education system in the second year, but not the first.
  3. *Stayers:* Includes individuals we found working in the state's public education system in both years with the same primary position and assigned district.
  4. *Movers: Different District and Different Position:* Includes individuals we found working in the state's public education system in both years, but who held a different primary position in a different district from one year to the next.
  5. *Movers: Same District and Different Position:* Includes individuals we found working in the state's public education system in both years in the same district, but who held a different primary positon.
  6. *Movers: Different District and Same Position:* Includes individuals we found working in the state's public education system in both years in the same primary position, but who were employed in a different district.

  For the purposes of the mobility analysis, we used an individual's position and district of *origin* as a reference group to report mobility counts of "movers" by different primary positions. For example, if we found an individual to be a "mover" in a given year, we reported that individual under the primary position this individual held in the first year, rather than the second.

- **Supply Estimate.** We based the estimates of the supply of educators on the pool of individuals in each primary position. We constructed this estimate at the district level and it includes all mobility categories in a given district, except the leaver category. Note that for the purposes of constructing the supply estimate and calculating projected supply, we used an individual's *destination* position and district. This is different from the approach we took in the mobility analysis and will result in a different sorting of individuals to positions and districts.

Key Methods

The key methods we used for this study are described in this section. These methods pertain to the primary analyses in the study and include the approaches we used to calculate all study projections, test the validity of these projections, and identify shortages and surpluses in supply. A detailed summary of these analysis methods and any methods not covered here can be found in Appendix A.

Enrollment Projections

Several approaches exist for creating student enrollment projections. These approaches include a model based on a simple mean score from the previous year; a growth model based on year-over-year changes; a growth model based on grade progression ratios (GPRs) (i.e., the proportion of students who progress grade to grade year to year); and regression-based modelling. The research team chose to use GPRs, which have previously been shown to be accurate for making projections as far as 10 years into the future (Berk & Hodgins, 2008; Minnesota Department of Education, 2015). This method relies on calculating projections based on a series of GPRs as follows.

Specifically, the research team used two basic calculations to create these projections: (1) the percentage of students who progress from one grade to the next year to year, beginning in Grades K–12 (i.e., GPRs from Grades K–1 through Grades 11–12); and (2) the percentage of children born in a given year that enroll in kindergarten five years later (i.e., birth-to-kindergarten GPR). The team then used the average GPR for birth to kindergarten and every other grade pair is calculate the number of students in each grade up to five years into the future.

Note that the team calculated enrollment projections at the regional level to account for projection errors arising from low enrollment counts at lower levels (i.e., county and district). In addition, the team did not create projections for students in prekindergarten or ungraded students. The reason for this decision and its impact on the study is covered in more detail later in this section.

A detailed summary of the method we used to project enrollment can be found in Appendix A.

Demand Projections

Once the projected student enrollments were calculated, the research team created estimates of demand using pupil-educator ratios from FY 2013–14. Specifically, the team used the following equation to calculate estimated demand:

$$Projected\ Demand = \frac{Projected\ Student\ Enrollment}{2014\ Pupil\text{-}Educator\ Ratio}$$

The team used this equation to calculate demand for all primary positions separately and reported the results for each region and statewide. The reported historical demand estimates are simply the count of educators in a given primary position by region. A discussion of the tests conducted to determine the validity of the created projections can be found in this section and in Appendix A.

Supply Projections

To calculate supply projections, the team used average relative year-over-year change in supply at the regional level and applied it to future years progressively. For example, the team applied the average relative year-over-year change to the actual supply estimate in 2013–14 to create the 2014–15 supply projection. Specifically, the team used the following equation:

$$supply2015 = (1+avgsupplychange)*supply2014$$

The team then used the projected 2014–15 supply estimate to create the 2015–16 estimate and so on. The team constructed historical supply estimates as the count of new educators and educators retained to a given region in a given year.

A discussion of the tests the team conducted to determine the validity of the created projections can be found in this section and in Appendix A.

Additional Projection Methods

In addition to the main projections described for enrollment, demand, and supply, the research team also developed projections of educator-preparation program completers and aggregate counts of educators holding certificates in different subject areas. The team modeled these new projections using a regression-based approach. Specifically, the team specified a simple regression of the count of program completers and certification areas on a time trend and created projections based on a best fit linear trend.

A discussion of the tests the team conducted to determine the validity of these projections can be found in this section and in Appendix A.

Projection Validation Testing

To test the validity of the calculated projections, we compared actual counts with projected counts for each analysis. To do this, we first created projections for historical years in which actual data were available using the same basic method the team used to calculate projections in

future years. We then assessed the average relative difference between the actual and projected counts to estimate the amount of error in our projections. A more detailed description of these tests and the results for each projection analysis is provided in Appendix A.

Identifying Shortages and Surpluses

We identified shortages or surpluses in supply by comparing the supply and demand projections described earlier. Specifically, we calculated the level difference between supply and demand for each primary position in each region of the state. We also calculated the relative difference between supply and demand, to allow for comparisons across positions composed of a larger or smaller number of educators. For example, if a given region is projected to have a supply of 541 high school social studies teachers in 2015–16, but the projected demand for this position in the same year is 574, we would say that an expected shortage exists of 33 teachers, or a relative shortage of 5.7 percent (e.g., (541-574)/574 = 0.057).

Key Decisions and Assumptions

Throughout the process of preparing the data for analysis, the research team made some key decisions and assumptions that are important to keep in mind when reviewing the reported results. We describe these decisions and assumptions in this section.

Defining Active Certification

To isolate only active certificates for each fiscal year, we limited the data to records with an effective date that was prior to or on October 1st of the first calendar year and with an expiration date after March 30th of the second calendar year. For example, certification data for FY 2014–15 includes certificates with an effective date on or before October 1, 2014, and with an expiration date after March 30, 2015. This assumes that all certificates are valid for at least one six-month period.

Primary Position Versus FTE

We decided to identify a primary position for individuals in the education workforce for the purpose of this study for a number of reasons. These reasons include that the alternative, analyzing FTEs, would need to account for individuals serving in multiple positions and individuals employed on a part-time basis (i.e., fewer than 1.0 FTE total), which would be difficult to determine given the available data. Identifying a primary position, however, allowed us to conduct a more straightforward mobility analysis for which we assessed entry and exit into the state's public education system on the individual level. In addition, this approach was in line with the approach taken in the study conducted in 2002 (Data and Decision Analysis Inc., 2002).

Data Merges and Unmatched Record

Completion of study analyses required that we combine the variety of data sources available. We also paid very careful attention to instances in which individuals, schools, or districts did not match across data sources. In nearly all cases, we were able to identify the reason why the data did not merge correctly, and took steps to mitigate the issue. This is discussed in more detail in Appendix A.

Prekindergarten and Ungraded Enrollments

For this study, the research team projected enrollment for Grades K–12, but did not project enrollments of prekindergarten or ungraded students (e.g., *out-of-home* placements). We made this decision for a number of reasons. The first reason is that our projection methodology relied on estimating the number of students progressing from grade to grade (see discussion of the GPR approach in the Enrollment Projections section of this report in Key Methods). Enrollment in prekindergarten, unlike kindergarten, is not consistently available in all communities and enrollment is voluntary and thus not universally available.[25] For this reason, estimating the average progression of prekindergarten students to kindergarten is problematic, and would require making potentially inaccurate assumptions. Similarly, estimating progression rates from birth to prekindergarten would be problematic and require assumptions regarding the numbers of children entering prekindergarten at various ages in different locations. The issue is similar for ungraded students, in that they do not exist as a regular part of Grades K–12, and thus could not be incorporated into the grade progression methodology without making assumptions. For these reasons, we chose not to include enrollments in these grades in our projections.

Age-Limit Assumption

We determined the age of educators that the Oklahoma public school system employed using birth-year data that OSDE provided. In some cases, however, we assumed the birth years were errors because the calculated age of the educator was too old to be realistic. Specifically, we assumed that any birth year that would make an active educator 90 years of age or older was an error, and we did not include these ages in the study analyses.

Districtwide Services Staff Assumption

We found that the personnel data assigned a number of employed individuals to the schooling level of *districtwide services*. For this reason, we could not connect these individuals to an individual school building. Moreover, it would not make sense for us to consider them part of school staff because they provide services districtwide. We therefore calculated the reported enrollment, minority, and poverty population variables for these individuals at the district level. In addition, we reported these individuals separately as part of the Districtwide Staff primary position.

Defining Add-On Certifications

For the purposes of this study, we defined add-on certification areas as areas in which individuals were not previously certified but that individuals added when they renewed their certification. We determined this definition by comparing the two most recent certifications for all individuals in the certification data. We could not include educators with only one certification in the given time period in this analysis. We based this definition on the data readily available to the researchers and determined it in consultation with the client.

[25] According to OSDE, 70 percent of Oklahoma's four-year-old students attend public school and have access to early childhood services (see http://ok.gov/sde/early-childhood-and-family-education).

Defining Educator-Preparation Program Completer

For the purposes of this study, educator-preparation program completers included a graduate who had taken the required courses to complete an educator-preparation program and be recommended for certification as an educator in Oklahoma public schools. This may include individuals with a variety of major fields of study, including noneducation majors. OSRHE staff determined the specific list of courses and identified the individuals meeting these criteria in the data prior to transferring the data to the research team.

Section 2. Results

In this section, we present the key findings for each research question we selected from a comprehensive set of findings accessible in the interactive tables and charts. For each research question, we provide a reference to the relevant interactive table and charts file, when applicable.

Analysis 1: Trends in the Educator Pipeline

The research team's first analysis focused on trends in the components of the educator pipeline and workforce entry. We examined the numbers of individuals undergoing three steps toward becoming an educator: (1) completing an educator-preparation program, (2) applying for and receiving certification, and (3) securing employment as an educator in the state's public education system.

Research Question 1 asked if trends exist in the aggregate pipeline of educators in Oklahoma. We defined the aggregate pipeline as all individuals who begin the process of becoming a Grade PK–12 educator in the state's public education system, regardless of whether they eventually become employed in the sector. This section reports analysis results of the first step toward employment—the production of education-preparation program completers.[26] From academic year 2009–10 to 2013–14, Exhibits 4, 5, 6, and 7 show the total numbers of educator-preparation program completers by IHE, the top major fields of study among program completers, and a breakdown of completers by original state of residence and for those program completers who came from outside Oklahoma. All data underlying these findings can be accessed using the *Aggregate Pipeline Interactive Tables and Charts* file.

For Research Question 2, we define the effective pipeline as all individuals who completed an educator-preparation program and went on to become employed in the sector. This section reports analysis results for recent program completers (i.e., completed in the last nine years) entering the state's public education system as new educators. We examined the demographic characteristics of this population, including gender, race, and age. We report key findings we selected from these analyses here. Specifically, Exhibit 8 displays overall trends by primary position from 2009–10 to 2013–14. All of the data underlying these findings can be accessed using the *Effective Pipeline Interactive Tables and Charts* file.

In addition, we examined trends in other components of the pipeline during the same time period. These include new alternatively certified educators (Exhibits 9, 10, and 11); educators with an emergency certification (Exhibit 12); and educators with out-of-state experience (Exhibit 13). The data underlying the emergency certification analysis can be accessed using the *Certification Interactive Tables and Charts* file.[27]

Finally, for Research Question 3, we considered the following employment pipeline step outcomes from academic year 2009–10 to 2012–13 for all those in the aggregate pipeline. These

[26] The other two pipeline steps include obtaining an educator certification and securing employment in the state's public education system, respectively—both of which are touched on in the report sections that follow.

[27] The descriptive statistics underlying the other analyses for this research question cannot be directly accessed using the *Interactive Tables and Charts*. This additional information is available upon request.

include (1) not certificated, (2) certificated and not employed in the state's public school system, and (3) certificated and employed in the state's public school system.[28] For this research question, we analyzed trends by IHE (Exhibit 14); major field of study (Exhibit 15); and original state of residence (Exhibit 16). We report selected findings from this analysis in this section. All data underlying these findings can be accessed using the *Aggregate Pipeline Interactive Tables and Charts* file.

Research Question 1: Aggregate Pipeline Trends

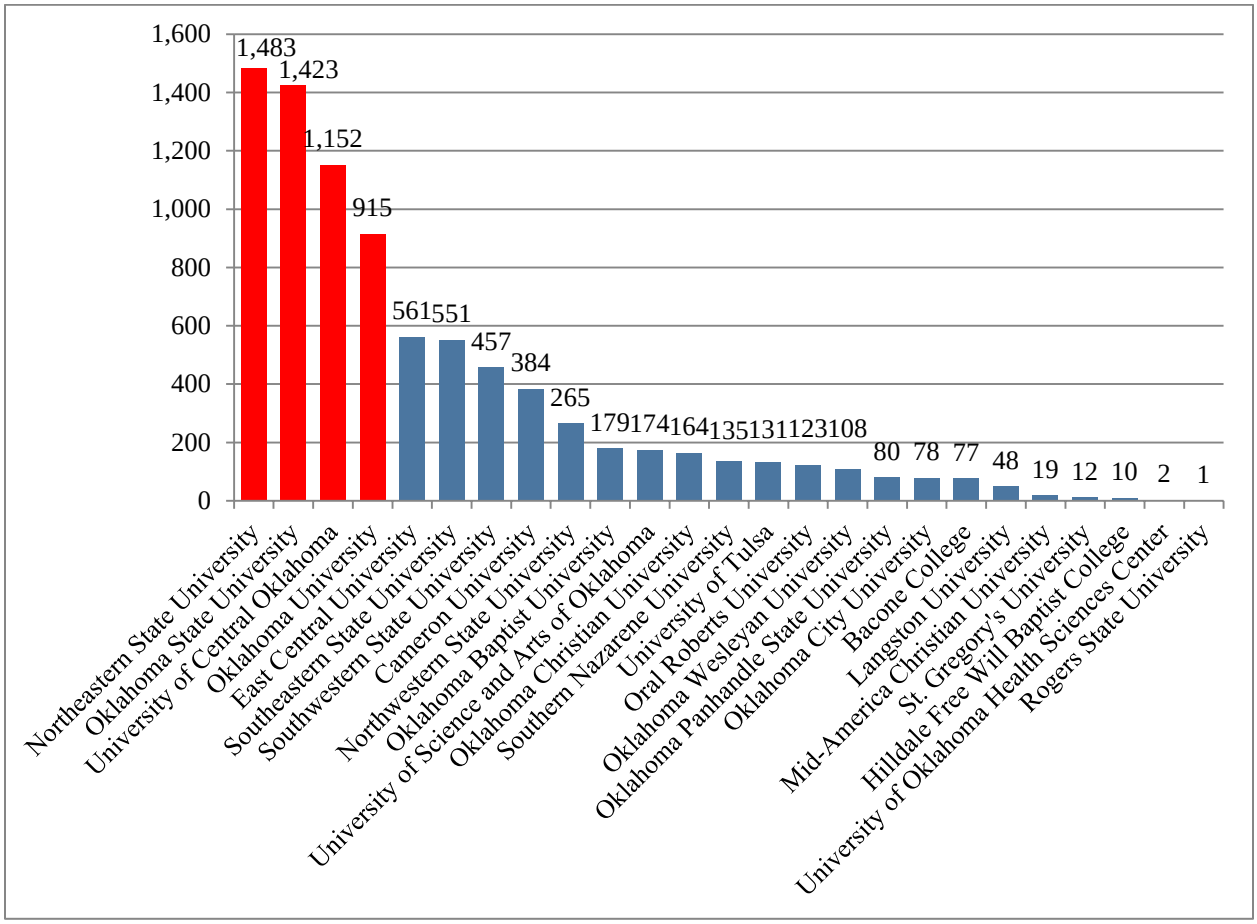
Top Producers of Educators

We first assessed which educator-preparation institutions were producing the largest number of educators over the last five academic years.

Exhibit 4 shows that from academic year 2009–10 to 2013–14, the top four producers of educator-preparation program completers were (1) Oklahoma University, (2) Oklahoma State University, (3) University of Central Oklahoma, and (4) Northeastern State University Combined, these four institutions account for 58 percent of completers during this time period. When looking at trends over the five year period for each of the IHEs we find that Northeastern State University was the top producer from 2009-10 through 2012-13, while more recently from 2012-13 through 2013-14 Oklahoma State University was the top producer.

[28] Membership in these categories is based on determining whether individuals graduating in the reported academic year were certified or employed in the following fiscal year. For example, for academic year 2012–13, we found those in the certificated and employed category to be employed in FY 2013–14. We chose to omit academic year 2013–14 from this analysis because of incomplete data.

Exhibit 4. Total Number of Program Completers by IHE From 2009–10 to 2013–14



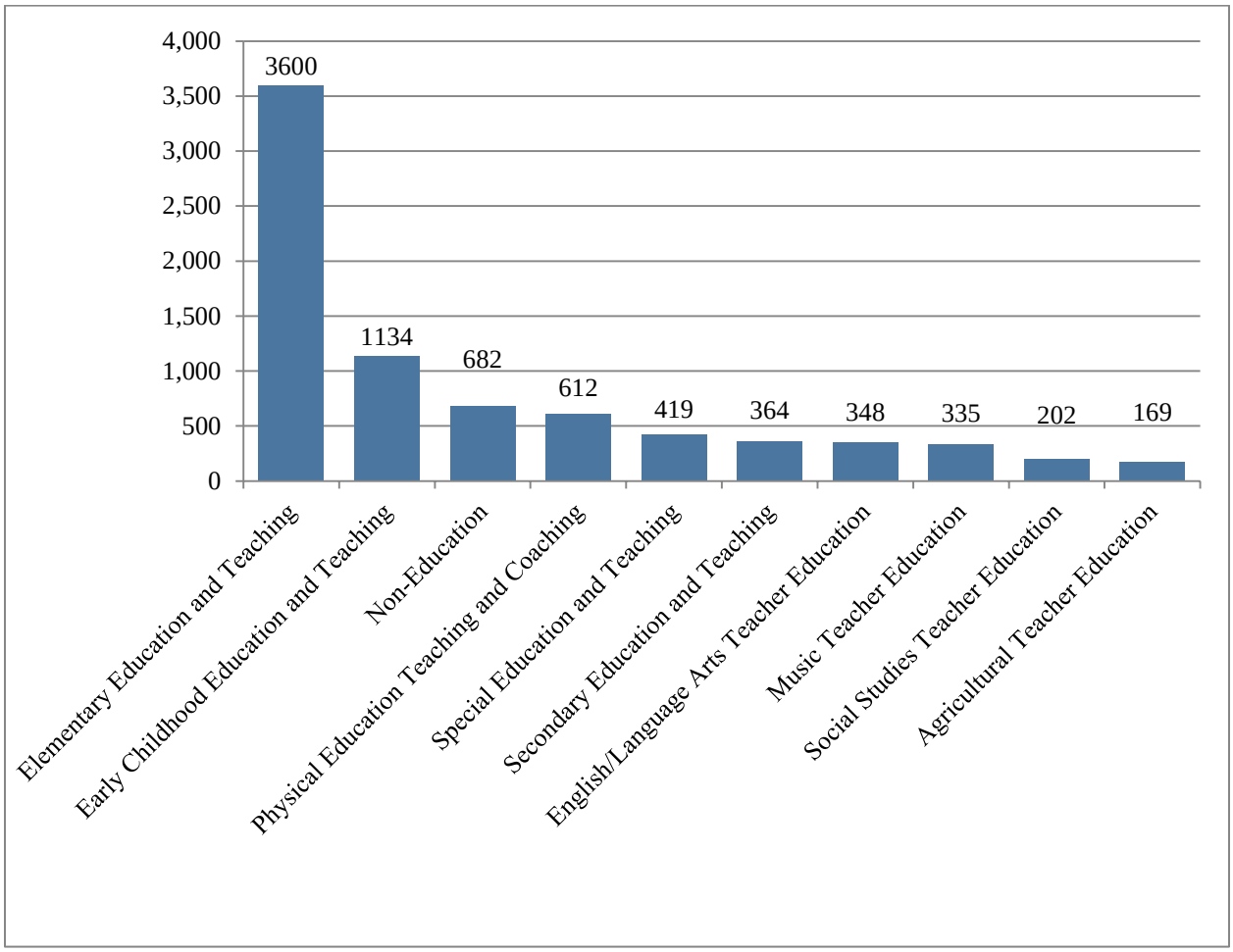
Top Major Fields of Study

By examining the most common major fields of study, one can see the degree to which institutions are training educators in high-demand subject areas. For example, policymakers might be interested in determining if the top major fields of study are sufficiently aligned with those majors that are the most in need statewide.

From 2009–10 to 2013–14, elementary education and teaching consistently has been the most common major field of study by a large margin (Exhibit 5). Early childhood education and teaching and noneducation majors[29] consistently have been the second and third most common majors, respectively.

[29] Noneducation majors include any major field of study not falling into the CIP Education code (i.e. CIP code series 13). An individual does not need to be an education major to qualify as a program completer. For more information, see the Defining Educator Preparation Program Completer section of this report in Key Decisions and Assumptions.

Exhibit 5. Share of Program Completers Across the Top 10 Major Fields of Study From 2009–10 to 2013–14



Top Original States of Residence

Our analysis of completers' state of origin can help policymakers gain a better understanding of the degree to which Oklahoma's educators are homegrown versus imported from out of state. Moreover, policymakers may be interested in whether those arriving from out of state to obtain their educator training are staying in Oklahoma. If not, it may be helpful to engage with stakeholders to better understand the dynamics at play.

From 2009–10 to 2013–14, 82 percent of educator-preparation program completers came from Oklahoma (Exhibit 6). If we only consider those with other states of origin (Exhibit 7), Texas consistently holds the largest share at 54 percent; the next closest state is Kansas, which accounts for 8 percent of the pool of education-preparation program completers that came from outside the state.

Exhibit 6. Share of Program Completers Coming from Oklahoma versus Outside of Oklahoma from 2009-10 to 2013-14

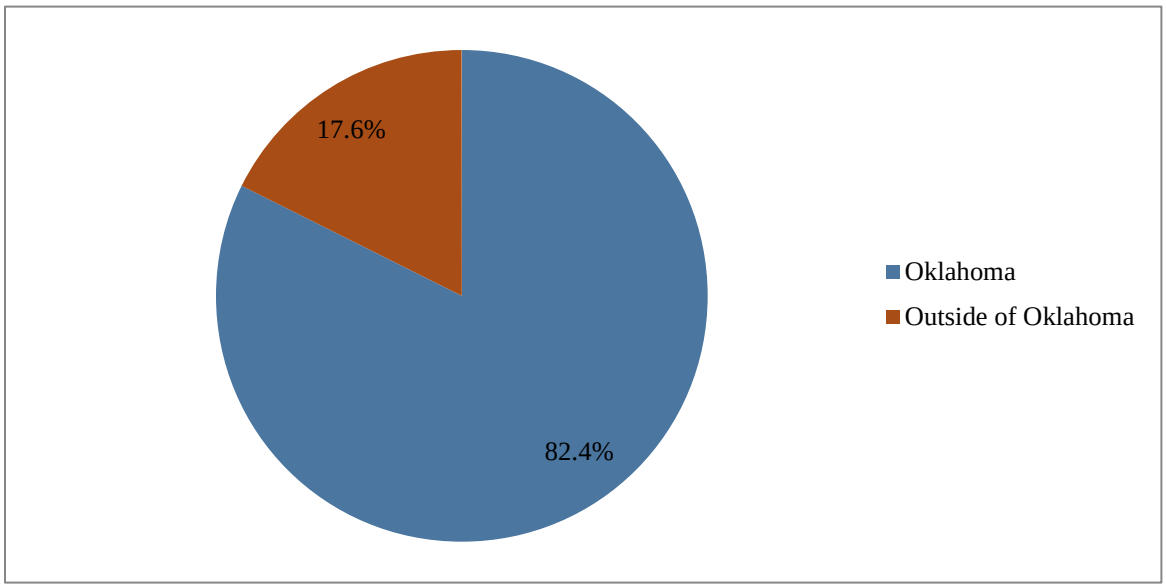
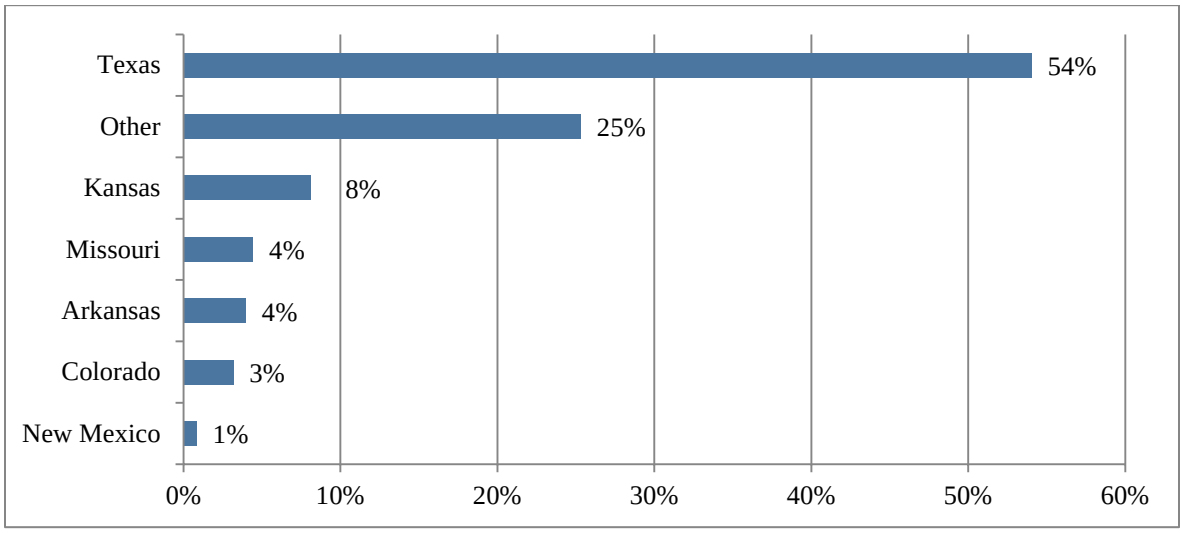


Exhibit 7. Share of Program Completers Among those Coming From Outside Oklahoma from 2009–10 to 2013–14



Research Question 2: Effective Pipeline Trends

New Educators by Primary Position

We next examined the types of positions that new program completers obtain. Such information can provide policymakers with an overall view of the flow from Oklahoma's educator-preparation programs to the educator workforce.

From 2009–10 to 2013–14, program completers who entered the state's public education system took on a variety of primary positons. Exhibit 8 displays the count and percentage of program

completers across the various positions in each year and cumulatively across all years over the five-year period. The most common positions align with the most common majors reported earlier (see Exhibit 5), including elementary teachers (61 percent) and early childhood teachers (5 percent). However, middle school and high school language arts teachers also appear to be relatively common, accounting for 3 and 4 percent, respectively.

Exhibit 8 Counts and Percentages of Program Completers Entering the Workforce by Primary Position

Primary Position	2009-10	2010-11	2011-12	2012-13	2013-14	Total
District-wide Staff	2	11	9	19	5	46
	0%	*2%*	*1%*	*1%*	*0%*	*1%*
Administrative	0	1	0	1	0	2
	0%	*0%*	*0%*	*0%*	*0%*	*0%*
Guidance Counselor	0	1	1	2	1	5
	0%	*0%*	*0%*	*0%*	*0%*	*0%*
Librarians	0	1	3	1	4	9
	0%	*0%*	*0%*	*0%*	*0%*	*0%*
Other Professional Staff	2	4	3	0	3	12
	0%	*1%*	*0%*	*0%*	*0%*	*0%*
Early Childhood	62	48	49	73	62	294
	7%	*7%*	*4%*	*5%*	*5%*	*5%*
Elementary	493	394	758	885	835	3,365
	59%	*57%*	*64%*	*62%*	*61%*	*61%*
Middle School - Language Arts	23	31	32	43	46	175
	3%	*4%*	*3%*	*3%*	*3%*	*3%*
Middle School - Arts and Music	13	6	14	20	18	71
	2%	*1%*	*1%*	*1%*	*1%*	*1%*
Middle School - Social Studies	12	15	30	34	41	132
	1%	*2%*	*3%*	*2%*	*3%*	*2%*
Middle School - Foreign Language	2	3	4	3	4	16
	0%	*0%*	*0%*	*0%*	*0%*	*0%*
Middle School - Mathematics	19	24	25	36	30	134
	2%	*3%*	*2%*	*3%*	*2%*	*2%*
Middle School - Science	14	6	21	17	11	69
	2%	*1%*	*2%*	*1%*	*1%*	*1%*
Middle School - Vocational Education	1	1	1	1	1	5
	0%	*0%*	*0%*	*0%*	*0%*	*0%*
Middle School - Other	7	11	12	18	22	70
	1%	*2%*	*1%*	*1%*	*2%*	*1%*
High School - Language Arts	30	17	46	59	58	210
	4%	*2%*	*4%*	*4%*	*4%*	*4%*

Primary Position	2009-10	2010-11	2011-12	2012-13	2013-14	Total
High School - Arts and Music	12	18	19	18	35	102
	1%	*3%*	*2%*	*1%*	*3%*	*2%*
High School - Social Studies	26	14	25	37	33	135
	3%	*2%*	*2%*	*3%*	*2%*	*2%*
High School - Foreign Language	4	5	5	5	5	24
	0%	*1%*	*0%*	*0%*	*0%*	*0%*
High School - Mathematics	27	19	22	33	46	147
	3%	*3%*	*2%*	*2%*	*3%*	*3%*
High School - Science	18	22	19	23	20	102
	2%	*3%*	*2%*	*2%*	*1%*	*2%*
High School - Vocational Education	14	13	24	22	30	103
	2%	*2%*	*2%*	*2%*	*2%*	*2%*
Other - High School	14	9	22	28	23	96
	2%	*1%*	*2%*	*2%*	*2%*	*2%*
Charter	13	4	21	23	21	82
	2%	*1%*	*2%*	*2%*	*2%*	*1%*
Other	25	11	23	22	13	94
	3%	*2%*	*2%*	*2%*	*1%*	*2%*
Total	833	689	1,188	1,423	1,367	5,500
	100%	*100%*	*100%*	*100%*	*100%*	*100%*

Note. Column percentages are in italics.

One important finding during the same period is that science teachers have made up a declining share of recent program completers entering the workforce, while mathematics teachers dropped in 2011–12 and have been increasing since. Specifically, science teachers declined from 4 percent of entrants in 2009–10 to 2 percent in 2013–14. Mathematics teachers dropped from about 6 percent to 4 percent between 2010–11 and 2011–12, and then increased during the next two years, reaching about 6 percent again in 2014. In contrast, the share of recent program completers entering the workforce as language arts teachers (both middle and high school teachers) was relatively constant over this time period, consistently hovering around 7 percent.

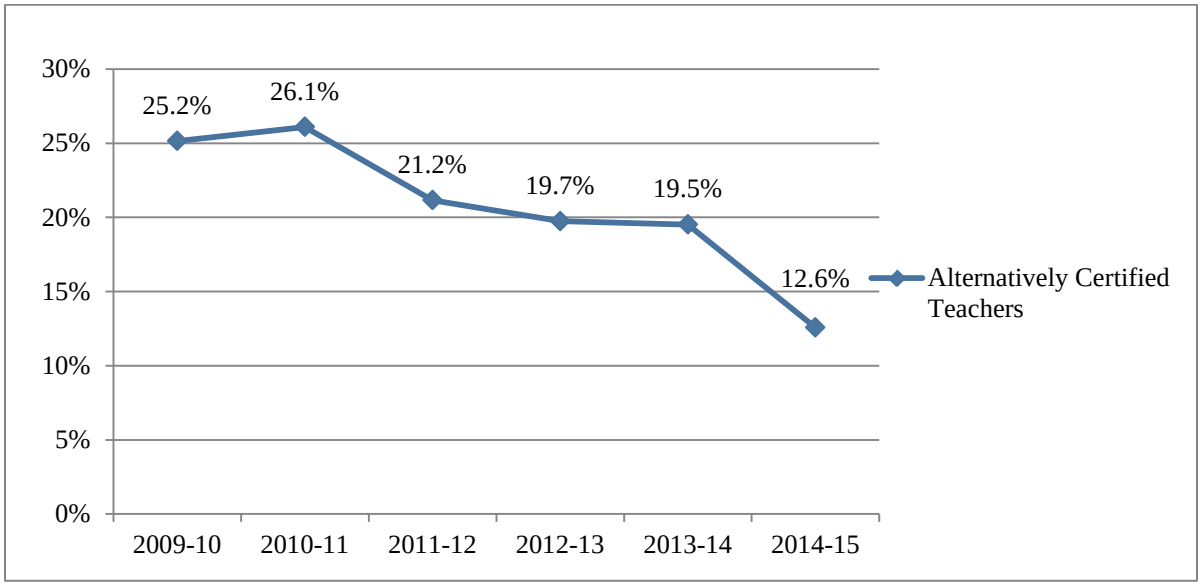
Lastly, the share of recent program completers entering the workforce as elementary teachers experienced a shock between 2010-11 and 2011-12, increasing from 57 percent to about 64 percent, and then remaining above 61 percent in the most recent two years.

Teachers Through Alternative Certification Programs

We also examined the numbers of teachers who were trained through alternative routes to certification. In Oklahoma, this includes such programs as Alternative Placement Program, CareerTech Instructor Certification, and Troops for Teachers.

From FY2009–10 to FY2014–15, the annual percentage of teachers who entered from alternative certification programs[30] declined by roughly half, from 25.2 percent in 2009–10 to 12.6 percent in 2014–15 (Exhibit 9). The majority of these individuals entered as elementary and high school teachers and had their subject listed as other.[31]

Exhibit 9. Alternatively Certified Teachers as a Share of New Educators Entering the Workforce From 2009–10 to 2014–15



In addition, the majority of new teachers who enter the workforce with alternative certifications were slightly more common in schools with lower concentrations of students in poverty (i.e., schools in the first and second poverty quartiles) from 2009–10 to 2013–14, ranging from 51.2 to 57.1 percent. However, over the full five-year period this increasing trend was not consistent. In comparison, the proportion of new teachers with standard certifications in the first and second poverty quartiles consistently declined during this time period, from 60.4 percent in 2009–10 to 50.8 percent in 2013–14 (Exhibit 10).

In contrast, alternatively certified new teachers were more common in the schools with the *larger* concentrations of minority students (i.e., schools in the third and fourth minority quartiles) during the same time period, ranging from 54.2 to 61.1 percent. This was less so for new teachers with standard certifications who were more evenly split between higher and lower minority schools, ranging from 47.8 to 54.3 percent and more or less increasing throughout the period (Exhibit 11).

[30] Specifically this includes new alternatively certified teachers that are not recent educator preparation program completers.
[31] The other category includes such subjects as physical education, driver education, and speech. Please see Appendix C for additional details.

Exhibit 10. Distribution of New Teachers with Alternative and Standard Certifications by Poverty Quartile From 2009–10 to 2014–15

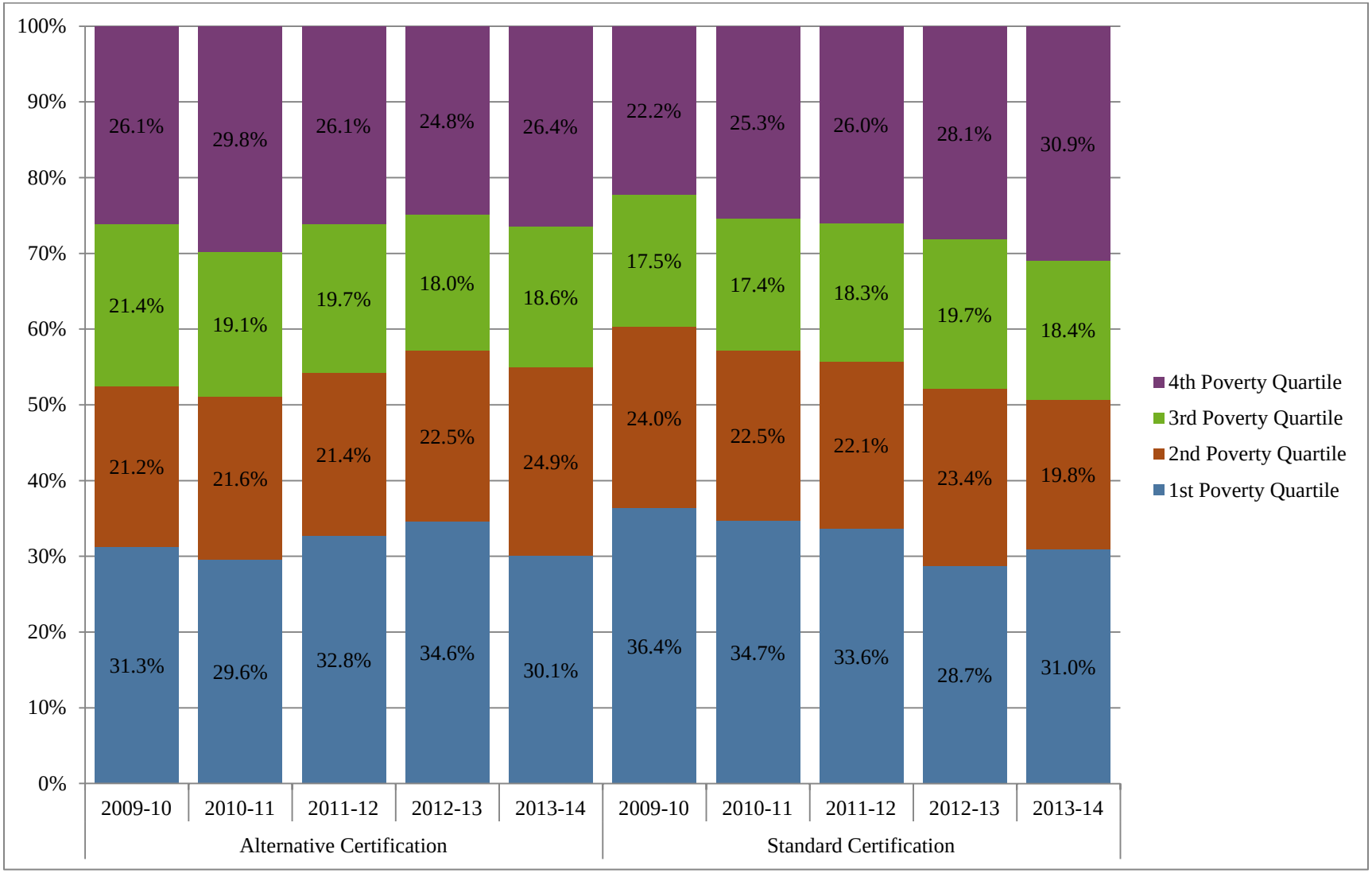
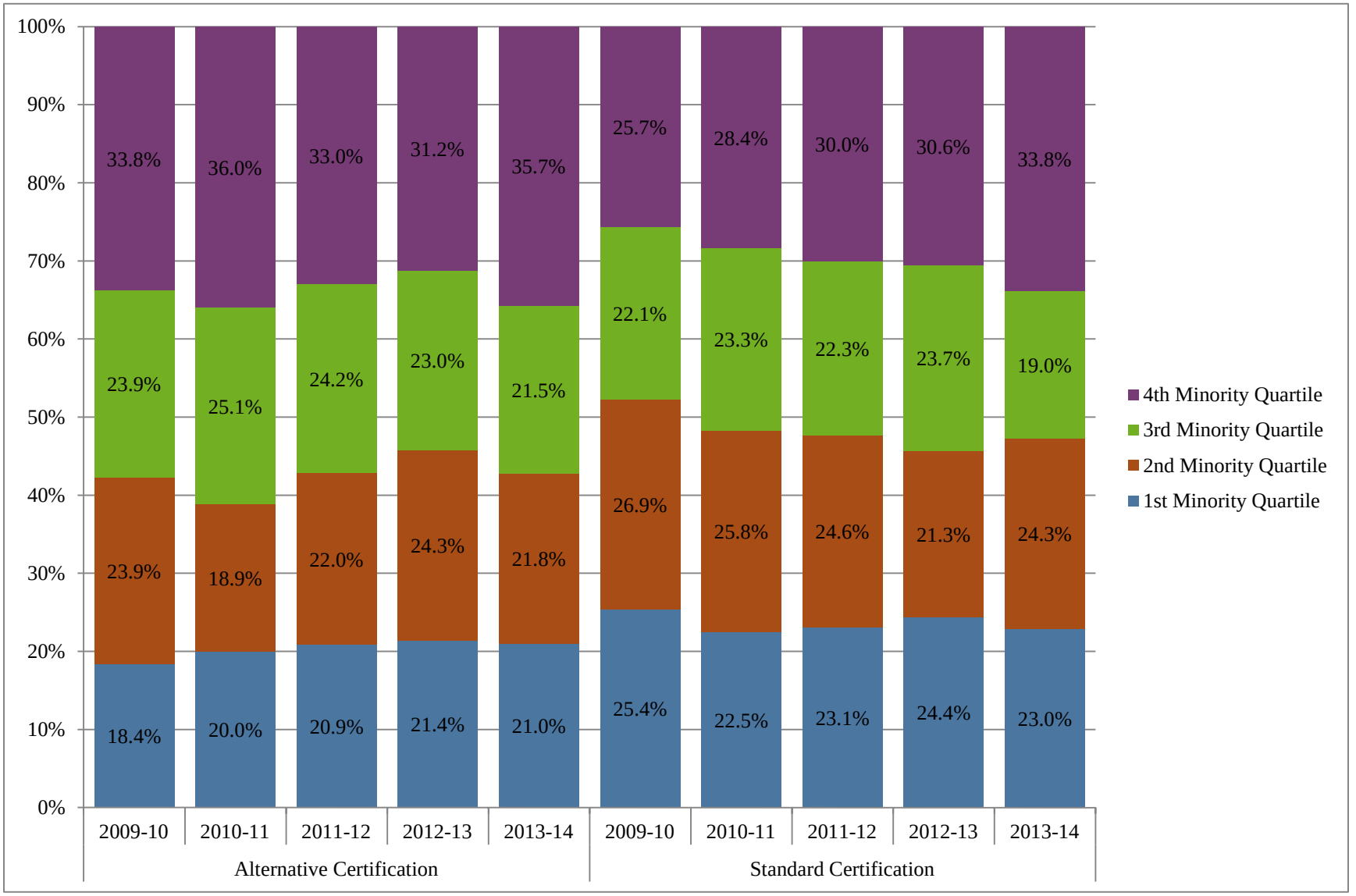


Exhibit 11. Distribution of New Teachers with Alternative Certification by Minority Quartile from 2009–10 to 2014–15

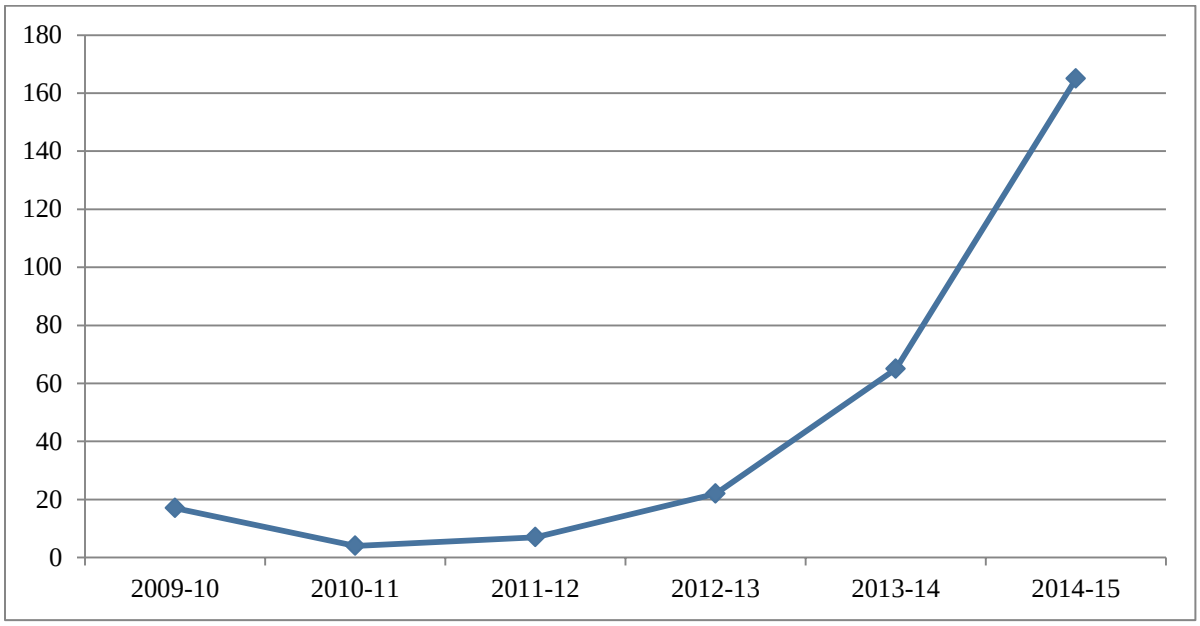


New Teachers With Emergency Certifications

One indicator of educator shortage is the degree to which emergency certifications are issued. In fact, the recent increase in the issuance of emergency certifications in Oklahoma has already caught the attention of policymakers, practitioners, as well as the public and raised concerns about teacher shortages.[32]

From 2009–10 to 2014–15, the number of newly entering teachers with only an emergency certification increased, especially in the most recent two years. Specifically, the number of new teachers with only an emergency certification more than doubled each year from FY2012–13 to FY2014–15 (Exhibit 12). As the counts include new teachers with only an emergency certification type, they reflect a lower bound with respect to all new teachers issued emergency certifications. There are also newly entering teachers with an active emergency certification that have at least one other certification type, and it is possible that some of these emergency certifications are being applied to their primary teaching position. For instance, in 2014-15 there were 53 new teachers that had both emergency and at least one other certification. Here, we chose to focus on those with only an emergency certification because we can be certain that these were being used for the reported primary teaching position. It should be noted that the population of teachers that only have an emergency certification made up about 1.3 percent of all new teachers with active certifications from 2009-10 to 2014-15, but 4.4 percent in the most recent year.

Exhibit 12. Annual Count of New Teachers Holding Only An Emergency Certification From 2009–10 to 2014–15

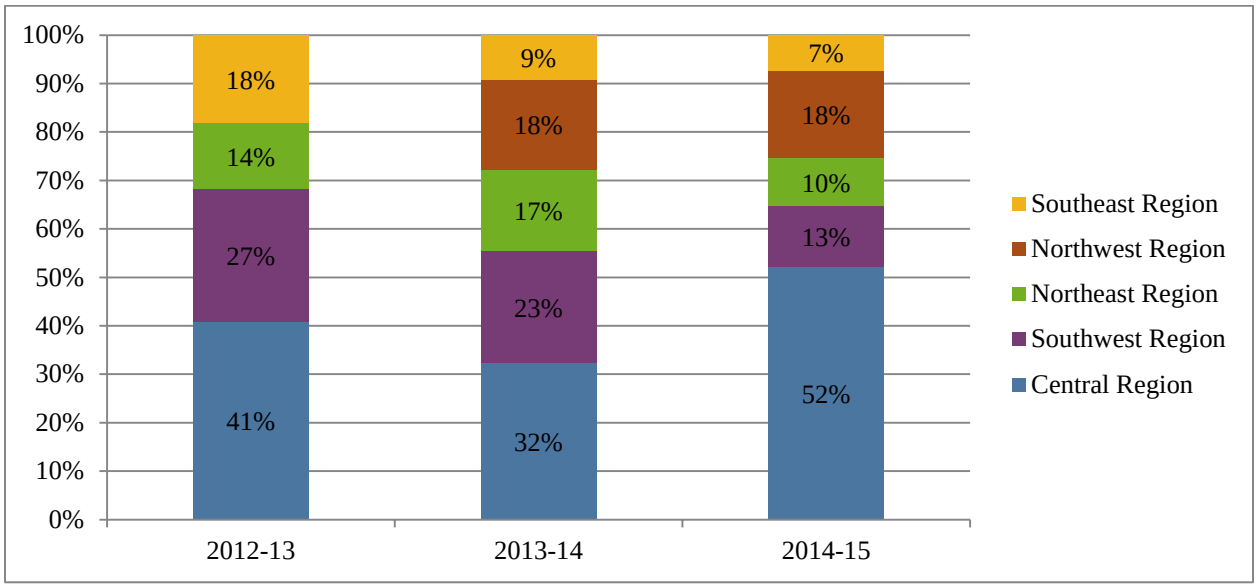


[32] Camera, Lauren, September 2015, "A 'Tremendous Teacher Shortage' in Okla. Confronts First-Year Chief", Education Week, retrieved from: http://blogs.edweek.org/edweek/state_edwatch/2015/09/a_tremendous_teacher_shortage_in_okla_confronts_first-year_chief.html?cmp=eml-enl-cc-news3.

The majority of new teachers holding only an active emergency certification in the past three years have been largely those with a primary position in elementary (46 percent); high school science (10 percent); and early childhood and high school language arts (6 percent).

With respect to region, Exhibit 13 shows the proportion of new teachers holding only an emergency certification by region from 2012–13 to 2014–15. Although the central region consistently has the largest share (between 32 and 52 percent), quite a bit of fluctuation exists over time in the other regions. In particular, the northwest region's share has grown over time (from 0 percent to 18 percent), overtaking the southwest region as the second largest share in the most recent year. On the other hand, the southeast has declined during this time period (from 18 percent to 7 percent). These findings may reflect the underlying size of the regions, with larger regions making up a larger share simply because they employ more teachers. On the other hand, relatively large percentages in small regions are notable because they suggest that these regions are making use of disproportionate shares of emergency certifications and thus may be experiencing large relative shortages of teachers.

Exhibit 13. Annual Count of New Teachers With Only An Emergency Certification by Region From 2012–13 to 2014–15



In addition, the share of new teachers holding only an emergency certification in rural locales was disproportionately high in 2012–13 and 2013–14. Specifically, these individuals held 50 percent of active emergency certifications in 2012–13 while only holding 28 percent of certifications overall. In 2013–14, these individuals held 40 percent of emergency certifications and 27 percent overall.[33] This trend may reflect disproportionately large shortages in rural communities, although it appears that the trend is declining. For additional information on certification trends by locale for all educators during this time period, see Exhibits 21a and 21b.

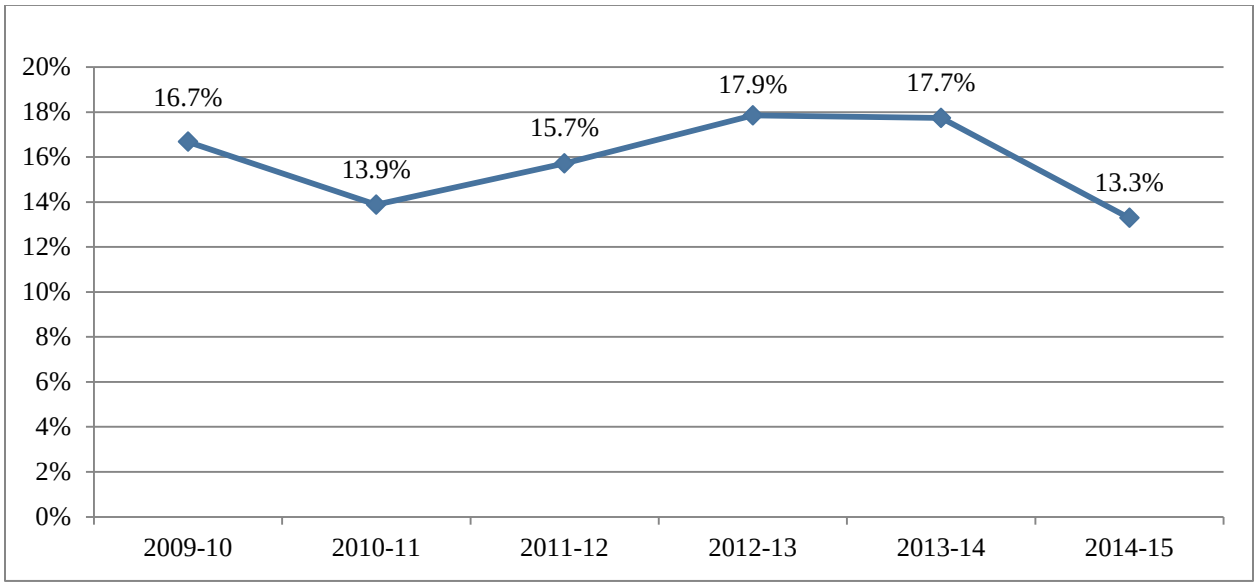
[33] The 2015 locale data are unavailable and consequently we could not report on them.

Out-of-State New Entrants

The final component of the educator pipeline that we examined is the flow of new entrants from out of state. To do this, we considered all educators with out-of-state experience[34]. Examining the numbers of new entrants with out-of-state experience gives policymakers a better understanding of areas to recruit teachers from to fill vacancies in Oklahoma's public schools.

Exhibit 14 shows that from 2009–10 to 2014–15, the proportion of new teachers with out-of-state experience fluctuated. It consistently increased from 2010–11 to 2012–13, peaking at 17.9 percent, and then declined during the next two years to 13.3 percent in 2014–15. This finding might suggest that the flow from out of state fluctuates within a range (e.g., between 13.0 and 18.0 percent). Regionally, the central and northeast regions have had the largest number of new entrants from out of state during this period. The concentration of these entrants in the two most populous regions of the state may suggest that these regions are more adept at attracting out-of-state entrants. On the other hand, it may simply reflect that these regions recruit more educators overall. Policymakers may want to investigate this further by engaging with stakeholders.

Exhibit 14. Out-of-State Teacher New Entrants From 2009–10 to 2014–15



Research Question 3: Trends in Workforce Entry

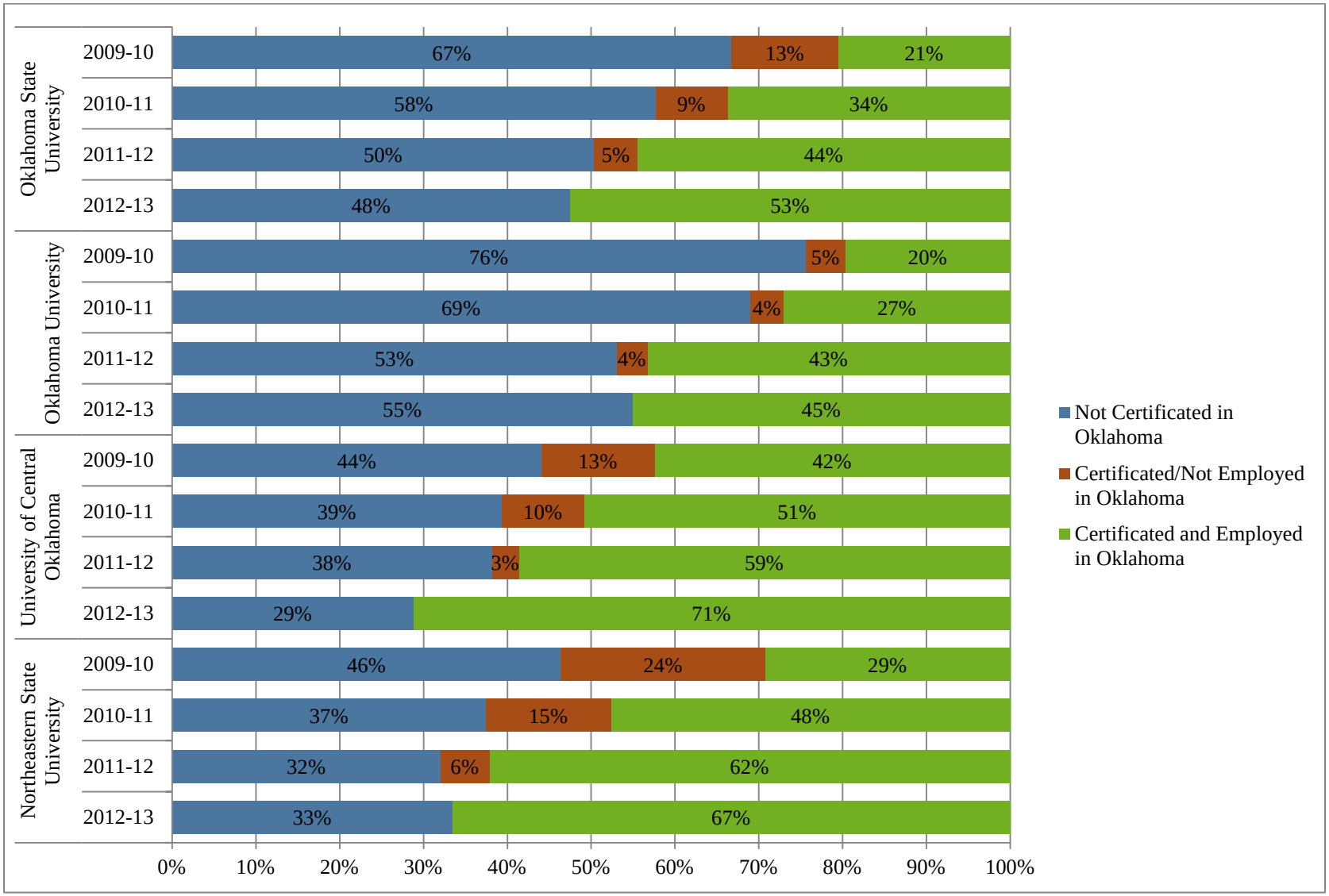
Employment Outcomes of Completers From Top Producing IHEs

Our analysis of top producers of educator-preparation program completers (see Exhibit 4) identified IHEs that policymakers may want to partner with to address shortages. Our analysis of the outcomes of program completers gives policymakers additional information on how likely these individuals are to enter the workforce by IHE. This information could be used to inform the placement strategies of IHEs in service of the overall goal of addressing shortages.

[34] To address the possibility of measurement error, we excluded those educators with zero total years of experience under the assumption that any years of out-of-state experience for these educators were entered in error.

Considering the outcomes of educator preparation program completers attending the top four IHEs from 2009–10 to 2012–13, we found that the share of these completers becoming certificated and employed in the state's public education system has grown for all four IHEs (Exhibit 15). This is especially true for Northeastern University (increasing by 38 percentage points), and to a lesser extent for Oklahoma State University (increasing by 32 percentage points) and the other two institutions. In addition, while the share of educators certificated and not employed as well as not certificated both declined; this growth seems to be primarily due to a decline in those educators certificated and not employed. This may indicate that certificated individuals previously unable to find employment have been better able to do so in recent years.

Exhibit 15. Share of Program-Completer Certification and PK–12 Public Education Employment Status Outcomes for the Top Four IHEs From 2009–10 to 2012–13



Outcomes of Educator-Preparation Program Completers for Top Major Fields of Study

Our analysis of top major fields of study for educator-preparation program completers (see Exhibit 5) identified majors that policymakers may want to consider alongside the needs of the market for educators. One way to assess whether these majors are meeting these needs would be to analyze the outcomes of those program completers with these majors. If the majority of these individuals are not going on to become employed, this may suggest that a high need does not exist for them in the educator labor market.

Considering the outcomes of those educator-preparation program completers in the top three major fields of study,[35] we found that elementary education and teaching as well as early childhood education and teaching completers made up a slightly disproportionate share of those who became certificated and employed (Exhibit 16). Specifically, in 2009-10 elementary education and teaching majors made up 47 percent of those who became certificated and employed, while accounting for 42 percent of those that completed their program one year earlier. Likewise, in the same year early childhood education and teaching majors made up 15 percent of those who became certificated and employed, while only accounting for 14 percent of recent program completers. In fact, these findings are robust across all years under consideration given that the three-year averages for each major are identical to the results for 2009-10. In contrast, physical education teaching and coaching majors were underrepresented among those becoming certificated and employed. They made up on average 4.9 percent of this population, but 7.5 percent of all completers.[36] These entrance rates may suggest that while a need exists for elementary and early childhood majors, graduates with a physical education major are not in as high demand.

Outcomes for Educator Preparation Program Completers Originating Outside Oklahoma

Similar to our analysis of the outcomes of those graduating with the top major fields of study, we examined outcomes of recent program completers by their original state of residence to help policymakers determine if in fact those entering educator-preparation programs from out of state end up entering Oklahoma's educator workforce.

Exhibit 17 shows that from 2009–10 to 2013–14, 76 percent of individuals completing Oklahoma educator-preparation programs that were from out of state did not go on to become certificated or employed in the state's public education system in the following year. For those that came from Texas, the largest group of out-of-state program completers, 82 percent of completers did not go on to become certificated or employed in Oklahoma. However, because we are not able to determine the specific employment outcomes of these individuals with the data available (i.e., we only know that they did not find employment within the state's public education system), policymakers may want to investigate this further to better understand the implications of this finding.

[35] Although physical education was the fourth most common major, we examined it here since the third most common major was actually a composite of all noneducation majors.

[36] These three-year averages were calculated by summing the counts in the certificated and employed category over all years for a given major and dividing it by the overall sum in that category. For example, calculation of the elementary major average was done as follows: 236+324+418+430)/(506+681+898+941) = 0.465. This was then compared to the total sum over all years for a given major divided by the sum over all years of completers. For elementary majors this was: (756+723+728+723)/(1,791+1,684+1,742+1,693) = 0.424.

Exhibit 16. Count and Percentage of Elementary, Early Childhood, and Physical Education Majors in Each Employment Step by Major Field of Study for 2009–10 to 2012–13

Major Field of Study	Year	Not Certificated	Certificated/Not Employed	Certificated and Employed	Total
Elementary Education and Teaching	2009-10	375 (37%)	145 (55%)	236 (47%)	756 (42%)
Early Childhood Education and Teaching		127 (12%)	41 (16%)	74 (15%)	242 (14%)
Physical Education Teaching and Coaching		94 (9%)	21 (8%)	16 (3%)	131 (7%)
Total		**1,022 (100%)**	**263 (100%)**	**506 (100%)**	**1,791 (100%)**
Elementary Education and Teaching	2010-11	317 (38%)	82 (47%)	324 (48%)	723 (43%)
Early Childhood Education and Teaching		96 (12%)	31 (18%)	110 (16%)	237 (14%)
Physical Education Teaching and Coaching		81 (10%)	16 (9%)	39 (6%)	136 (8%)
Total		**829 (100%)**	**174 (100%)**	**681 (100%)**	**1,684 (100%)**
Elementary Education and Teaching	2011-12	280 (36%)	30 (42%)	418 (47%)	728 (42%)
Early Childhood Education and Teaching		88 (11%)	12 (17%)	128 (14%)	228 (13%)
Physical Education Teaching and Coaching		76 (10%)	9 (13%)	44 (5%)	129 (7%)
Total		**773 (100%)**	**71 (100%)**	**898 (100%)**	**1,742 (100%)**
Elementary Education and Teaching	2012-13	293 (39%)	0 (0%)	430 (46%)	723 (43%)
Early Childhood Education and Teaching		89 (12%)	0 (0%)	136 (14%)	225 (13%)
Physical Education Teaching and Coaching		70 (9%)	0 (0%)	50 (5%)	120 (7%)
Total		**752 (100%)**	**0 (0%)**	**941 (100%)**	**1,693 (100%)**

Exhibit 17. Counts and Percentages of Out-of-State Program Completers Who Did Not Become Certificated in Oklahoma from 2009-10 to 2012-13

Year	State	Total Not Certificated or Employed in Oklahoma	Percentage Not Certificated or Employed in Oklahoma
2009-10	Texas	145	90%
2009-10	Other	52	78%
2009-10	Kansas	21	84%
2009-10	Missouri	13	87%
2009-10	Arkansas	11	79%
2009-10	Colorado	10	91%
2009-10	New Mexico	1	100%
2009-10	**Total**	**253**	**86%**
2010-11	Texas	133	86%
2010-11	Other	52	60%
2010-11	Kansas	13	72%
2010-11	Missouri	10	77%
2010-11	Colorado	5	71%
2010-11	Arkansas	2	33%
2010-11	New Mexico	2	50%
2010-11	**Total**	**217**	**75%**
2011-12	Texas	113	78%
2011-12	Other	57	64%
2011-12	Kansas	21	68%
2011-12	Arkansas	9	64%
2011-12	Colorado	8	100%
2011-12	Missouri	8	73%
2011-12	New Mexico	3	100%
2011-12	**Total**	**219**	**73%**
2012-13	Texas	144	76%
2012-13	Other	43	60%
2012-13	Kansas	16	67%
2012-13	Arkansas	10	71%
2012-13	Colorado	10	77%
2012-13	Missouri	10	63%
2012-13	New Mexico	2	67%
2012-13	**Total**	**235**	**71%**
2009-10-2012-13	**Grand Total**	**924**	**76%**
2009-10-2012-13	**Texas Total**	**535**	**82%**

Analysis 2: Trends in Educator Certification

For Analysis 2, the research team analyzed trends in certification in the aggregate and among the effective supply; trends in the reserve pool and in add-on certification areas (as defined in the Defining Add-on Certifications section of this report in Key Decisions and Assumptions); and projections of certification areas during the next five years.

To address Research Question 4, we analyzed these trends in certification from FY2009–10 to FY2014–15 overall and by gender, race, region, age, poverty and minority populations, locale, and certification area. This section reports on select findings from this analysis. Specifically, Exhibit 18 displays the overall trends in certification in the aggregate and among the effective supply, whereas Exhibit 19 displays specific counts and percentages of educators by certification type for each year of the time period. In addition, Exhibit 20 displays these trends by region in 2014–15, and Exhibits 21a and 21b display them by locale for 2009–10 and 2014–15, respectively. Finally, Exhibits 22, 23, and 24 display the counts of consolidated certification areas among teachers, all educators, and those in the reserve pool. All data underlying these findings can be accessed using the *Certification Interactive Tables and Charts* file.

For Research Question 5, we examined trends in the reserve pool of educators—or those with an active certification who are not employed in the state's public education system in a given year–during the same time period. Exhibit 25 displays these trends overall and broken out by certification type among those in the reserve pool. This section also reports on common certification areas among those in the reserve pool. Although the data underlying the overall findings can be directly accessed using the *Certification Interactive Tables and Charts* file, the analysis by certification area cannot. This additional data is available upon request.

For Research Question 6, we analyzed trends in the number and area of add-on certificates effective after January 1, 2004. We defined add-on certification areas as areas in which individuals were not certified that was added when they renewed their certification. A more detailed explanation of this analysis can be found in the Defining Add-On Certifications section of this report in Key Decisions and Assumptions. This section reports on overall trends, paying particular attention to the most commonly added areas. Specifically, Exhibit 26 displays the percentage of add-on certification areas for each area in the analysis. Although the data underlying these findings cannot be directly accessed using the *Interactive Tables and Charts* file, this additional data is available upon request.

Finally, in Research Question 7, we calculated projections of the number of individuals obtaining certification in different areas over the next five years (from 2015-16 to 2019-20). A more detailed explanation of this analysis can be found in the Additional Projection Methods section of this report in Key Methods. This section reports on overall trends, paying particular attention to the areas with the largest projected changes. Specifically, Exhibit 27 displays the historical and projected counts of the certification areas with the largest projected changes during the covered time period. Although the data underlying these findings cannot be directly accessed using the *Interactive Tables and Charts* file, this additional data is available upon request.

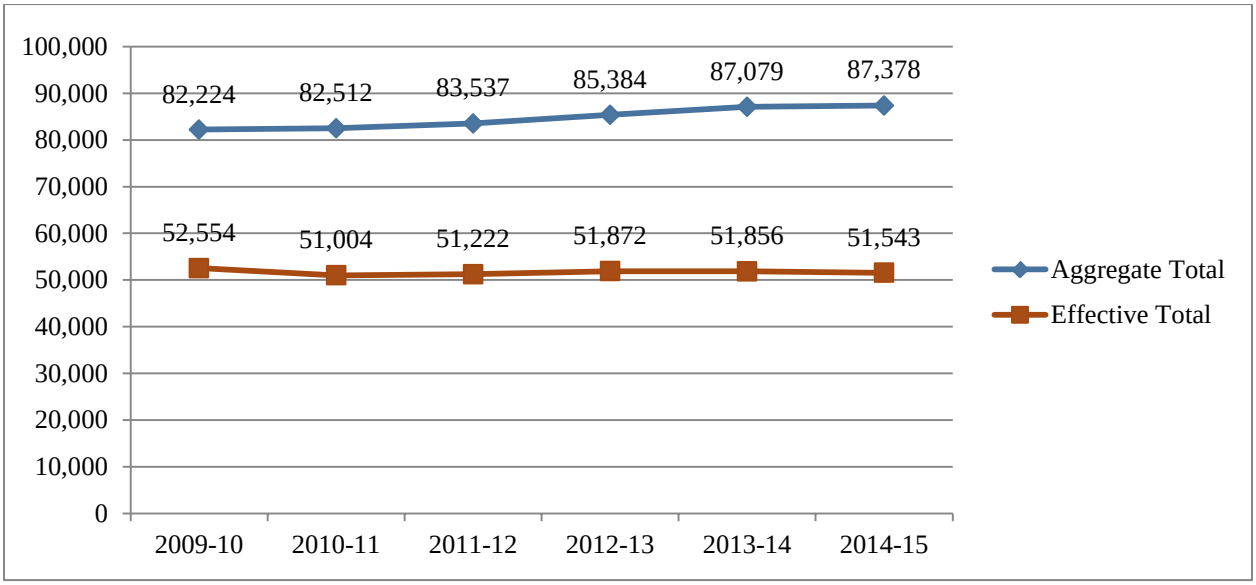
Research Question 4: Trends in Certification

Certificated Educators in Aggregate Versus Actively Employed

Comparing the trends in certifications in the aggregate and among the effective supply of educators allows policymakers to better understand the difference between all certified individuals and those actively employed in the state's public education system.

The count of certificated educators actively employed in a given year has decreased 2 percent from 2009-10 to 2014-15, but the overall count of individuals with active certifications has gone up 6 percent during the same time period (Exhibit 18).

Exhibit 18. Total Versus Actively Employed Counts of Certificated Educators From 2010 to 2015



The increase in the number of individuals in Oklahoma with an active certification during the past six years, combined with the decline in the number of actively certified and employed educators, may be noteworthy. This finding could indicate that supply is becoming larger than demand by an increasing amount each year. However, there may be reason to believe this is not the case. An alternative interpretation might be that a growing proportion of individuals with an active certification in a given year are not entering the state's public education sector, despite unmet demand. While the present study can examine trends in entry for recent Oklahoma educator preparation program completers (see Research Question 3), it cannot answer this question for the broader population of certificated individuals. To this end, policymakers might want to consider strategies to attract (and retain) certificated individuals from both traditional educator preparation programs and from alternative certification routes into the public education sector.

Overall Trends Among Effective Educators

Exhibit 19 displays the counts and percentages of each certification type from 2009–10 to 2014–15. [37] The numbers associated with particular general types of certifications are especially noteworthy: certifications denoting nonstandard entrance into the workforce (e.g., emergency, alternative, and provisional) and certifications intended for nonstandard roles (e.g., paraprofessional and other[38]).

During this six-year period, there was an increase in alternative certified educators actively employed of 11 percent, while emergency and provisionally certified educators increased by a factor of 7.4 (744 percent) and 2.6 (259 percent), respectively.[39] When the three certification type categories are taken as a group this equals a 32 percent increase over the period, with the sharpest growth occurring between 2011–12 and 2012–13. An increase in these certification types may suggest that the population of educators entering the workforce through nonstandard routes is growing, and this information may be helpful as policymakers consider strategies to improve recruitment in high-need areas.

The certification data also showed growth in the numbers of employed individuals with paraprofessional and other certifications by a factor of 9.9 (985 percent) and 6.8 (678 percent), respectively during the six-year period. Taken collectively, the number of employed paraprofessionals and other certificate holders grew by a factor of 7.8 over the period, increasing an average of 52 percent each year. This trend is also observed when considering only teachers; the number of teachers actively employed in a given year with a paraprofessional or other certification increased an average of 51 percent during the same time period. An increase in paraprofessional and other certifications may be an indication that educators in these roles are becoming more common and perhaps are in higher demand. But policymakers may want to investigate this further through engagement with stakeholders (e.g., district staff, principals).

Exhibit 19. Overall Counts and Percentages of Certification Types From 2009–10 to 2014–15

Year	Multiple	Standard	Alternative	Emergency	Provisional	License	Paraprofessional	Other	Total
2009-10	699 (1%)	44,088 (84%)	5,370 (10%)	25 (0%)	749 (1%)	1,503 (3%)	39 (0%)	81 (0%)	52,554 (100%)
2010-11	1,778 (3%)	43,012 (84%)	5,386 (11%)	11 (0%)	575 (1%)	10 (0%)	61 (0%)	171 (0%)	51,004 (100%)
2011-12	2,163 (4%)	42,365 (83%)	5,510 (11%)	14 (0%)	814 (2%)	4 (0%)	126 (0%)	226 (0%)	51,222 (100%)
2012-13	2,365 (5%)	41,778 (81%)	5,717 (11%)	35 (0%)	1,442 (3%)	10 (0%)	197 (0%)	328 (1%)	51,872 (100%)
2013-14	2,509 (5%)	40,708 (79%)	5,894 (11%)	77 (0%)	1,957 (4%)	12 (0%)	292 (1%)	407 (1%)	51,856 (100%)
2014-15	2,168 (4%)	40,346 (78%)	5,957 (12%)	186 (0%)	1,937 (4%)	16 (0%)	384 (1%)	549 (1%)	51,543 (100%)

[37] It should be noted that the categories in Exhibit 19 and throughout the report represent individuals characterized by a single reported certification type category. Individuals with more than one active certification type have been captured in the Multiple certification category, while those with a single certification type are listed under one of the other classifications, with all categories being mutually exclusive from one another.

[38] The other certification type includes specialty certifications such as the infant, toddler, and three-year-old student certificate or the speech language therapy assistant certificate. A list of all consolidated variables and the corresponding components is included in Appendix C.

[39] Although the increases in emergency and provisional certifications are dramatic, this is deceptive (especially in the case of emergency certifications) because the underlying number of individuals with these types of certifications is smaller than for those with alternative certifications.

Note. Row percentages are in parentheses. Due to an issue with the certification data that the research team uncovered, the counts in the license certification type are erroneously high in 2009–10. As a result, counts in this type in 2009–10 should be disregarded. For more details on this issue, see Appendix A.

Certification by Region

Examining these trends by region may give policymakers helpful information to better target statewide strategies and meet the needs of particular parts of the state.

Exhibit 20 shows the counts of educators by certification type and region in 2014–15. In this year, the central region made up about one third of all active educators, but had a disproportionate statewide share of the alternative certifications (38 percent); provisional certifications (38 percent); and especially emergency (52 percent) certifications. In contrast, the northeast region also made up about one third of the all active educators (34 percent), but accounted for just 11 percent of the emergency credentials across the state. These trends suggest that in the central region, nonstandard routes to entering the workforce are particularly common. Perhaps a lack of supply exists of individuals prepared to receive a standard certification, or, in the case of alternative certifications, it may reflect a preference in this region for educators with a specific background.

Findings by Locale

As with the findings by region, analyzing trends by locale may help policymakers better target strategies to meet the needs of particular types of communities. Given the large number of rural communities in Oklahoma and their very unique context, we paid particular attention to trends in certification in these communities.

Exhibits 21a and 21b show the counts of active educators by locale category and certification type for 2009–10 and 2013–14, respectively.[40] One interesting finding suggested by the figures is that the proportion of educators employed within rural locales that have alternative, emergency, or provisional certifications has increased over time. In 2009–10, 10 percent of educators working in rural locales had these types of certifications, whereas in 2013–14 this percentage increased slightly to 13 percent.[41] But we also observed corresponding increases in the proportion of employed educators in other locales with these types of certifications. Specifically, we found that the shares of alternative, provisional, and emergency certifications within city, suburb, and town locales increased from 16 to 20 percent, from 13 to 16 percent, and from 10 to 14 percent, respectively. The fact that nonstandard certifications are growing across all locales is in line with our earlier finding suggesting these types of certifications are growing in general across the state.

[40] Note that locale data are unavailable for 2014–15 and thus could not be reported.

[41] This calculation was made by summing the counts of educators in the cells in the rural locale rows under the columns for alternative, emergency, and provisional certifications, and dividing this figure by the sum of the total counts in the rural local rows in the last column of the table. This calculation was similarly performed for each of the other locales using the city, suburb and town rows, respectively.

Certification Area

Exhibit 22 displays the counts of teachers with different certification areas from 2009–10 to 2014–15. Exhibits 23 and 24 also show counts of all educators and just those in the reserve-pool by certification area, respectively.

Between 2009–10 and 2014–15, teachers held on average certificates in 1.77 unique subject areas (Exhibit 22). Educators employed in the education system were certified in 1.88 unique areas (Exhibit 23), while those in the reserve pool were certified in 1.81 unique areas (Exhibit 24). This finding might suggest that during this period it was slightly more common among educators to add more than one certification area overall than among only those employed as teachers, while those in the reserve pool fall somewhere in between. However, the differences are quite small.

The most common areas of certification in 2014–15 among all educators were elementary, early childhood, and special education. This is different from 2009–10, when the most common areas were elementary, early childhood, and vocational education. The fact that special education certification areas overtook vocational education as the third most common area may reflect increasing demand for educators prepared to serve students with special needs and/or a decrease in the demand for vocational education teachers.

Exhibit 20. Counts of Active Educators by Certification Type and Region for 2014–15 (Column Percentages in Parentheses)

Region	Multiple	Standard	Alternative	Emergency	Provisional	License	Paraprofessional	Other	Total
Northwest	192 (9%)	3,636 (9%)	484 (8%)	31 (17%)	190 (10%)	4 (25%)	32 (8%)	14 (3%)	4,583 (9%)
Northeast	730 (34%)	13,977 (35%)	1,900 (32%)	21 (11%)	683 (35%)	7 (44%)	106 (28%)	234 (43%)	17,658 (34%)
Southwest	236 (11%)	4,846 (12%)	670 (11%)	25 (13%)	178 (9%)	0 (0%)	44 (11%)	29 (5%)	6,028 (12%)
Southeast	283 (13%)	5,046 (13%)	658 (11%)	12 (6%)	148 (8%)	0 (0%)	51 (13%)	13 (2%)	6,211 (12%)
Central	727 (34%)	12,841 (32%)	2,245 (38%)	97 (52%)	738 (38%)	5 (31%)	151 (39%)	259 (47%)	17,063 (33%)
TOTAL	2,168 (100%)	40,346 (100%)	5,957 (100%)	186 (100%)	1,937 (100%)	16 (100%)	384 (100%)	549 (100%)	51,543 (100%)

Note. Row percentages are in parentheses.

Exhibit 21a. Counts of Active Educators by Certification Type and Locale for 2009–10 (Column Percentages in Parentheses)

Locale	Multiple	Standard	Alternative	Emergency	Provisional	License	Paraprofessional	Other	Total
City, Small	19 (3%)	963 (2%)	137 (3%)	0 (0%)	24 (3%)	39 (3%)	0 (0%)	0 (0%)	1,182 (2%)
City, Mid-Size	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
City, Large	152 (22%)	7,686 (17%)	1,405 (26%)	3 (12%)	181 (24%)	330 (22%)	8 (21%)	74 (91%)	9,839 (19%)
Suburb, Small	17 (2%)	983 (2%)	136 (3%)	1 (4%)	20 (3%)	44 (3%)	2 (5%)	0 (0%)	1,203 (2%)
Suburb, Mid-Size	1 (0%)	21 (0%)	3 (0%)	0 (0%)	2 (0%)	1 (0%)	0 (0%)	0 (0%)	28 (0%)
Suburb, Large	85 (12%)	6,745 (15%)	851 (16%)	3 (12%)	154 (21%)	235 (16%)	3 (8%)	0 (0%)	8,076 (15%)
Town, Remote	65 (9%)	4,498 (10%)	414 (8%)	2 (8%)	67 (9%)	153 (10%)	6 (15%)	2 (2%)	5,207 (10%)
Town, Distant	80 (11%)	5,780 (13%)	565 (11%)	1 (4%)	84 (11%)	171 (11%)	3 (8%)	0 (0%)	6,684 (13%)
Town, Fringe	3 (0%)	560 (1%)	66 (1%)	0 (0%)	7 (1%)	9 (1%)	0 (0%)	0 (0%)	645 (1%)
Rural, Remote	64 (9%)	4,151 (9%)	433 (8%)	5 (20%)	39 (5%)	116 (8%)	10 (26%)	3 (4%)	4,821 (9%)
Rural, Distant	118 (17%)	7,058 (16%)	724 (14%)	7 (28%)	80 (11%)	228 (15%)	2 (5%)	1 (1%)	8,218 (16%)
Rural, Fringe	94 (13%)	5,554 (13%)	618 (12%)	3 (12%)	90 (12%)	174 (12%)	5 (13%)	1 (1%)	6,539 (12%)
TOTAL	698 (100%)	43,999 (100%)	5,352 (100%)	25 (100%)	748 (100%)	1,500 (100%)	39 (100%)	81 (100%)	52,442 (100%)

Note. Row percentages are in parentheses. For this year and contrast metric there are 112 missing values. For more details see Appendix A.

Exhibit 21b. Counts of Active Educators by Certification Type and Locale for 2013–14 (Column Percentages in Parentheses)

Locale	Multiple	Standard	Alternative	Emergency	Provisional	License	Paraprofessional	Other	Total
City, Small	54 (2%)	966 (2%)	164 (3%)	0 (0%)	63 (3%)	0 (0%)	5 (2%)	7 (2%)	1,259 (2%)
City, Mid-Size	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
City, Large	516 (21%)	7,200 (18%)	1,449 (25%)	10 (13%)	538 (28%)	4 (33%)	70 (25%)	317 (78%)	10,104 (20%)
Suburb, Small	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Suburb, Mid-Size	64 (3%)	1,009 (2%)	169 (3%)	0 (0%)	62 (3%)	0 (0%)	12 (4%)	4 (1%)	1,320 (3%)
Suburb, Large	450 (18%)	7,452 (18%)	1,128 (19%)	13 (17%)	384 (20%)	3 (25%)	45 (16%)	23 (6%)	9,498 (18%)
Town, Remote	263 (11%)	3,834 (9%)	456 (8%)	17 (22%)	185 (9%)	0 (0%)	25 (9%)	3 (1%)	4,783 (9%)
Town, Distant	287 (11%)	4,901 (12%)	615 (10%)	9 (12%)	247 (13%)	2 (17%)	36 (13%)	9 (2%)	6,106 (12%)
Town, Fringe	72 (3%)	1,306 (3%)	170 (3%)	2 (3%)	52 (3%)	1 (8%)	11 (4%)	4 (1%)	1,618 (3%)
Rural, Remote	233 (9%)	3,793 (9%)	442 (8%)	8 (10%)	100 (5%)	1 (8%)	22 (8%)	6 (1%)	4,605 (9%)
Rural, Distant	339 (14%)	6,228 (15%)	770 (13%)	13 (17%)	176 (9%)	1 (8%)	31 (11%)	17 (4%)	7,575 (15%)
Rural, Fringe	223 (9%)	3,941 (10%)	524 (9%)	5 (6%)	146 (7%)	0 (0%)	28 (10%)	17 (4%)	4,884 (9%)
TOTAL	2,501 (100%)	40,630 (100%)	5,887 (100%)	77 (100%)	1,953 (100%)	12 (100%)	285 (100%)	407 (100%)	51,752 (100%)

Note. Row percentages are in parentheses. For this year and contrast metric there are 104 missing values. For more details see Appendix A.

Exhibit 22. Counts of Teachers by Consolidated Certification Areas From 2009–10 to 2014–15

Consolidated Certification Area	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Administrative	2,254	2,349	2,351	2,192	2,046	1,856
Pupil Support	835	851	837	766	706	635
Instructional Support	1,745	1,759	1,731	1,598	1,514	1,413
Early Childhood	9,462	9,607	10,128	10,599	10,919	10,983
Elementary	21,714	21,209	21,203	21,213	21,005	20,695
Language Arts	4,742	4,765	4,840	4,947	4,963	4,924
Arts/Music	3,187	3,030	2,946	2,955	2,913	2,860
Social Studies	5,052	4,846	4,768	4,713	4,640	4,430
Foreign Language	1,277	1,202	1,176	1,156	1,138	1,084
Math	5,833	5,803	5,830	5,765	5,652	5,479
Science	2,995	2,896	2,855	2,803	2,703	2,634
Special Education	5,476	5,525	5,594	5,638	5,632	5,630
ELL	390	413	492	578	668	701
Vocational Education	6,090	5,803	5,600	5,351	5,098	4,765
Other	4,279	4,601	4,557	5,042	5,492	5,522
Total Teachers	**42,762**	**41,652**	**41,846**	**42,230**	**42,370**	**42,141**
Total Areas Among Teachers	**75,331**	**74,659**	**74,908**	**75,316**	**75,089**	**73,611**
Number of Areas Per Teacher	**1.76**	**1.79**	**1.79**	**1.78**	**1.77**	**1.75**

Exhibit 23. Counts of Educators by Consolidated Certification Areas From 2009–10 to 2014–15

Certification Area	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Administrative	6,182	6,177	6,198	6,136	5,997	5,765
Pupil Support	3,686	3,556	3,521	3,439	3,332	3,208
Instructional Support	3,450	3,377	3,308	3,181	3,043	2,882
Early Childhood	10,188	10,350	10,926	11,531	11,912	12,003
Elementary	25,495	24,797	24,815	24,944	24,637	24,281
Language Arts	5,796	5,776	5,853	5,991	5,964	5,891
Arts/Music	3,548	3,381	3,273	3,266	3,202	3,152
Social Studies	6,612	6,297	6,182	6,164	6,043	5,750
Foreign Language	1,494	1,414	1,373	1,364	1,325	1,271
Math	6,838	6,768	6,848	6,817	6,705	6,512
Science	3,610	3,488	3,449	3,406	3,282	3,210
Special Education	7,750	7,598	7,664	7,714	7,678	7,644
ELL	459	500	584	680	786	820
Vocational Education	7,958	7,537	7,284	7,015	6,667	6,247
Other	5,628	5,940	5,916	6,541	7,046	7,041
Total Educators	**52,554**	**51,004**	**51,222**	**51,872**	**51,856**	**51,543**
Total Areas Among Educators	**98,694**	**96,956**	**97,194**	**98,189**	**97,619**	**95,677**
Number of Areas Per Educator	**1.88**	**1.90**	**1.90**	**1.89**	**1.88**	**1.86**

Exhibit 24. Counts of Educators by Consolidated Certification Areas Among All Those in the Reserve Pool From 2009–10 to 2014–15

Certification Area	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Administrative	3,150	3,283	3,321	3,484	3,587	3,657
Pupil Support	2,398	2,537	2,577	2,696	2,808	2,793
Instructional Support	1,566	1,689	1,683	1,735	1,765	1,793
Early Childhood	3,890	4,438	4,603	4,837	5,180	5,519
Elementary	12,566	13,252	13,423	13,863	14,545	14,781
Language Arts	3,494	3,837	3,841	3,958	4,199	4,278
Arts/Music	2,181	2,269	2,364	2,375	2,468	2,474
Social Studies	4,456	4,645	4,711	4,799	4,868	4,817
Foreign Language	1,117	1,165	1,154	1,192	1,224	1,233
Math	3,260	3,557	3,589	3,787	3,983	4,011
Science	2,387	2,452	2,391	2,478	2,579	2,572
Special Education	3,274	3,578	3,681	3,849	4,129	4,326
ELL	242	318	347	414	481	518
Vocational Education	6,029	6,193	6,162	6,212	6,273	6,179
Other	3,998	4,384	4,447	4,751	5,169	5,345
Total Number of Individuals in the Reserve Pool	**29,670**	**31,508**	**32,315**	**33,512**	**35,223**	**35,835**
Total Areas Among Those in the Reserve Pool	**54,008**	**57,597**	**58,294**	**60,430**	**63,258**	**64,296**
Number of Areas Per Individual in the Reserve Pool	**1.82**	**1.83**	**1.80**	**1.80**	**1.80**	**1.79**

Research Question 5: Trends in the Reserve Pool

Membership in the reserve pool as a share of all individuals with active certifications has risen slightly, from 36 percent in 2009–10 to 41 percent in 2014–15.[42] This rise has been concentrated largely in individuals with nonstandard certification types, particularly alternative and provisional certifications (Exhibit 25). Specifically, nonstandard certifications made up 23.4 percent of the reserve pool in 2009-10 and 25.9 percent in 2014-15, while standard certifications made up 76.5 percent in 2009-10 and 74.1 percent in 2014-15. Since educator preparation program completers are unlikely to have a nonstandard certification, we would not expect them to be driving this growth in the reserve pool. In fact, a previous finding found that the share of recent educator preparation program completers in the reserve pool is shrinking over time (see Employment Outcomes of Preparation Program Completers from Top IHE).

It may be the case that this reflects a preference among employers in the market for those candidates holding standard certifications. In addition, those completing traditional educator preparation programs may have more support in identifying opportunities and securing employment in the public education system. Regardless, policymakers may want to consider strategies that involve partnering with programs offering alternative routes to improve the employment prospects of alternatively certificated individuals in the state's public education system.

Exhibit 25. Total Number of Certifications Held by Pool of Active Educators and Reserve Pool From 2009-10 to 2014-15

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Effective Supply	52,554 (64%)	51,004 (62%)	51,222 (61%)	51,872 (61%)	51,856 (60%)	51,543 (59%)
Reserve Pool - Overall	29,670 (36%)	31,508 (38%)	32,315 (39%)	33,512 (39%)	35,223 (40%)	35,835 (41%)
Reserve Pool - Standard	22,709 (28%)	23,347 (28%)	23,946 (29%)	24,691 (29%)	25,508 (29%)	26,570 (30%)
Reserve Pool - Nonstandard Overall	6,961 (8%)	8,161 (10%)	8,369 (10%)	8,821 (10%)	9,715 (11%)	9,265 (11%)
Reserve Pool - Alternative	3,190 (4%)	3,885 (5%)	4,228 (5%)	4,344 (5%)	4,639 (5%)	4,480 (5%)
Reserve Pool - Emergency	1 (0%)	1 (0%)	0 (0%)	3 (0%)	5 (0%)	74 (0%)
Reserve Pool - Provisional	1,070 (1%)	1,071 (1%)	1,198 (1%)	1,564 (2%)	2,088 (2%)	2,284 (3%)
Reserve Pool - Other Nonstandard	2,700 (3%)	3,204 (4%)	2,943 (4%)	2,910 (3%)	2,983 (3%)	2,427 (3%)

Note. Column percentages are in parentheses.

Among educators in the reserve pool, the most common areas of certification in 2014–15 were elementary, vocational education, and early childhood. This is different from 2009–10, when the most common areas were elementary, vocational education, and social studies. Similar to our earlier finding (see Outcomes of Education Preparation Program Completers for top Major Fields of Study), the change in the third most prevalent reserve pool certification area from social studies to early childhood may correspond with changes in the relative supply and demand for

[42] We defined the term reserve pool in this context and throughout the report as the pool of individuals who have an active certification but who do not hold a position in the public education system in a given year.

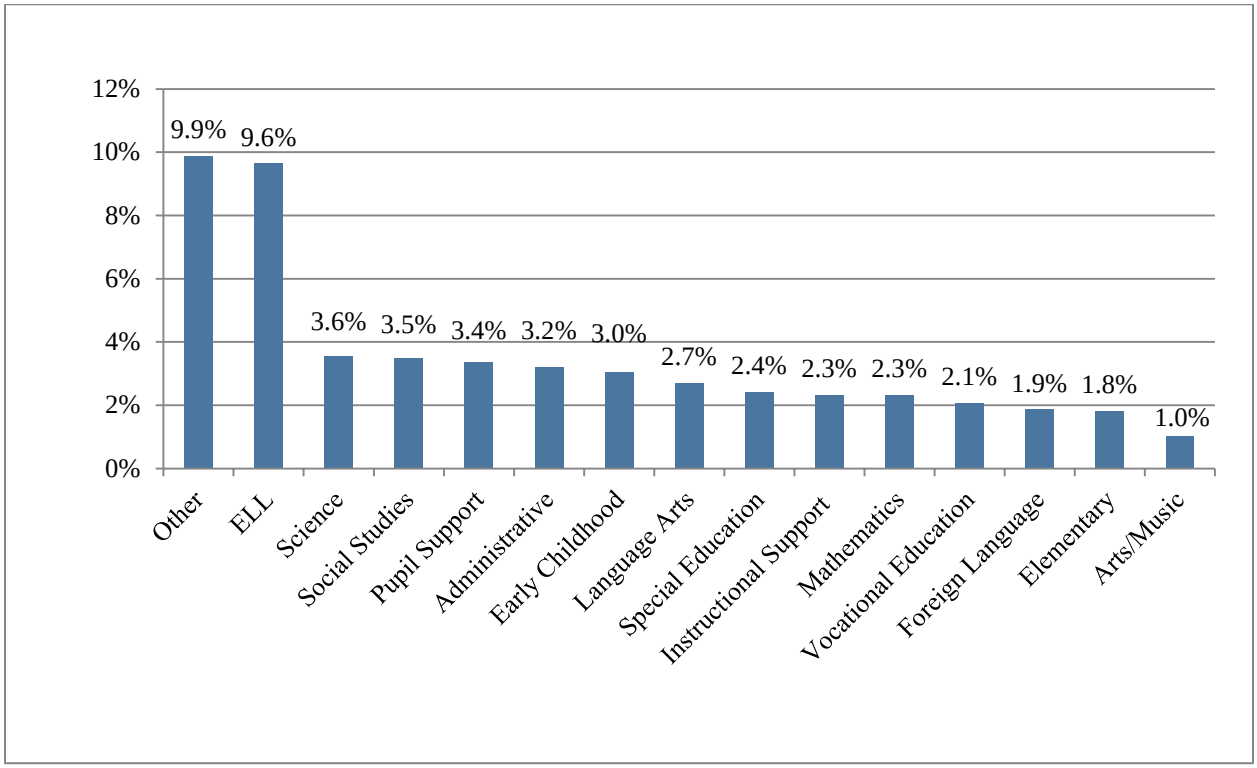
individuals prepared to teach in these respective areas, which policymakers may want investigated further.

Research Question 6: Add-On Certification Areas

An analysis of add-on certification areas may provide policymakers with additional information about what subjects or roles educators are adding to their portfolio. When considering the two most recent certifications for educators with a certification effective after January 1, 2004, we found that only a small percentage of educators added on one or more certification areas from one certificate period to the next. In fact, among this population, only about 3 percent of all certification areas were add-ons.

The certificate areas that educators added were quite varied. Specifically, ELL and other[43] certification areas were most common, with about 10 percent of these areas being add-ons. The next most common area was science, and only 3.6 percent of these areas were add-ons (Exhibit 26).

Exhibit 26. Percentage of Educators With Add-On Certification Areas



Research Question 7: Certification-Area Projections

Projections of numbers of educators in different certification areas may offer policymakers a preview of whether the pool of educators in various areas will meet demand. It is important to

[43] The other certification area category includes such areas as yearbook and journalism. A list of all consolidated variables and the corresponding components is included in Appendix C.

note that this does not mean these individuals are *available* to fill these positions, but just that they have the necessary certification area. While we calculated projections for all certification areas, we have chosen to focus on the three areas with the largest projected changes.

We found some variation in the number of educators projected to obtain certificates in different areas between 2015–16 and 2019–20. But the annual count for most areas was not expected to change by more than 3 percent from year to year. Based on historical trends, the number of employed educators with certification areas in ELL, foreign language, instructional support, and vocational education showed the largest projected changes. Specifically, we project that the number of educators with an ELL certification area will grow at an average rate of 8.4 percent per year (Exhibit 27). From 2014–15 to 2019–20, we project the annual count in this area will grow about 50 percent, or from 820 to 1,229. But it is important to keep in mind that relatively few educators historically have had this certification area and therefore the total projected counts remain relatively low.[44]

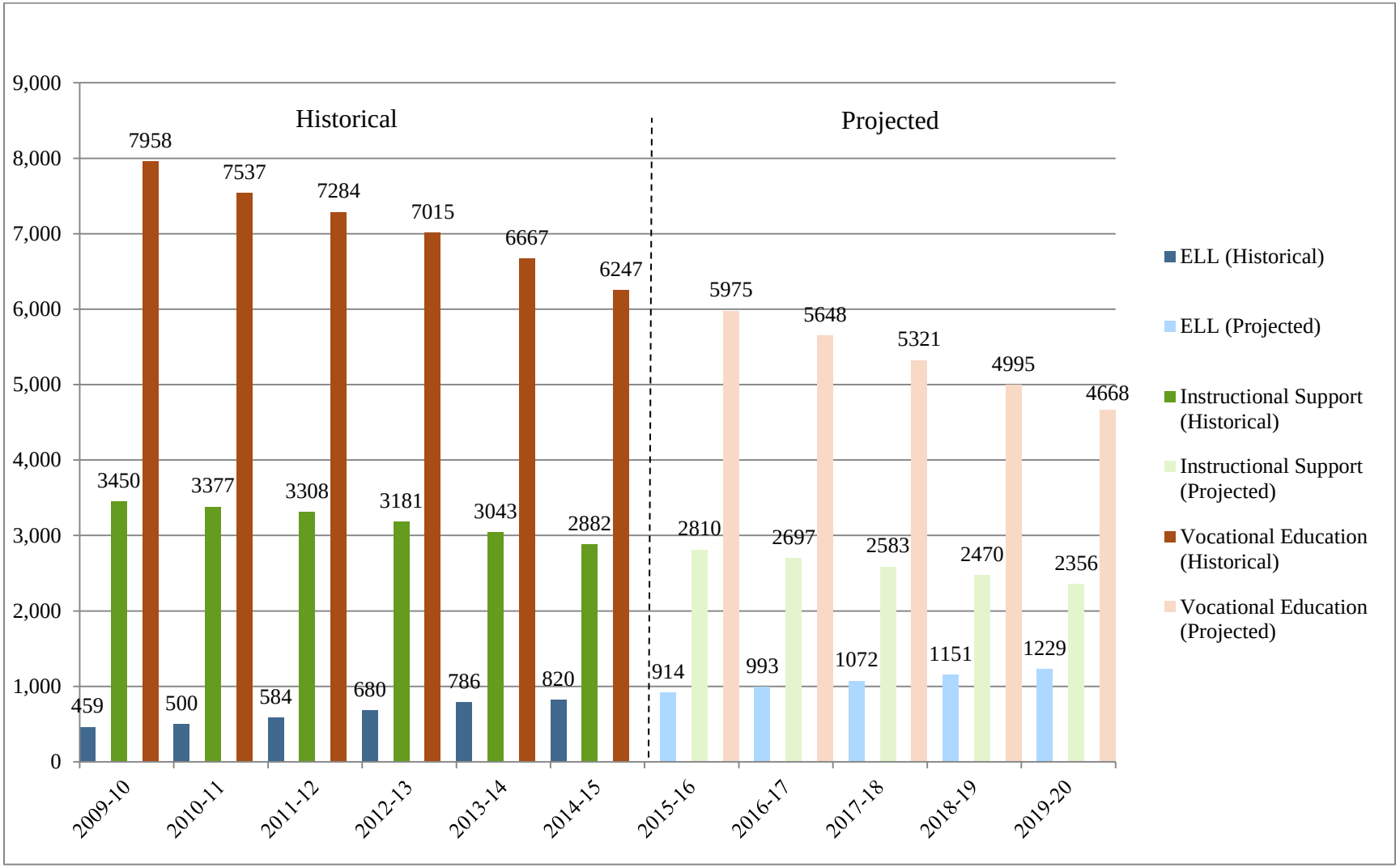
In contrast, we project that the number of educators with instructional support or vocational education certification areas will shrink on average by 3.9 and 5.7 percent per year, respectively. For the whole period from 2014–15 to 2019–20, this equates to an overall decrease in the projected counts of 18.2 percent (from 2,882 to 2,470) for instructional support and 25.3 percent (from 6,247 to 4,668) for vocational education.

The large projected change in educators with an ELL certification area may be encouraging if the need for these educators is not being met. It remains to be seen whether this increase is enough to satisfy existing demand. Unfortunately, we were not able to answer this question directly using the primary positions in this study.[45] However, policymakers may want to further investigate it in the future. The fact that there has been a consistent decline in the number of educators certified to teach foreign language might also be a cause for concern. Here, we were able to compare supply and demand of foreign language instructors (for whom certification in this area is important) and find there to be a projected statewide shortage in high school foreign language teachers (see Exhibit 45). Policymakers may want to consider ways to increase the number of teachers certified in foreign languages.

[44] It also is important to keep in mind that areas with smaller numbers of historical counts are more susceptible to projection error.

[45] The primary positions used here were based on the categories included in the 2002 study (Data and Decision Analysis, Inc, 2002), which did not include ELL.

Exhibit 27. Historical and Projected Numbers of Educators in ELL, Instructional Support, and Vocational Education Certification Areas From 2009–10 to 2019–20



Analysis 3: Trends in Educator Mobility

In Analysis 3, the research team analyzed trends in educator mobility overall and for various subpopulations. We also examined mobility trends before and after the moratorium on the Oklahoma Teacher Residency Program.

For Research Question 8, we considered overall trends in educator mobility, including trends by primary position from 2006–07 to 2014–15. This analysis relies on the mobility categories outlined in the Data Methods section of this report.[46] Exhibit 28 displays the trends among new educators and leavers for all positions. We conducted separate analyses for mobility trends among teachers. In addition, we compared trends in stayers and movers (including all three mover categories; see Exhibit 29). All data underlying these findings can be accessed using the *Mobility Interactive Tables and Charts* file.

To address Research Question 9, we examined disaggregated mobility trends, including trends by gender, race, region, age, student populations, locale, and school size. This section reports on select findings from this analysis. Specifically, we report findings by region (Exhibit 30). We also compared trends before and after the Teacher Residency Program moratorium in 2010–11 (Exhibit 31). All data underlying these findings can be accessed using the *Mobility Interactive Tables and Charts* file.

Research Question 8: Overall Mobility Trends

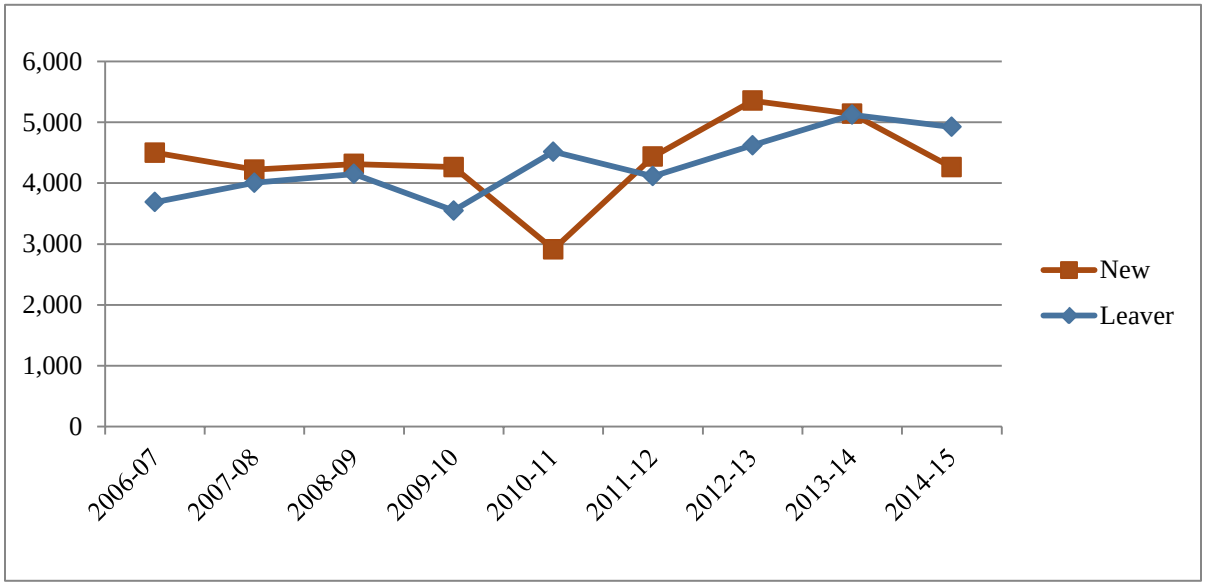
New Versus Leaving Educators

Comparing the trends in educators leaving the state public education system to those newly entering the system is one way to gauge whether enough new educators are being hired to replace those leaving. It is possible that a decrease in demand or a change in policy (i.e., raising pupil-educator ratios) may make it unnecessary for this replacement to occur. But we have seen no information to suggest such a change in policy. In addition, these statewide trends are likely to be different within specific regions and especially specific districts.

From 2006–07 to 2014–15, the proportion of all educators leaving the state public education system annually has increased by 2 percent. During the same period, the proportion of new educators entering the education system sharply decreased (from 2009–10 to 2010–11), and then gradually increased thereafter. Despite this gradual increase in the number of new educators, it has not been enough to offset the number of leavers. Specifically, Exhibit 28 shows that in 2010–11 only 2,912 new educators entered the education system, compared to 4,516 educators leaving. Moreover, the most recent year (2014–15) marked another deficit of 661 fewer new educators than leavers. While in the four years following 2010-11, more new educators have entered the education system than have left, but this has not been enough to make up for the deficit created in that year and in 2014-15.

[46] These include leavers; new; stayers; movers: different district and different position; movers: same district but different position; and movers: different district but same position. A full description of these categories can be found in the Constructed Metrics section of this report in Data Preparation.

Exhibit 28. Count of New and Leaving Educators From 2006–07 to 2014–15



For Teachers. We also found similar trends of leavers versus new educators for teachers only. But the increase in new teachers from 2011–12 to 2014–15 appears to have filled the gap created by the drop in 2010–11. Specifically, the drop in new teachers and the increase in those departing in 2010–11 left a net gap of 1,128 teachers. During the four years that followed, Oklahoma has had a net gain of 1,899 teachers, overcoming the statewide gap of 1,128. But it would be incorrect to conclude that gaps across all areas of the state were closed; this is an analysis in the aggregate and makes no assumption that the gap and the subsequent gains in teachers were identically distributed across the state.

Looking at trends by primary position between 2011–12 and 2014–15, the results suggest that instructors of high school foreign language, mathematics and science were leaving at greater rates than new educators were entering the public education system. For example, on average there were 8 percent more leavers than new educators in high school science during this time period, and more of these types of teachers left than entered in all but one year (2012–13).

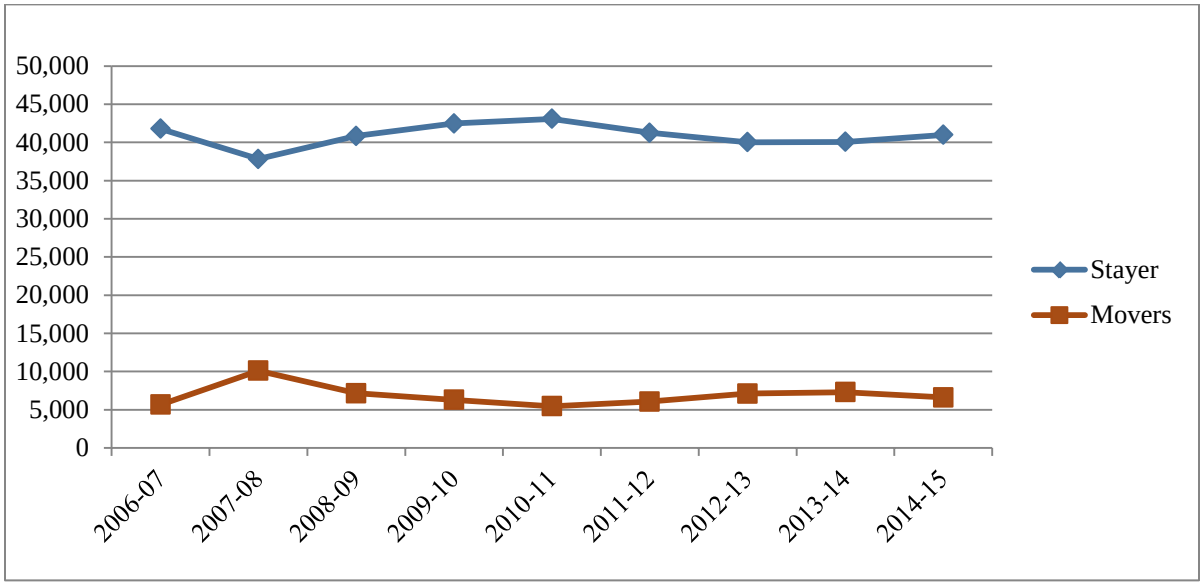
Stayers Versus Movers

We performed a similar analysis comparing educators who stay in their primary position and district to those who change either one or both of these. This is one way for policymakers to assess the overall level of mobility statewide and may contribute to a better general understanding of the stability of educator staffing from district to district.

When comparing those educators staying in the same primary position and same district from year to year (stayers) to those educators changing either position, district, or both (movers), we found that in general between 2006–07 and 2014–15 the profiles for the two groups mirrored each other. Specifically, there was a shock between 2006-07 and 2007-08 in which stayers decreased by 3,965 educators (9.5 percent) and movers increased by 4,460 educators (78.9 percent). Following the shock, these two categories gradually returned to pre-shock levels around

2010-11 and remained relatively constant thereafter. Exhibit 29 displays the number of educators in these categories over this time period.

Exhibit 29. Count of Staying and Moving Educators From 2006–07 to 2014–15



The trends observed suggest that, aside from the 2007-08 shock, statewide mobility was relatively stable with cycles of moderate fluctuation. Clearly, policymakers might want to investigate the cause of the shock observed in 2007-08 and consider how future shocks might best be avoided.

Research Question 9: Disaggregated Mobility Trends

Region

Given that a statewide gap between new and leaving educators was created in 2010–11 and has persisted through to the present, it may be helpful to consider whether or not gaps were apparent in each region of the state and how large these may have been.

Our analysis indicated that the gap between new teachers and leavers occurring in 2010–11 seems to have affected the central region the least. The majority of the 1,899 new teachers (1,311 or 69 percent) who entered the profession statewide from 2011–12 to 2014–15 were in the central region, and as a result this region was able to overcome the gap created in 2010–11. But three of the other five regions have been unable overcome the gap created in 2010-11. For the southwest region, this remaining gap is particularly stark, estimated to be 211 teachers over the five-year period. Exhibit 30 displays data on the calculated gap for each region based on the sum of the gap created by the initial shock in 2010–11 and the sum of the gaps in the years that followed (the difference between the total number of new and leavers between 2011–12 and 2014–15). Note that the gaps are defined such that negative numbers indicate there were more leavers than new teachers, while positive numbers denote the opposite.

Exhibit 30. Overall Gap Between New and Leaving Teachers by Region From 2010–11 to 2014-15

Region	2011 Gap	Total New (2012-2015)	Total Leavers (2012-2015)	2012-2015 Difference (Total New - Total Leavers)	Calculated Overall Gap (2011 Gap + 2012-2015 Difference)
Central	-207	6,631	5,320	1,311	1,104
Northeast	-443	5,310	5,023	287	-156
Northwest	-108	1,617	1,410	207	99
Southwest	-170	1,710	1,751	-41	-211
Southeast	-200	1,644	1,509	135	-65

These findings suggest that some regions, particularly the central region, were better able to recover from the 2010-11 shock than the others. Policymakers may want to further investigate the factors that led to these relative differences in mobility rates in order to inform the development of future strategy to minimize gaps between new and leaving teachers.

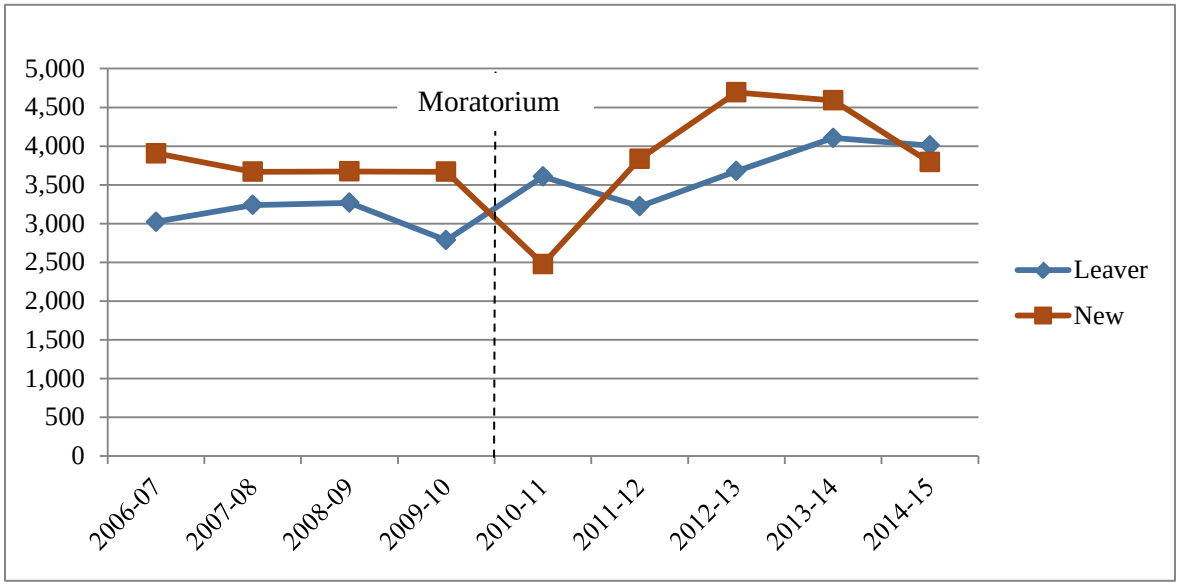
Mobility Before and After the Oklahoma Teacher Residency Program Moratorium

The Oklahoma Teacher Residency Program provided practical support, mentorship, and coaching to new Oklahoma teachers. In 2010, this program was suspended for five years before being recently reinstated.[47]

As we found in our analysis of overall mobility trends, a sharp increase occurred in Oklahoma teachers leaving their positions between 2009-10 and 2010-11, and a corresponding decrease in new teachers occurred during the same time period (Exhibit 31). This period also happens to be the first transition to a new school year in which the Teacher Residency Program was not being implemented because of the moratorium. It would be inappropriate to draw causal conclusions (i.e., that the decrease in new teachers was necessarily *caused* by the program moratorium), but the apparent correlation between the observed shocks and the moratorium may warrant further investigation.

[47] Additional information on this program can be found at http://www.ok.gov/sde/teacher-residency-program.

Exhibit 31. Mobility Trends Before and After the Teacher Residency Program Moratorium



Analysis 4: Future Projections

For Analysis 4, the research team calculated projections in numbers of educator-preparation program completers, student enrollment, educator demand, and educator supply. In addition, we compared demand and supply projections by region and primary position to determine whether any shortages or surpluses are expected.

For Research Question 10, we calculated projected counts of educator-preparation program completers for 2014–15 through 2018–19 based on historical trends in the previous nine years. We calculated these projections using a regression-based model. Additional details on tests we conducted to assess the validity of these projections can be found in Appendix A. This section reports on these projections and their trends over time (Exhibit 32). While the data underlying these findings cannot be directly accessed using the *Interactive Tables and Charts* file, this additional data is available upon request.

For Research Question 11, we calculated student enrollment projections for 2014–15 to 2018–19 based on the previous nine years of historical data. We calculated these projections using a GPR method. Additional details on this method along with the tests we conducted to assess the validity of these projections are described in more detail in Appendix A. This section reports on these projections and their trends over time (Exhibit 33). This section also reports on the average pupil-educator ratios for all primary positions (Exhibit 34) from 2009–10 to 2013–14. Finally, using the enrollment projections and 2013–14 pupil-educator ratios, we created demand projections for 2014–15 through 2018–19. This section reports on select findings from these projections and their trends over time and by region (Exhibits 35 and 36). The data underlying these findings cannot be directly accessed using the *Interactive Tables and Charts* file, with the exception of the demand projections, which can be accessed using the *Supply and Demand Interactive Tables and Charts* file.

For Research Question 12, we calculated supply projections for 2014–15 to 2018–19 based on the five-year average year-over-year relative change in supply. Additional details on the tests we conducted to assess the validity of these projections are discussed in Appendix A. This section reports on select findings from these projections and their trends over time and by region (Exhibits 37 and 38). All data underlying these findings can be accessed using the *Supply and Demand Interactive Tables and Charts* file.

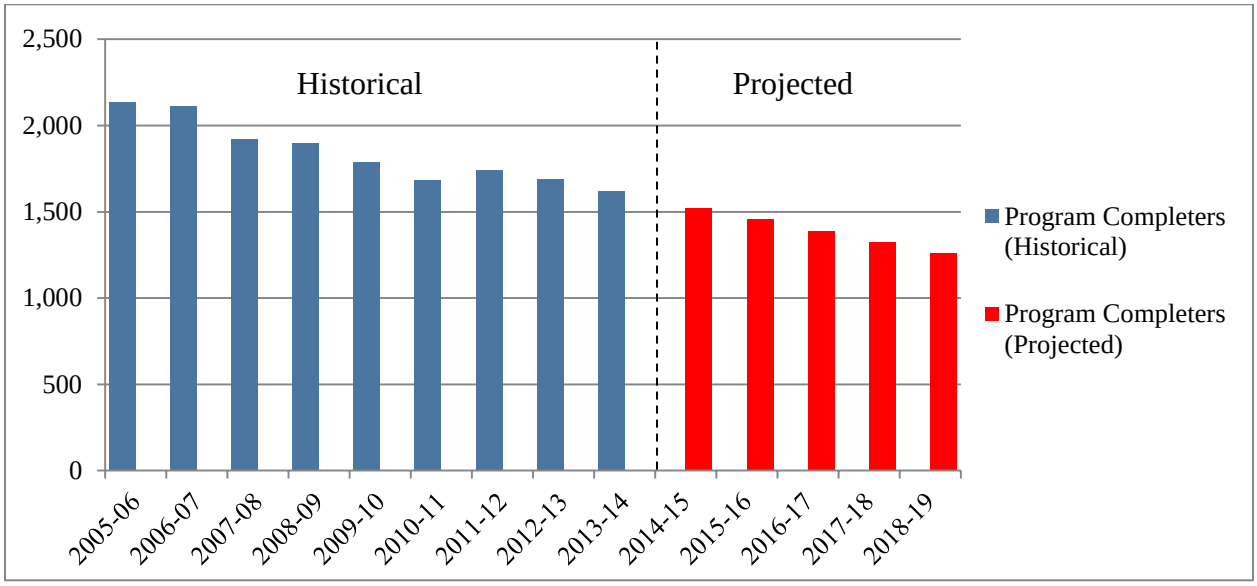
For Research Question 13, we compared the trend in projected educator supply and demand by region and primary position to assess whether shortages or surpluses are expected during the next five years. Specifically, we calculated the relative difference between supply and demand so that a negative difference would reflect a shortage in supply relative to demand. For example, a shortage of -4 percent means that 4 percent of expected demand is unmet by supply. This section reports on this comparison statewide (Exhibit 39), across all regions (Exhibits 40–44), and for particular primary positions (Exhibits 45–49). All data underlying these findings can be accessed using the *Supply and Demand Interactive Tables and Charts* file.

Research Question 10: Program-Completer Projections

Overall Trends and Projections of the Number of Oklahoma Program Completers

Based on historical trends in the number of individuals completing an educator-preparation program in Oklahoma, we expect the number of program completers to continue to decline during the next five years. Specifically, this number declined 24 percent between 2005-06 and 2013-14 (Exhibit 32). If this trend continues, we project that it will further decline 22 percent between 2013-14 and 2018-19.

Exhibit 32. Trends in Historical and Projected Oklahoma Educator-Preparation Program Completers From 2005-06 to 2018-19



The downward trend in the number of program completers may be a concern for those interested in addressing shortages by recruiting educators entering through the traditional educator-preparation program component of the pipeline. Policymakers may want to develop policies that help IHEs recruit and retain educator candidates. In addition, by partnering with IHEs, policymakers may learn more about effective strategies for candidate recruitment and retention.

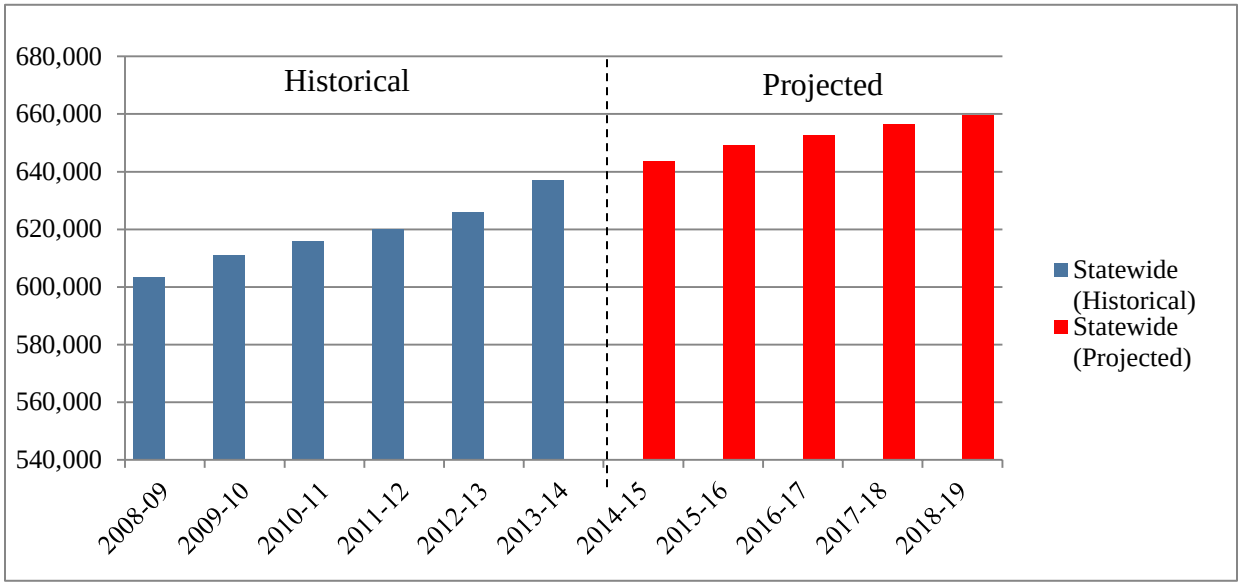
Research Question 11: Demand Projections

Enrollment Projections

Projections in student enrollment offer policymakers a glimpse of the future trends in the demand for educators in Oklahoma. Shifts in population and rates at which students enter the state's public education system and progress from grade to grade may not be easily affected by changes in policy. But having an understanding of how these factors affect educator demand may allow policymakers to create policies in advance that will support a workforce that is sufficient to serve future inflows of students into the state's public education system.

Exhibit 33 displays historical and projected enrollment statewide from 2009–10 to 2018–19. As shown in the chart, we project statewide enrollment will increase at a declining rate over the period. Specifically, we project it to grow by 1 percent each year on average, but we expect year-over-year growth to slow down from 1.1 percent in 2014–15 to 0.5 percent in 2018–19.

Exhibit 33. Trends in Historical and Projected Statewide Enrollment from 2009-10 to 2018-19



The overall trend of increasing student enrollment suggests that the statewide demand for educators is likely going to continue to increase. While policies related to pupil-educator ratios can affect demand somewhat, increasing enrollments ultimately will likely require corresponding increases in educator supply to avoid shortages.

Trends in Pupil-Educator Ratios

It is important to consider trends in pupil-educator ratios before we report demand projections. These ratios represent an average for each primary position based on historical enrollments and staff counts.

Exhibit 34 shows the average pupil-educator ratios for each of the primary positions across the state. From 2009–10 to 2013–14, pupil-educator ratios in each of the reported primary positions generally have increased, growing on average about 8.1 percent during this time period. The primary positions with the largest absolute relative changes in pupil-educator ratios include educators in other positons (growing 33.5 percent); charter teachers (growing 16.6 percent); librarians (growing 13.7 percent); and high school social studies teachers (growing 11.7 percent).

Exhibit 34. Average Pupil-Educator Ratios Across Primary Positions From 2009–10 to 2013–14

Staffing Category	Year				
	2009-10	*2010-11*	*2011-12*	*2012-13*	*2013-14*
District-wide Staff	323.4	354.3	358.9	330.0	335.7
Administrative	244.7	249.6	250.3	245.1	241.5
Guidance Counselor	364.7	384.7	382.0	385.1	390.4
Librarians	516.9	558.3	580.3	580.7	587.9
Other Professional Staff	753.8	728.5	779.4	777.1	821.1
Elementary	13.0	13.4	13.4	13.3	13.4
Middle School - Language Arts	82.0	86.7	85.6	88.2	88.9
Middle School - Arts & Music	262.4	265.0	270.3	281.2	268.9
Middle School - Social Studies	132.7	141.0	146.0	144.6	142.7
Middle School - Foreign Language	1,150.9	1,157.6	1,265.4	1,417.6	1,062.9
Middle School - Math	113.4	118.1	120.9	117.5	122.3
Middle School - Science	141.0	143.4	147.0	147.7	152.0
Middle School - Vocational Education	1,025.4	1,007.6	1,112.0	1,081.3	1,132.4
Middle School - Other	154.5	165.9	174.5	171.3	169.1
High School - Language Arts	76.7	79.7	80.0	80.8	81.9
High School - Arts & Music	202.8	213.3	219.2	217.3	221.6
High School - Social Studies	90.4	94.3	95.3	96.6	101.0
High School - Foreign Language	351.7	361.7	367.7	379.7	386.0
High School - Math	90.2	91.9	90.0	92.9	94.5
High School - Science	103.1	107.6	108.0	110.5	112.2
High School - Vocational Education	165.1	165.9	177.4	176.5	177.5
High School - Other	77.9	79.9	79.3	78.8	80.3
Charter	16.9	17.8	17.5	18.9	19.7
Other Positions	419.4	455.5	484.4	483.3	560.1

The fact that ratios generally are increasing might suggest that educators across positions are being asked to serve an increasing number of students, which could have implications for overall educator quality and turnover rates. This might be something for policymakers to consider if they are contemplating policy changes affecting pupil-educator ratios.

Demand Trends

Using projected enrollments and pupil-educator ratios in 2013–14, the research team calculated demand projections by region for each primary position. These projections represent an estimate of how demand for educators will change during the next five years and can inform any discussion of potential shortages or surpluses.

Exhibit 35 displays historical and projected demand statewide from 2009–10 to 2018–19, and Exhibit 36 displays this by region. In general, we expect overall statewide educator demand to

increase gradually over the period from 2014-15 to 2018-19, but at a decreasing rate. Specifically, we expect it to grow an average of 0.5 percent statewide between 2014–15 and 2018–19, but we expect year-over-year growth to increase in the first two years (2014–15 and 2015–16) and then decline from 0.8 percent in 2015–16 to 0.4 percent in 2018–19.

Exhibit 35. Statewide Demand Projections for All Educators

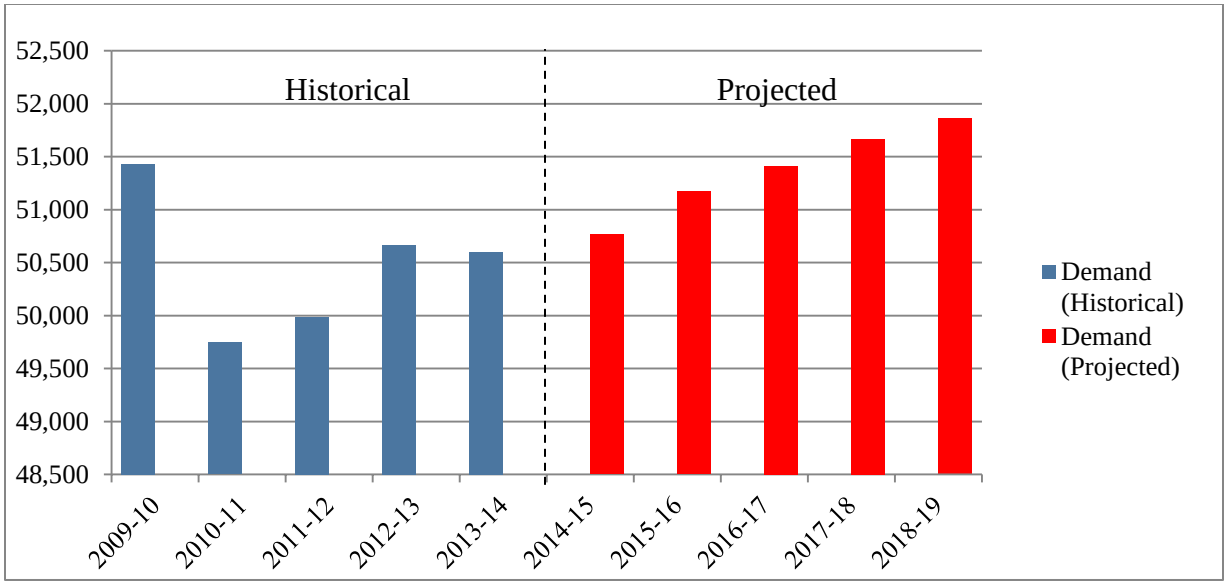


Exhibit 36. Trends in Historical and Projected Demand by Region

Year	Northwest	Northeast	Southwest	Southeast	Central	Total
2010	4,495 (0.0%)	18,063 (0.0%)	6,293 (0.0%)	6,338 (0.0%)	16,239 (0.0%)	51,428 (0.0%)
2011	4,380 (-2.6%)	17,356 (-3.9%)	6,072 (-3.5%)	6,040 (-4.7%)	15,898 (-2.1%)	49,746 (-3.3%)
2012	4,324 (-1.3%)	17,286 (-0.4%)	6,021 (-0.8%)	6,047 (0.1%)	16,313 (2.6%)	49,991 (0.5%)
2013	4,442 (2.7%)	17,445 (0.9%)	5,989 (-0.5%)	6,115 (1.1%)	16,673 (2.2%)	50,664 (1.3%)
2014	4,457 (0.3%)	17,383 (-0.4%)	5,985 (-0.1%)	6,041 (-1.2%)	16,730 (0.3%)	50,596 (-0.1%)
2015	4,550 (2.1%)	17,407 (0.1%)	5,975 (-0.2%)	6,024 (-0.3%)	16,811 (0.5%)	50,767 (0.3%)
2016	4,617 (1.5%)	17,465 (0.3%)	5,992 (0.3%)	6,058 (0.6%)	17,038 (1.4%)	51,170 (0.8%)
2017	4,674 (1.2%)	17,455 (-0.1%)	5,992 (0.0%)	6,073 (0.2%)	17,215 (1.0%)	51,409 (0.5%)
2018	4,745 (1.5%)	17,467 (0.1%)	6,005 (0.2%)	6,071 (0.0%)	17,382 (1.0%)	51,670 (0.5%)
2019	4,807 (1.3%)	17,445 (-0.1%)	6,018 (0.2%)	6,067 (-0.1%)	17,526 (0.8%)	51,863 (0.4%)

Note. Relative year-to-year changes are in parentheses.

In sum, our demand projections of educators statewide are similar to our enrollment projections as one might expect. As can be seen from the findings, however, the picture is more complex when considered by region. Moreover, by comparing the demand projections with corresponding supply projections (as we do in Research Question 13) policymakers can get a better understanding of the regions and positions for which potential shortages or surpluses might occur over the next five years.

Research Question 12: Supply Projections

Before future shortages or surpluses can be identified, one needs to have projections of future supply. Using a five-year average year-over-year relative change, the research team calculated supply projections by region for each primary position. Analysis of these projections will inform any discussion of potential shortages or surpluses.

Exhibit 37 shows that we project statewide supply of educators to increase gradually in future years (i.e. from 2014-15 to 2018-19). But we project supply fluctuations, including both increases and decreases, for the different regions of the state. Exhibit 38 shows that although we project supply in the northwest and central regions to increase, we expect the southwest and southeast regions to experience slight declines in supply over time. In addition, we expect the northeast region to have a decrease in supply from 2014–15 to 2016–17 that levels out in 2017–18 and increases slightly in 2018–19

Exhibit 37. Statewide Supply Projections for All Educators

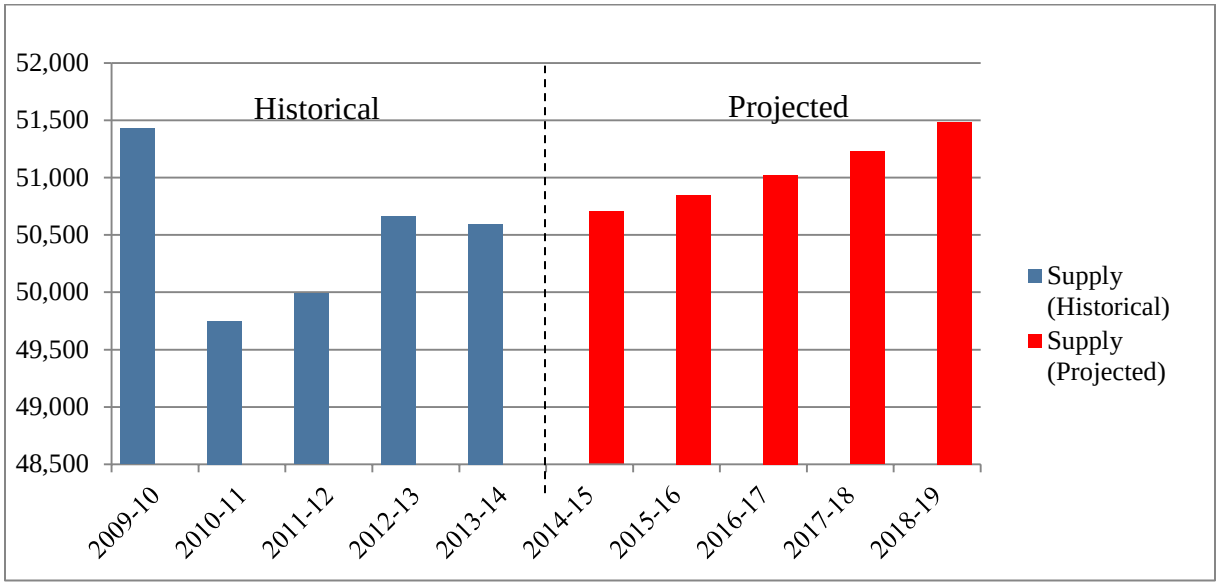


Exhibit 38. Trends in Historical and Projected Supply by Region

Year	Northwest	Northeast	Southwest	Southeast	Central	Total
2009-10	4,495 (0.0%)	18,063 (0.0%)	6,293 (0.0%)	6,338 (0.0%)	16,239 (0.0%)	51,428 (0.0%)
2010-11	4,380 (-2.6%)	17,356 (-3.9%)	6,072 (-3.5%)	6,040 (-4.7%)	15,898 (-2.1%)	49,746 (-3.3%)
2011-12	4,324 (-1.3%)	17,286 (-0.4%)	6,021 (-0.8%)	6,047 (0.1%)	16,313 (2.6%)	49,991 (0.5%)
2012-13	4,442 (2.7%)	17,445 (0.9%)	5,989 (-0.5%)	6,115 (1.1%)	16,673 (2.2%)	50,664 (1.3%)
2013-14	4,457 (0.3%)	17,383 (-0.4%)	5,985 (-0.1%)	6,041 (-1.2%)	16,730 (0.3%)	50,596 (-0.1%)
2014-15	4,476 (0.4%)	17,335 (-0.3%)	5,953 (-0.5%)	6,011 (-0.5%)	16,933 (1.2%)	50,708 (0.2%)
2015-16	4,497 (0.5%)	17,300 (-0.2%)	5,925 (-0.5%)	5,982 (-0.5%)	17,144 (1.2%)	50,848 (0.3%)
2016-17	4,521 (0.5%)	17,280 (-0.1%)	5,902 (-0.4%)	5,956 (-0.4%)	17,364 (1.3%)	51,023 (0.3%)
2017-18	4,546 (0.6%)	17,277 (0.0%)	5,884 (-0.3%)	5,931 (-0.4%)	17,592 (1.3%)	51,230 (0.4%)
2018-19	4,574 (0.6%)	17,297 (0.1%)	5,873 (-0.2%)	5,909 (-0.4%)	17,829 (1.3%)	51,482 (0.5%)

Note. Relative year-to-year changes are in parentheses.

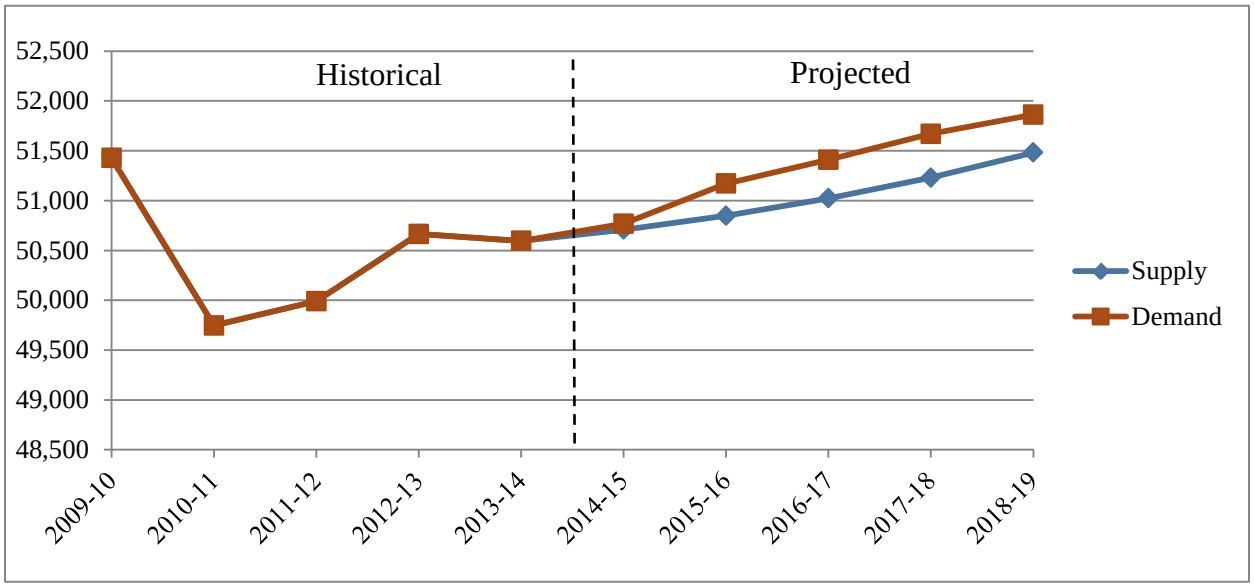
The fact that we also project supply to increase statewide may be encouraging to policymakers. As can be seen from the findings when these projections are examined for particular regions and primary positions, however, the picture becomes more complex. The main question is whether or not supply in each position and each region is growing fast enough to meet the projected growing demand. Research Question 13 offers findings that may help policymakers answer this question.

Research Question 13: Comparing Supply and Demand

Overall Trends: Supply Versus Demand

We expect overall educator supply to increase quite gradually over the next five years, growing an average of 0.34 percent each year during the projection period. We project that overall educator demand will increase an average of 0.5 percent per year, but at a decreasing rate, and therefore we expect it to level off. But all year-over-year increases in demand are larger than corresponding projected increases in supply, with an average statewide annual relative shortage of 0.62 percent.

Exhibit 39. Trends in Historical and Projected Aggregate Supply and Demand of Educators



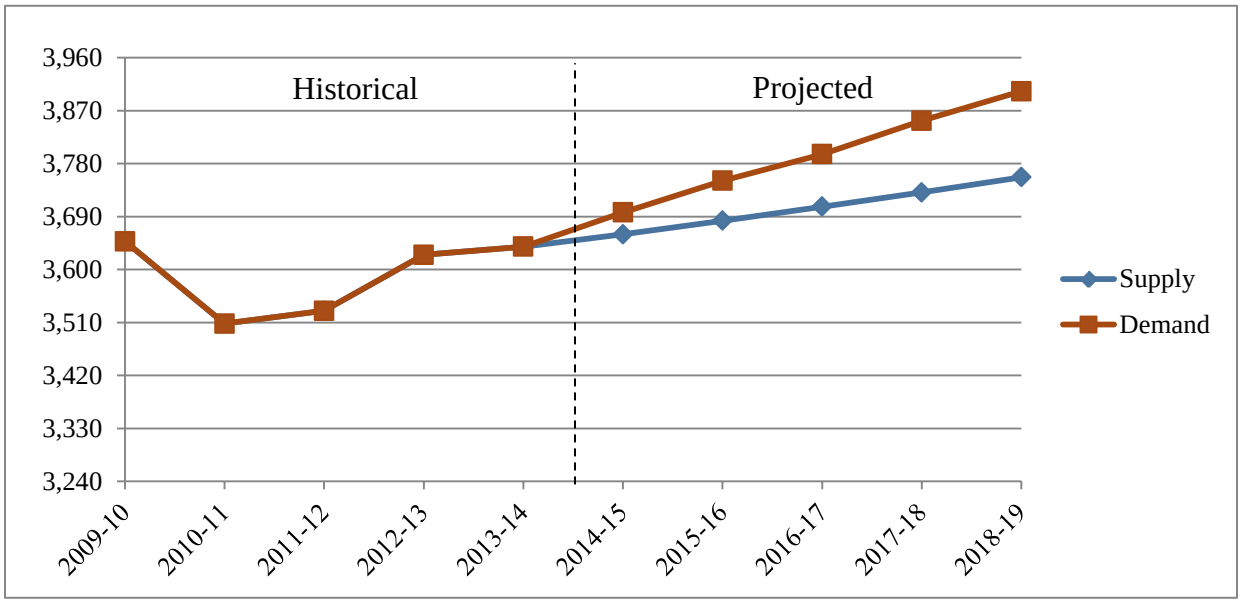
Disaggregated Trends in Teacher Supply and Demand

The observed statewide trend may not be consistent across regions. In fact, we found the analysis results varied when we considered each region separately. As teachers make up a largest share of the educator workforce we chose to focus on them in particular for the analysis of these trends across regions.

Northwest

In the northwest region of the state, we project demand will increase at a higher rate than supply, creating a gradually widening gap starting in 2014–15 (Exhibit 40). Specifically, in 2014–15 we expect a 1 percent gap, which is projected to grow to 3.7 percent in 2018–19.

Exhibit 40. Trends in Historical and Projected Teacher Supply and Demand in the Northwest Region

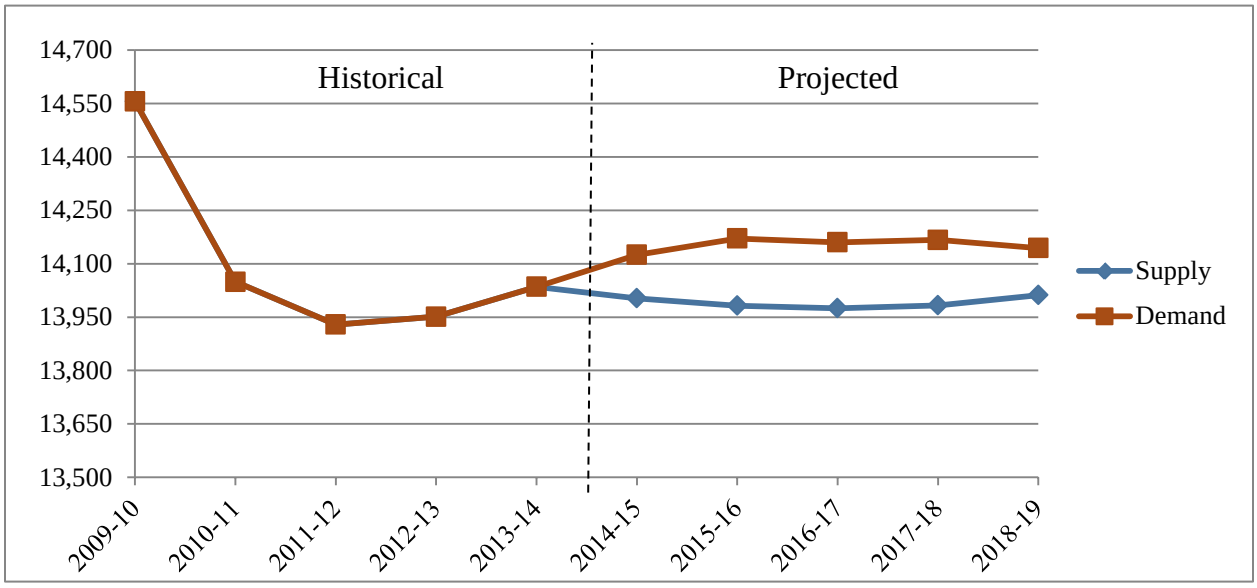


The projected shortage for the northwest, and the fact that it is growing, might suggest that this region will need additional support recruiting educators. Policymakers may want to consider partnering with districts in this region to support strategies to expand their recruitment from local IHEs and draw from the reserve pool, and thereby increase supply in future years. In addition, through these partnerships, policymakers might gather additional information that can put this finding into context.

Northeast

Exhibit 41 shows that we project a slight decline in supply in the northeast region over the next three years and increase back to its 2014–15 level by 2018–19. We project that demand will increase in the next two years and then level off until it experiences a slight decline in 2018–19. We expect these trends will lead to shortages of about 0.9 percent in 2014–15, 1.3 percent in 2015–16 through 2017–18, and then back to 0.9 percent in 2018–19.

Exhibit 41. Trends in Historic and Projected Teacher Supply and Demand in the Northeast Region

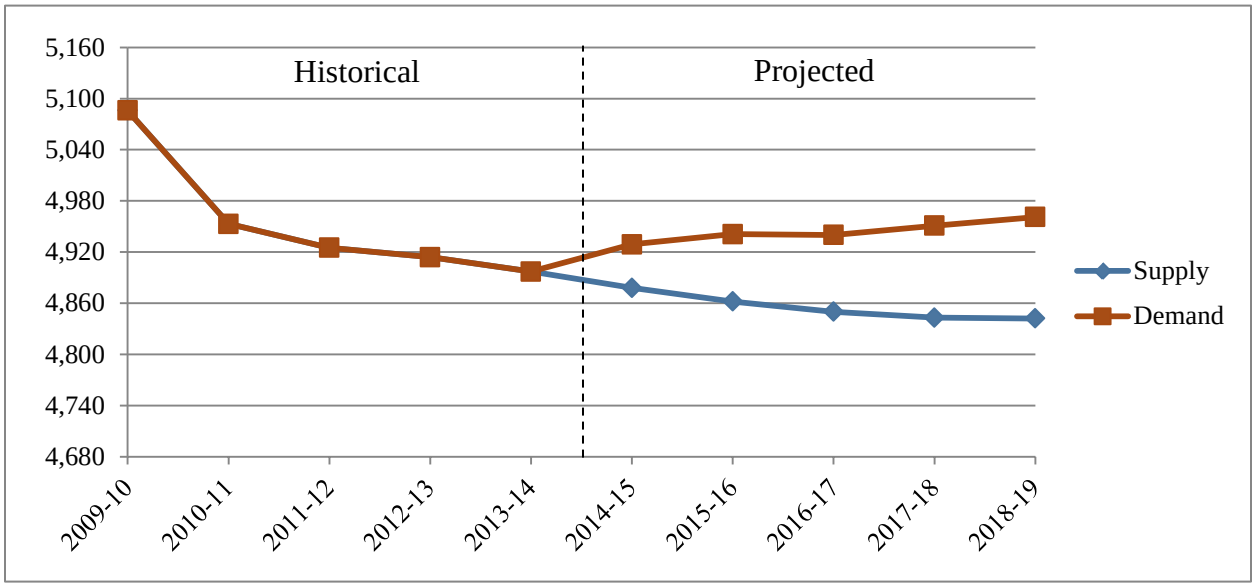


Although we project a shortage in this region, findings suggest that it may shrink in the future. Specifically, from 2017-18 to 2018-19 supply has increased, while over the same time period demand leveled off and declined in the most recent year. On the other hand, given the fluctuation in the projected years the trends in later years shrinking the expected gap may not persist.

Southwest

In the southwest region, we project that supply will decline over the five-year period, while we expect demand to increase (Exhibit 42). We project that this will result in a slowly widening gap. Specifically, in 2014–15 we expect a 1.0 percent gap between demand and supply, which will grow to 2.4 percent in 2018–19.

Exhibit 42. Trends in Historical and Projected Teacher Supply and Demand in the Southwest Region

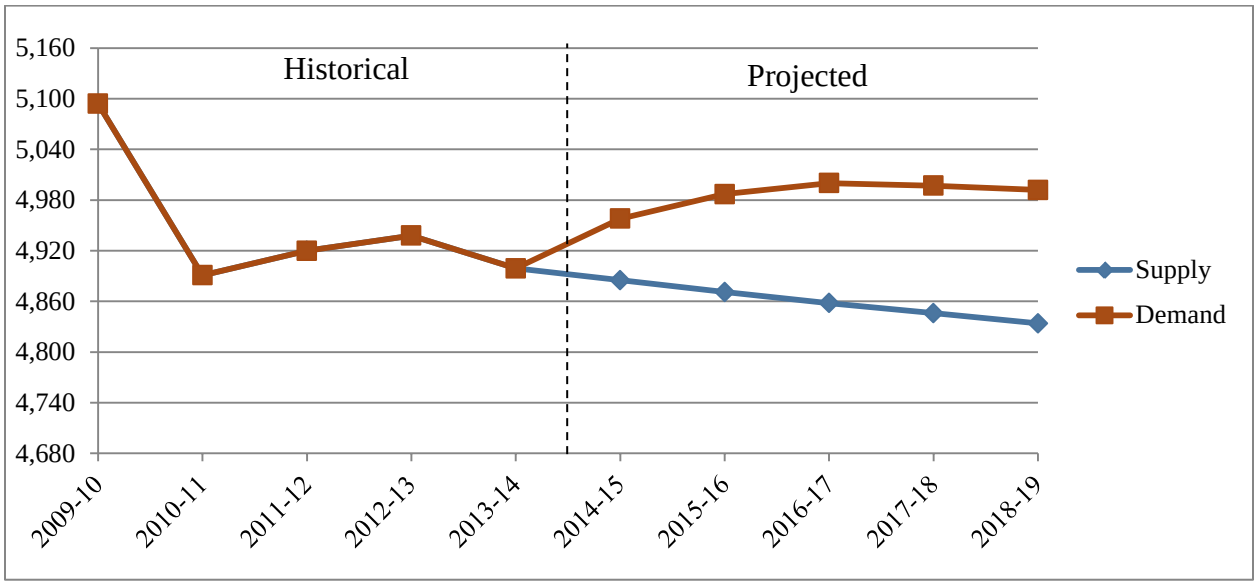


Here, as in the northwest region, we project a regional shortage that we expect will grow over time. This might suggest that this region also will need additional support with recruiting and retaining educators. Policymakers also might want to consider partnering with districts in this region to develop strategies to address this shortage.

Southeast

In the southeast region, we project that supply will decline at a relatively constant rate, while we project demand will increase over time, resulting in a slowly widening gap (Exhibit 43). Specifically, in 2014–15 we expect a 1.5 percent gap that will grow to 3.2 percent in 2018–19.

Exhibit 43. Trends in Historic and Projected Teacher Supply and Demand in the Southeast Region

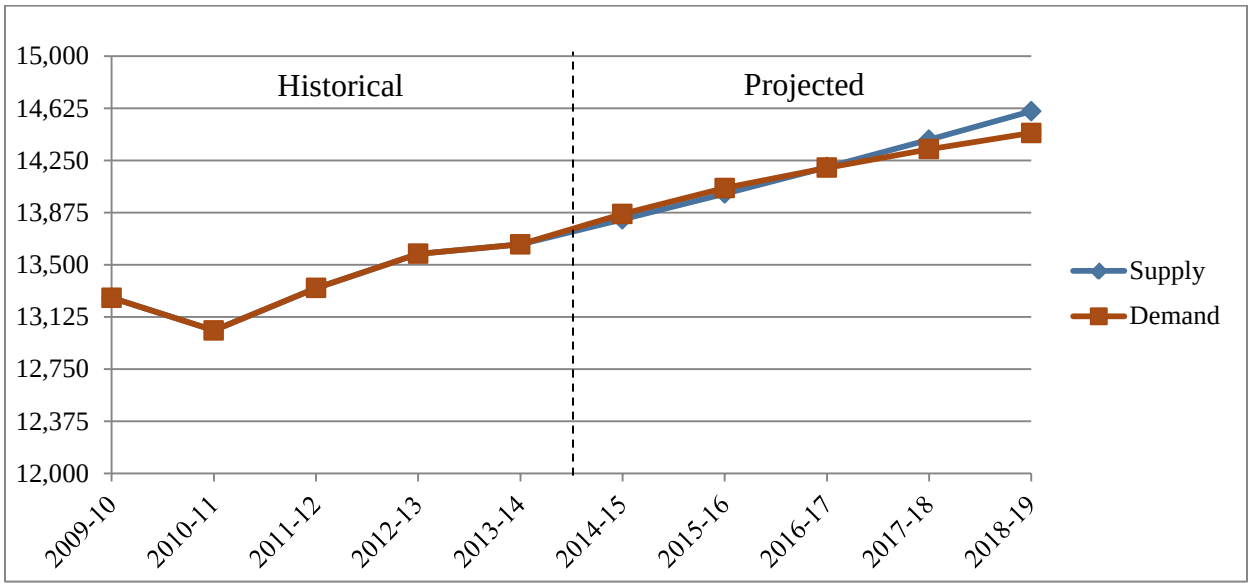


Here again we project a shortage that we expect will increase during the next five years. It might be noteworthy that we expect all of the smallest regions (i.e., northwest, southwest, and southeast) to face similar challenges region-wide. These regions are composed primarily of rural districts, which may face similar challenges with respect to staffing and retention. With this in mind, policymakers might want to consider offering similar supports to these regions, and engaging with district leaders from across these regions simultaneously. This could be accomplished through a state convening or another forum for discussion.

Central

In the central region, we project that supply and demand will both increase over time, but we project that supply will increase at a slightly higher rate. We expect that this will result in small shortages in earlier projected years and a gradually increasing surplus in later years (Exhibit 44). Specifically, in 2014–15 we expect a 0.3 percent shortage, which will turn into a slight surplus in 2016–17 and ultimately grow to a 1.1 percent surplus in 2018–19.

Exhibit 44. Trends in Historical and Projected Teacher Supply and Demand in the Central Region



We project that only the central region will overcome its regional shortage over the next five years. Given this, policymakers might want to engage districts in this region to gather any best practices for staffing and recruitment that also might help other regions overcome their projected shortages.

Regardless whether there is an expected shortage or surplus, it could be the case that particular districts are driving these trends, and/or some districts are having more success than others at meeting demand. Policymakers might want to consider engaging with district stakeholders to gather additional information that will put these regional findings in context.

Educator Shortages and Surpluses by Primary Position

Based on a review of all trends in projected supply and demand in all primary positions, we found that the following positions will experience statewide shortages:

- Districtwide staff[48]
- Language arts teachers
- Arts and music teachers
- Social studies teachers
- Foreign language teachers (high school only)
- Mathematics teachers

[48] The districtwide staff primary position includes all educators whose primary position was at the schooling level districtwide services. This definition is described in more detail in the Districtwide Services Staff Assumption section of this report in Key Decisions and Assumptions.

- Science teachers
- Vocational education teachers (high school only)
- Other teaching positions (middle school only)

Of these positions, we project that the greatest shortages will occur in districtwide staff, and teachers in language arts, social studies and science. In addition, we project that shortages among high school teachers generally will be larger than those among middle school teachers. These projected shortages generally are consistent with those shortage areas that the state reported to the U.S. Department of Education for the 2014–15 and 2015–16 school years (U.S. Department of Education, 2015). Exhibit 45 displays shortages and surpluses by primary position for each projected year.

As previously noted, researchers identified some important limitations in the calculated projections which impact the identification of projected shortages and surpluses. In particular, projections based on observational units with small counts in historical years are more prone to error. This is a particular problem in Oklahoma due to the fact that a large number of districts have small student enrollments and thus correspondingly small counts of staff. In addition, as is the case with all projections, future shocks are inherently difficult to anticipate with a high degree of accuracy. These limitations are discussed in more detail in Appendix A.

Exhibit 45. Expected Absolute and Relative Shortages and Surpluses by Primary Position

Primary Position	2014-15	2015-16	2016-17	2017-18	2018-19
Districtwide Staff	-34 (-1.9%)	-136 (-7.4%)	-224 (-12.2%)	-313 (-17.0%)	-395 (-21.3%)
Administrative	101 (3.9%)	101 (3.9%)	111 (4.3%)	118 (4.5%)	128 (4.9%)
Guidance Counselor	61 (3.8%)	60 (3.7%)	64 (3.9%)	66 (4.0%)	71 (4.3%)
Librarians	46 (4.3%)	53 (5.0%)	61 (5.7%)	71 (6.6%)	81 (7.5%)
Other Professional Staff	63 (6.1%)	90 (8.6%)	121 (11.5%)	153 (14.5%)	186 (17.5%)
Elementary	-97 (-0.4%)	-54 (-0.2%)	84 (0.4%)	276 (1.2%)	544 (2.4%)
Middle School - Language Arts	-26 (-1.6%)	-55 (-3.3%)	-89 (-5.3%)	-126 (-7.3%)	-174 (-9.9%)
Middle School - Arts and Music	-1 (-0.2%)	-2 (-0.4%)	-7 (-1.2%)	-11 (-1.9%)	-20 (-3.4%)
Middle School - Social Studies	-19 (-1.9%)	-36 (-3.5%)	-58 (-5.5%)	-82 (-7.7%)	-114 (-10.5%)
Middle School - Foreign Language	7 (3.5%)	14 (7.0%)	24 (11.8%)	37 (17.9%)	54 (25.6%)
Middle School - Mathematics	-12 (-1.0%)	-29 (-2.4%)	-50 (-4.1%)	-72 (-5.8%)	-104 (-8.1%)
Middle School - Science	-12 (-1.2%)	-24 (-2.4%)	-41 (-4.1%)	-61 (-6.0%)	-86 (-8.3%)
Middle School - Vocational Education	4 (3.4%)	4 (3.3%)	9 (7.4%)	11 (8.9%)	15 (12.0%)

Primary Position	2014-15	2015-16	2016-17	2017-18	2018-19
Middle School - Other	-11 (-1.3%)	-25 (-2.9%)	-38 (-4.3%)	-56 (-6.3%)	-79 (-8.6%)
High School - Language Arts	-43 (-2.0%)	-85 (-3.9%)	-116 (-5.2%)	-158 (-7.0%)	-189 (-8.4%)
High School - Arts and Music	-14 (-1.8%)	-23 (-2.9%)	-34 (-4.2%)	-42 (-5.2%)	-52 (-6.3%)
High School - Social Studies	-52 (-3.0%)	-107 (-6.2%)	-149 (-8.5%)	-200 (-11.3%)	-243 (-13.6%)
High School - Foreign Language	-12 (-2.4%)	-23 (-4.6%)	-32 (-6.4%)	-42 (-8.3%)	-52 (-10.2%)
High School - Mathematics	-34 (-1.9%)	-63 (-3.4%)	-87 (-4.7%)	-117 (-6.2%)	-140 (-7.3%)
High School - Science	-38 (-2.5%)	-78 (-5.0%)	-108 (-6.9%)	-144 (-9.1%)	-177 (-11.1%)
High School - Vocational Education	-15 (-1.6%)	-30 (-3.1%)	-40 (-4.1%)	-52 (-5.3%)	-64 (-6.4%)
High School - Other	-8 (-0.4%)	-13 (-0.6%)	-4 (-0.2%)	-6 (-0.3%)	1 (0.0%)
Charter	63 (11.1%)	143 (25.0%)	236 (40.9%)	348 (59.8%)	481 (81.9%)
Other Positions[49]	25 (2.2%)	-1 (-0.1%)	-18 (-1.6%)	-37 (-3.2%)	-57 (-5.0%)

Note. Relative shortages and surpluses are in parentheses.

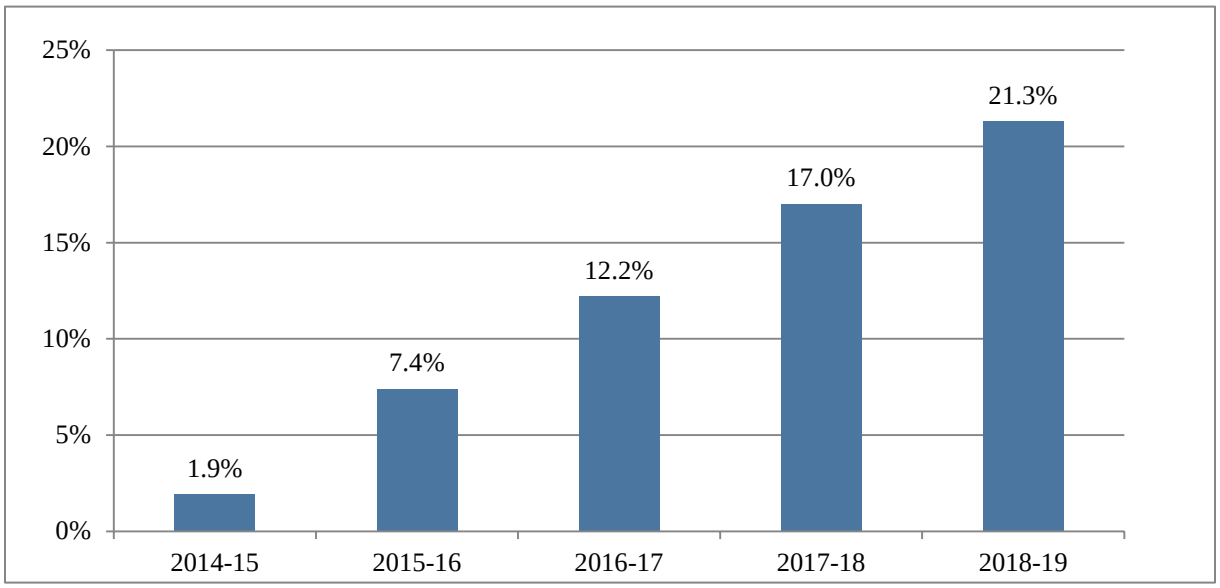
The following section examines shortages in the positions with the largest projected shortages—districtwide staff and teachers in language arts, social studies and science—in more detail.

Districtwide Staff

We expect that the overall shortages in individuals providing districtwide services will grow from a shortage of 1.9 percent (34 educators) in 2014–15 to 21.3 percent (395 educators) in 2018–19 (Exhibit 46). This trend generally is consistent over time, growing an average of 12 percent per year.

[49] The other positions category includes job, subject, and site codes not fitting any other primary position. Please see Appendix C for additional details.

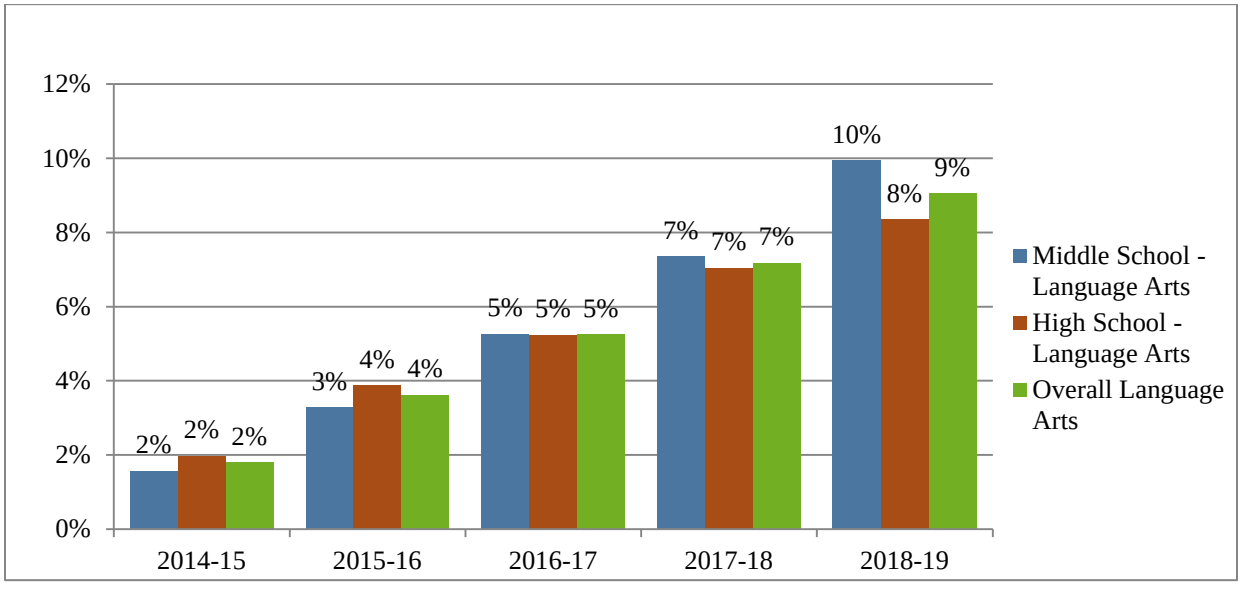
Exhibit 46. Expected Absolute Relative Shortages in Districtwide Staff Positions From 2014–15 to 2018–19



Language Arts Teachers

We expect that the overall shortage in language arts teachers will grow from a shortage of 1.8 percent in 2014–15 to 9.0 percent in 2018–19 (Exhibit 47). This trend generally is consistent across schooling levels, although a sharper increase exists in the projected shortage for middle schools than for high schools.

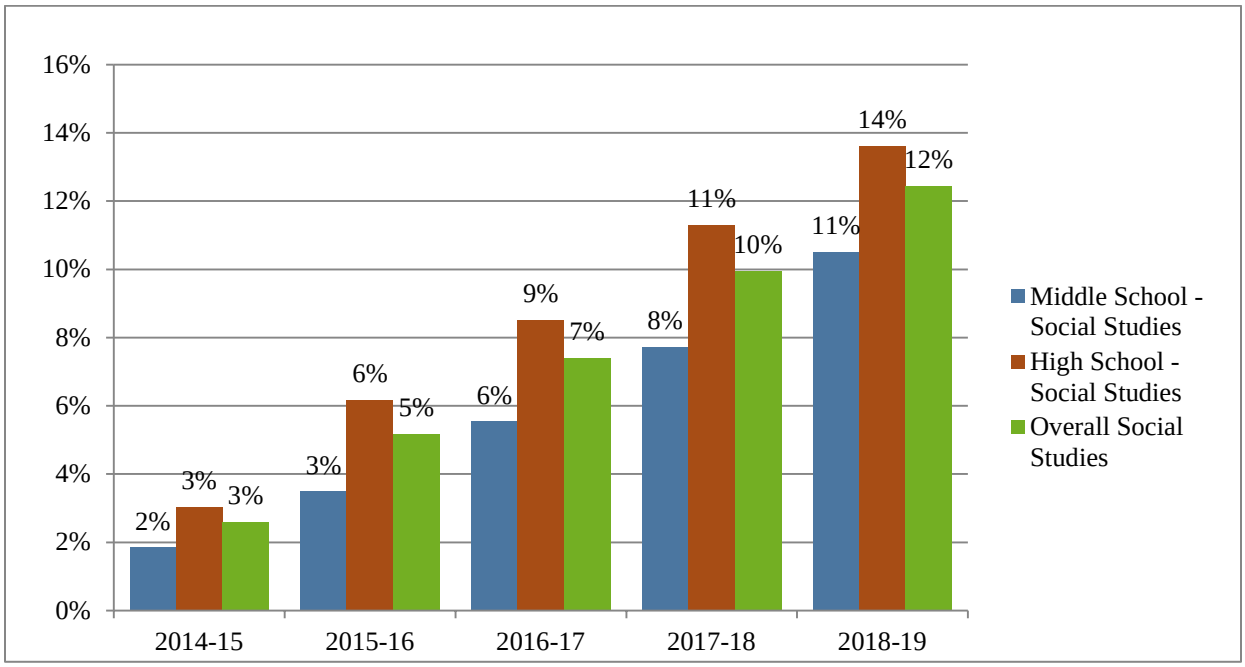
Exhibit 47 Expected Absolute Relative Shortages in Language Arts Teaching Positions From 2014–15 to 2018–19



Social Studies Teachers

We expect that the overall shortage in social studies teachers will grow from 2.6 percent in 2014–15 to 12.4 percent in 2018–19 (Exhibit 48). But here our predicted shortages across the years for high schools are notably larger than for their middle school counterparts.

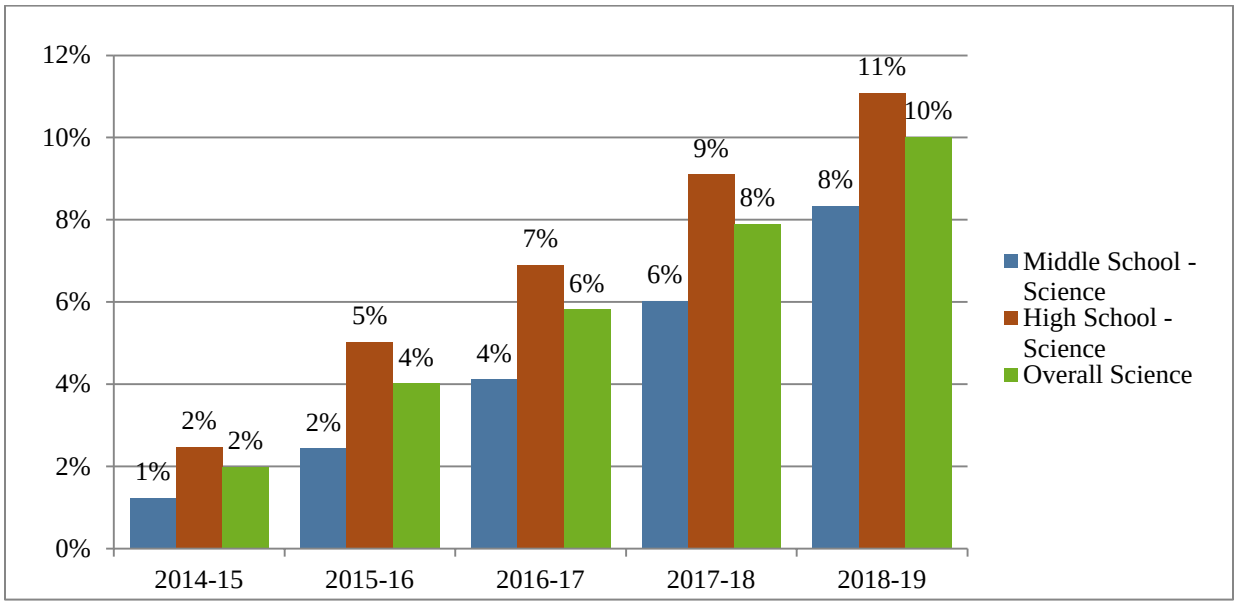
Exhibit 48. Expected Absolute Relative Shortages in Social Studies Teaching Positions From 2014–15 to 2018–19



Science Teachers

We expect the shortage in science teachers will grow from about 2.0 percent in 2014–15 to 10.0 percent in 2018–19 (Exhibit 49). The shortages here are also notably larger over time for high schools than for middle schools.

Exhibit 49. Expected Absolute Relative Shortages in Science Teaching Positions From 2014–15 to 2018–19



Given that the shortages for the positions listed above are the largest that were found, policymakers might want to consider focusing on developing strategies to increase the supply of educators in these positions and retain educators already in these positions. To accomplish this goal, policymakers might want to engage with district stakeholders to better understand their recruitment and retention needs for these particular positions. They also might want to partner with traditional and alternative educator preparation programs to develop strategies to increase the flow of educators into these positions from the pipeline or consider strategies to recruit educators in the reserve pool into these positions. In addition, by initially targeting these high-shortage areas, policymakers might build their capacity to address shortages in other positions.

Analysis 5: Additional Analyses

Analysis 5 reports on a series of investigations related to competition for educator staff and the cost of completing higher education in Oklahoma and surrounding states, as well as trends in the employment outcomes of those who graduated with an education major from the state's IHEs.

Specifically, to address Research Question 14, we draw upon existing research that investigates the relative cost of hiring and retaining education staff in different labor markets and use this to better understand the cost differential between states in the Oklahoma region (Exhibit 50). Next, we look at the difference in the cost of obtaining a higher education in Oklahoma and its neighboring states (Exhibits 51a and 51b). Finally, we make use of research similar to that which examines between-state cost differentials, which looks at the average difference in salaries of teachers and other comparably qualified individuals within Oklahoma (Exhibit 52).

To address Research Question 15, we considered the employment outcomes of education majors one year following graduation. Here, we first examine the trends in the percentage of education major graduates who successfully find employment one year following graduation. We then examine the sectors in which recent graduates find employment. This section reports selected findings from this analysis. Specifically, Exhibit 53 displays the percentage of education majors employed and not employed one year after graduation from 2007–08 to 2012–13. The most common sectors of employment for this population are also reported.

Research Question 14: Comparative Salary Analysis

Regional Costs to Hire and Retain Educators

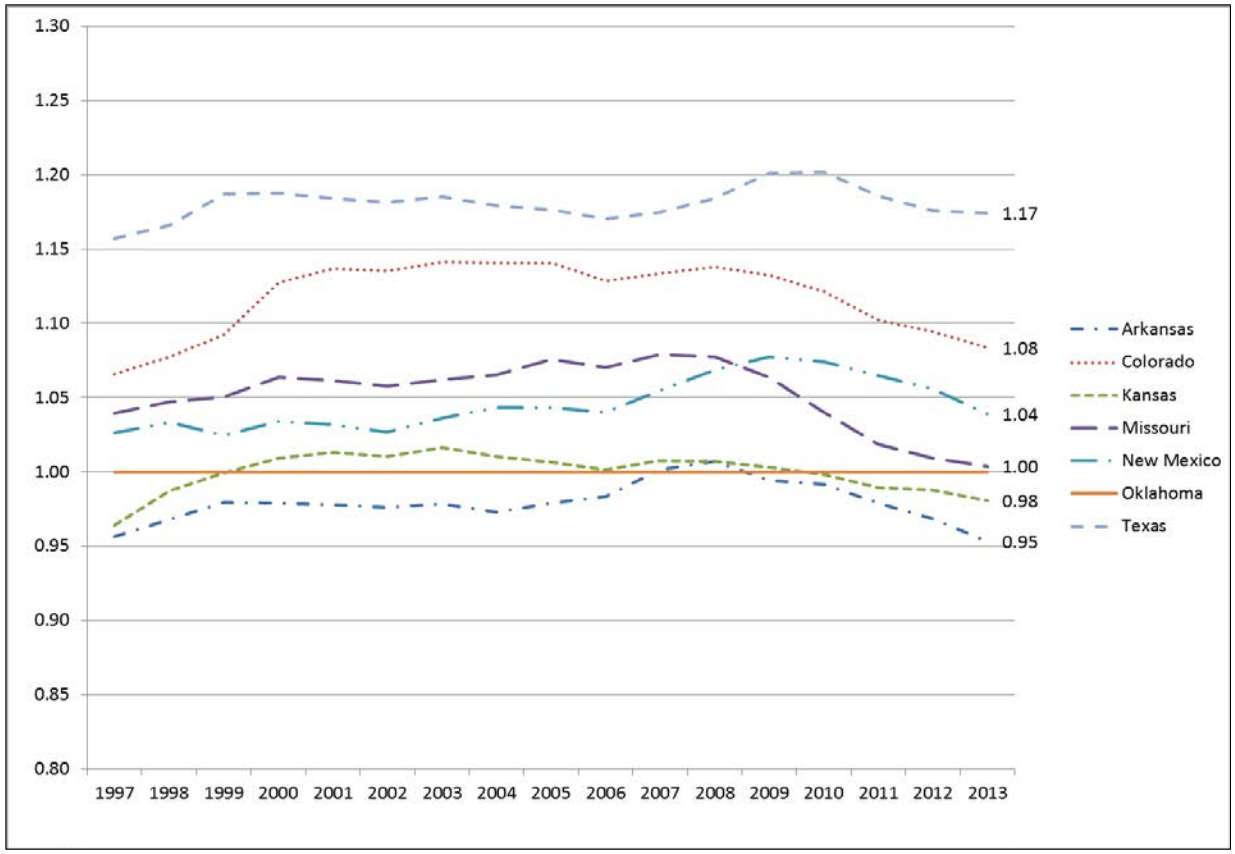
To better understand the competitive pressures Oklahoma faces because of the demand for educators from its neighboring states, we make use of the Comparable Wage Index (CWI). The CWI was originally developed as a product for the National Center for Education Statistics (NCES) by Lori Taylor, Ph.D., of Texas A&M University and allows researchers to compare the differential costs of hiring and retaining educators in different labor markets throughout the country.[50] Values for the index are reported at the district and state levels (the results here make use of the state-level data), which are centered around the national average (i.e., the index value for the national average equals 1.00). For example, an index value for a specific state of 1.10 suggests that it costs 10 percent more than the national average to hire and retain education staff in that state (i.e., the wage level necessary to hire and retain educators is 10 percent higher than the national average). For this analysis, we have re-centered the state-level index values around Oklahoma so that the index values presented represent the differential educator cost relative to this reference state.

Exhibit 50 presents the trends in the CWI values for Oklahoma's neighboring states from 1997 through 2013 (value labels are listed for the most recent year). During this period, the figures

[50] Specifically, the CWI uses U.S. Census data to examine the patterns of variation in wages of employees with comparable qualifications and characteristics in noneducation occupations as a benchmark for assessing the costs of education labor across roughly 800 place-of-work areas defined by the census. Detailed documentation on the CWI can be found in Taylor and Fowler (2006). Although the original CWI developed for NCES covered only 2005, Dr. Taylor has extended the index on an annual basis through 2013 and made these data publicly available through the Texas School Finance Project at http://bush.tamu.edu/research/faculty/Taylor_CWI/.

suggest that the cost of educational staff in Arkansas has almost always been lower than in Oklahoma, while the cost in Kansas has been the closest of all the surrounding states. Educator costs in the other four surrounding states (Colorado, Missouri, New Mexico, and Texas) have almost always consistently been higher than in Oklahoma, the exception being in the most recent year of data (2013) where the cost in Missouri was equal. New Mexico, Colorado, and Texas are the states with educator costs that have been consistently higher than that of Oklahoma over the period being examined. Specifically, in 2013, education staff in New Mexico, Colorado, and Texas were 4, 8, and 17 percent more costly, respectively, than in Oklahoma.

Exhibit 50. Average Cost of Hiring and Retaining Educators in Oklahoma and Surrounding States Using Comparable Wage Index (CWI) Values from 1997 to 2013



Source: The Texas School Finance Project, Bush School of Government and Public Service, Texas A&M University.

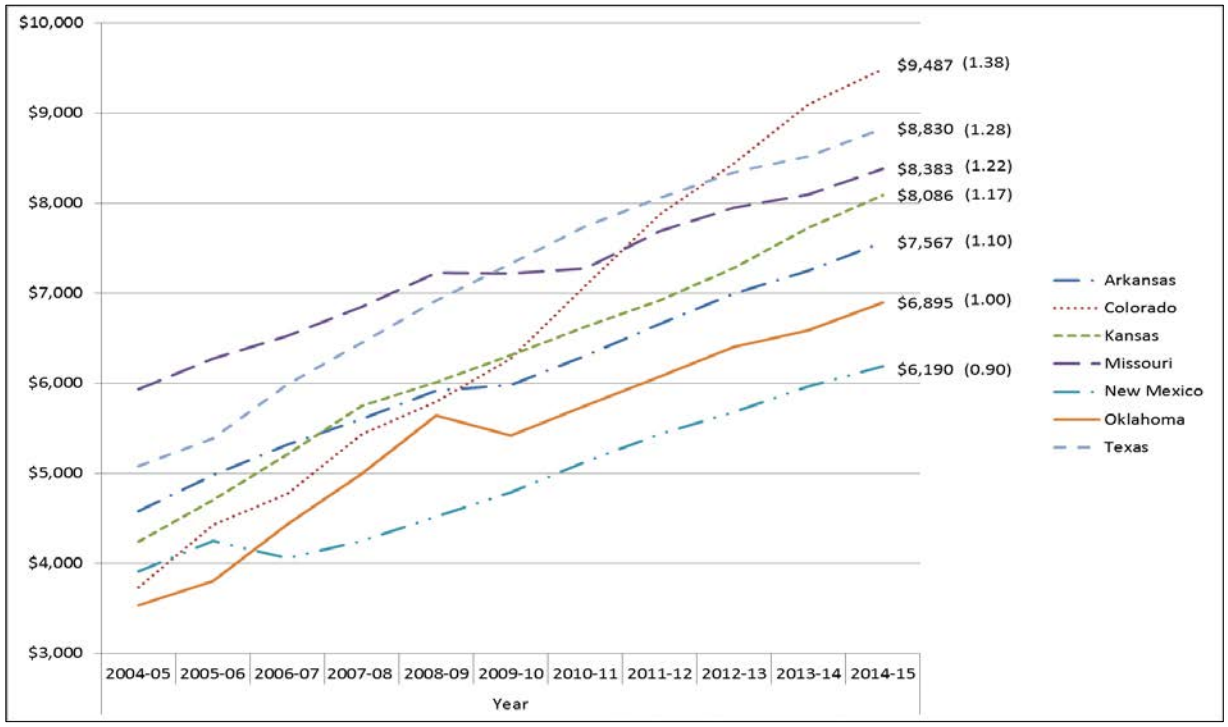
The implication of the findings is that these higher cost states represent competition for education staff in the region. Both the magnitude of the cost differential and length of the shared border with Texas suggest that this state presents the most competition for educators among all of Oklahoma's neighboring states.

Regional Costs to Become an Educator

In addition, there may be differences across states in the cost of becoming an educator. To investigate this possibility, we make use of data from the College Board Annual Survey of Colleges to analyze the trends of average annual tuition and fees for public and private four-year

universities in Oklahoma and its neighboring states during the period 2004–05 to 2014–15 (Exhibits 51a and 51b, respectively).[51] The results of the analysis suggest that the average annual tuition and fees for both public and private four-year universities in Oklahoma have been traditionally lower compared to the surrounding states. For public universities, the only neighboring state that has been more inexpensive than Oklahoma on average is New Mexico. In contrast, for virtually the whole period under study, the other bordering states have had an average tuition and fee cost that have been higher (in the most recent year observed, 2014–15, between 10 and 38 percent higher). The results for private four-year universities are qualitatively similar except that the average costs in Kansas closely shadow those of Oklahoma, while the relative differences for the other states are more pronounced.

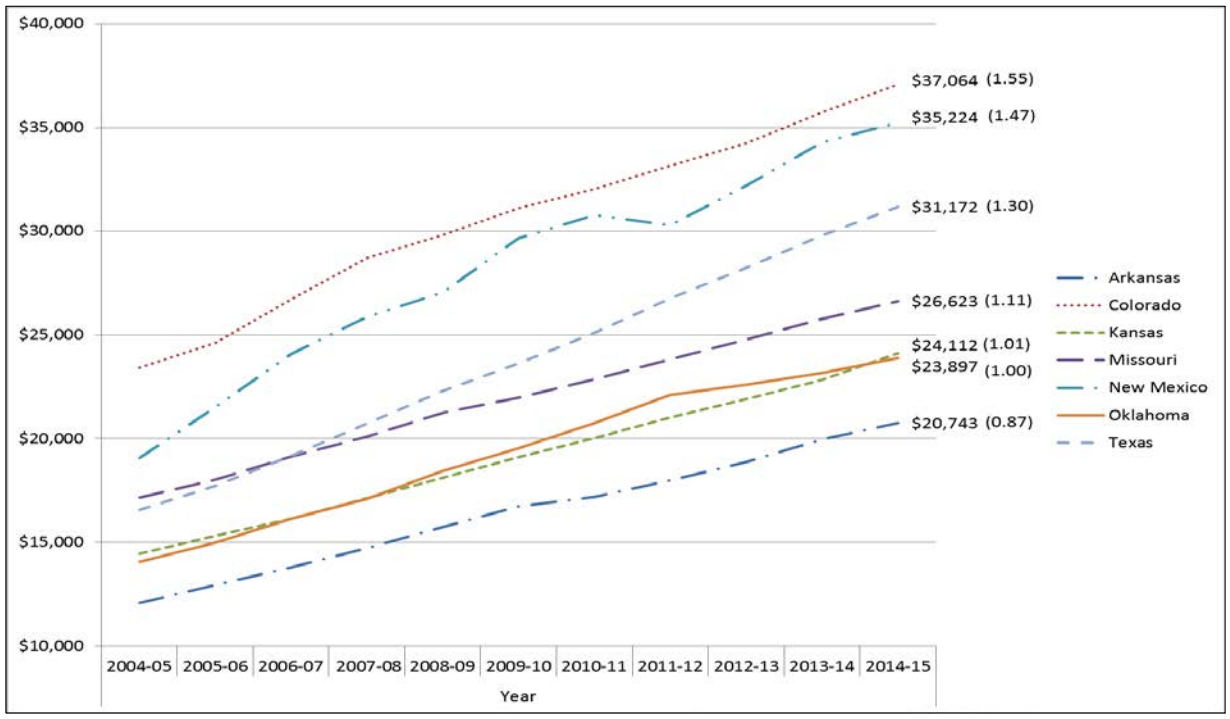
Exhibit 51a. Average Cost of Tuition and Fees for Four-Year Public Universities in Oklahoma and Surrounding States (Labels Represent Absolute and Relative Cost for 2014–15)



Source: The College Board, Annual Survey of Colleges.

[51] The College Board makes these data publicly available on their website at http://trends.collegeboard.org/college-pricing/figures-tables/published-prices-state-region.

Exhibit 51b. Average Cost of Tuition and Fees for Four-Year Private Universities in Oklahoma and Surrounding States (Labels Represent Absolute and Relative Cost for 2014–15)



Source: The College Board, Annual Survey of Colleges.

Again, it is notable that Texas is among the states with a high tuition and fee cost differential (i.e., tuition and fees at a public four-year university was 28 percent higher on average than in Oklahoma). To the extent that educator training and certifications are portable between Oklahoma and Texas, this finding coupled with the fact that educators in Texas tend to get paid more suggests that Oklahoma may be at risk of not only providing a relatively cheap avenue for Texas residents to obtain educator training but also losing these trained educators back to their home state. Indeed, a finding presented earlier shows that Texas has by far the largest share of those out-of-state residents completing educator preparation programs in Oklahoma (see the section Analysis 1: Trends in the Educator Pipeline).

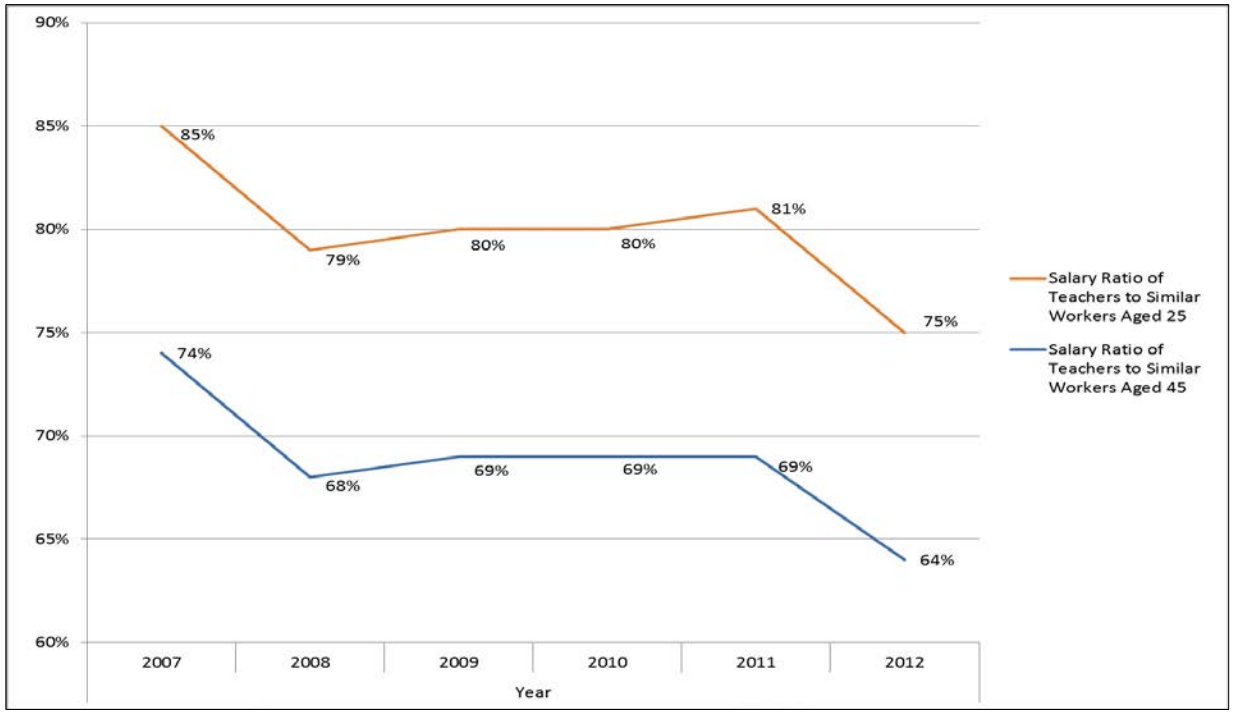
Opportunities for Employment Outside of Education

In addition to competition for educators from outside of the state, Oklahoma faces competition for potential educators from other sectors within its state economy. Put simply, to the extent that certificated educators in Oklahoma have outside opportunities to find employment in other industries in the state that offer more lucrative salaries, public education will face increased internal competition for these workers. To investigate the degree to which employment opportunities in the noneducation sector create competition for certificated educators, we make use of the Wage Competitiveness Index (WCI) developed by Bruce Baker, Ed.D., of Rutgers University. This index estimates the average salary differential within states between teachers and other similar workers using data from the U.S. Census. Values of the WCI represent the

average differential salary between teachers with workers in the same labor market that are of a similar age, higher education degree level, and working the same number of hours.[52]

Exhibit 52 shows trends in the WCI for individuals in early- and mid-career (aged 25 and 45, respectively) from 2007 to 2012. As can be seen from the exhibit, during the study period, early-career teachers in Oklahoma have earned on average between 75 and 85 percent of what their similar nonteacher counterparts have earned, with the index clearly trending downward because of shocks in 2008 and 2012. Moreover, the relative difference in earnings between teachers and nonteachers becomes worse as careers progress; the ratio of mid-career teacher to nonteacher salaries drops from 74 to 64 percent during the period under study.

Exhibit 52. Salary Ratios of Teachers to Similar Workers in Oklahoma for Early- and Mid-Career Individuals Using the Wage Competitiveness Index (WCI) From 2007 to 2012



Source: Is School Funding Fair? A National Report Card. Education Law Center, Newark, N.J.

These results suggest that there exists substantial competition for educators from other sectors within the state that deserves consideration when formulating policy.

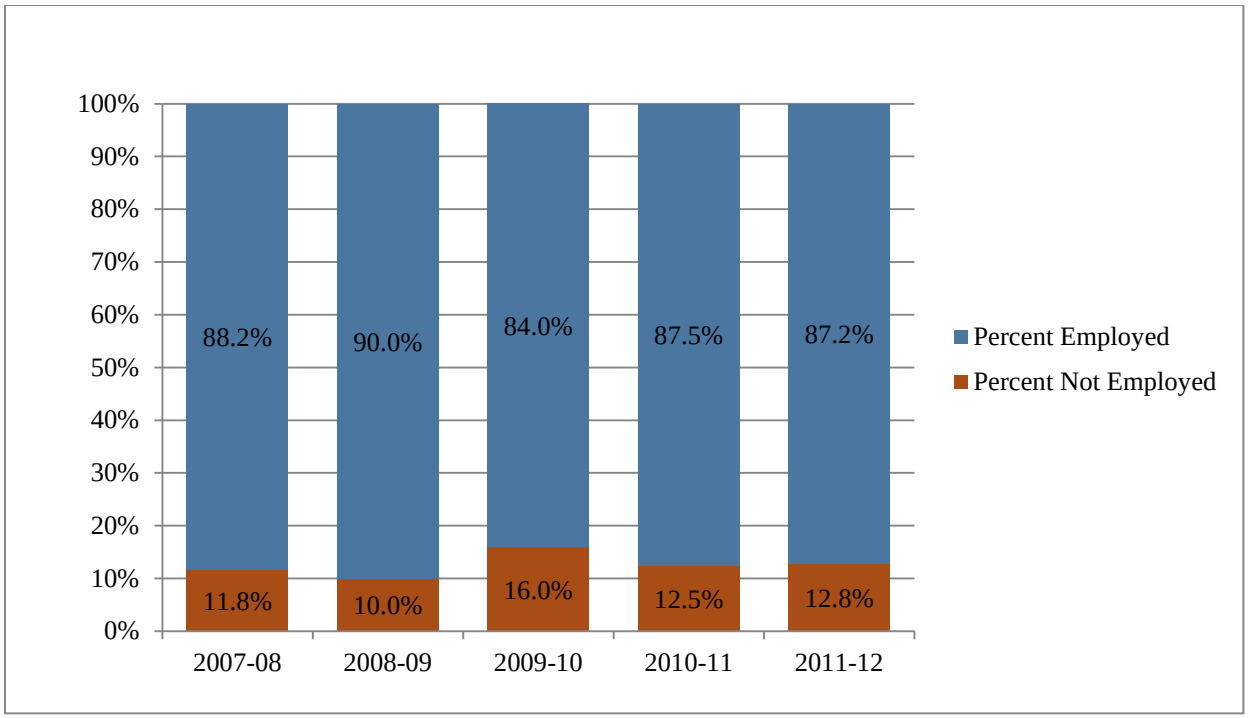
Research Question 15: Employment Outcomes of Education Majors One Year After Graduation

To understand the employment prospects of potential educators in Oklahoma, we examined the employment outcomes of education majors one year following graduation. Exhibit 53 displays the percentage of education majors employed and not employed one year after graduation from 2007–08 to 2011–12. The results show that the majority of education majors graduating during

[52] More detail on the WCI can be found in the report *Is School Funding Fair? A National Report Card* (4th ed.) by Baker, Sciarra, and Farrie (2015), available at http://www.schoolfundingfairness.org/.

this time period were consistently employed one year after graduation. Specifically, on average, 87.4 percent of graduates were employed one year out from graduation while 12.6 percent did not yet obtain employment.

Exhibit 53. Percentage of Education Majors Employed and Not Employed One Year After Graduation From 2007–08 to 2011–12



Of those education majors employed between 2008-09 and 2011-12, the majority found work in the education sector (77.3 percent on average), primarily in elementary and secondary schools.[53] The second most common sector of employment was health care and social assistance (4.8 percent on average), followed by retail trade (3.6 percent on average).

[53] Academic year 2007-08 was not included in the analysis as the data for this year used Standard Industrial Classification (SIC) codes to identify sector rather than the more modern North American Industry Classification System (NAICS) codes used in later years. This was done in an effort to ensure consistency with respect to employment sector across all reported years.

Section 3. Data Recommendations

Key Recommendations

Having systematically collected, cleaned, and processed the various sources of data used in the analyses presented in this report, the research team has developed a number of key recommendations to improve the usefulness of this information for investigating the state's educator supply and demand.

Recommendation 1: Codebooks and Documentation

Perhaps the most important documents that accompany any data source are the codebook and corresponding documentation. This documentation should define each variable and detail how it is coded and stored. In addition, this documentation should provide information about how the data are collected and refer to any unique aspects of the data that a user might need to know. Ultimately, data codebooks provide an invaluable resource to those interested in conducting an analysis using the data source.

With this in mind, we recommend that codebooks be compiled, improved upon, and made readily available for the various sources of data we used in this study that the client and its partners maintain. For the personnel data, the provided documentation included some helpful information about the database used to maintain the data underlying the personnel reports we received. But a document specifically designed as a resource for data analysts using these reports would be ideal. On the other hand, no documentation was available for the certification data and therefore the research team had to learn as much as possible through conversations with OSDE staff. The team also spent a considerable amount of time investigating aspects of these data not immediately apparent in provided files. In contrast, the documentation for the OSRHE Unitized Data System provided the basic information needed to proceed with data cleaning and preparation with minimal need for follow-up on the data elements. Perhaps this document could be used as a starting point for documentation of other data sources. Once comprehensive codebooks are in place, we believe they will improve the efficiency of any future study or analysis of supply and demand.

Recommendation 2: Annual Certification Reports

Unlike the personnel data, we received the certification data as output from a transactional database and the certification records had effective dates running continuously from one year to the next. But in order to consider trends in certification by year, we had to convert the received data into annual reports of active certifications. This required preparing the data to be at the individual level, with a single record for each certified educator. It also required determining how best to define active certification based on the effective date and expiration date of the certificate.

We recommend that OSDE consider creating an annual report of active certifications at the individual level each year. This would allow for easier analysis of certification trends in combination with other sources of data, especially the personnel data. This process may be time-

consuming and complex to conduct the first time, but if regular procedures are established to generate this type of data report, the burden would far lower for future collection and the state would be able to use these data on a regular basis to monitor certification types and areas.

Recommendation 3: Create Policies to Allow Regular Data Sharing

Many of the analyses contained in this report would not have been possible without the use of data sources that different state agencies collect and maintain. Combining these data allows the researcher to leverage the power of a larger data set and hence conduct a more comprehensive analysis of educator supply and demand. We therefore recommend that the client and its partners consider establishing formal policies to allow for any regular data sharing that is not already in place.

Conclusion

It seems clear that shortages in the supply of educators will continue to be a problem in Oklahoma during the next five years unless steps are taken to address this issue.

For the present study, the research team used various sources of data that OSDE and OSRHE provided to complete the five analyses and answer 15 research questions. These analyses ranged from our examination of the educator pipeline in Oklahoma during the past five years to our analysis of projected educator supply and demand during the next five years. We also considered a variety of indicators of supply and demand.

We concluded from our analyses that during the past five years the number of traditional educator preparation program completers is declining, while the number of educators with nonstandard certifications is increasing. The overall number of active certifications has grown during the past five years, while certifications among those employed in the state's public education system has stayed constant during this period. In addition, as a result of many more educators leaving public education than entering in 2010–11, many regions are likely experiencing a shortfall in staff. Finally, we projected that educator shortages are likely to grow for many regions of the state and for many primary positions, particularly districtwide staff and teachers in language arts, social studies, and science. Finally, the findings suggest that Oklahoma faces competition for educators both internally from the non-education employment sector and externally from other states in the region. Specifically, our results show that within the state teachers make substantially less on average than workers with similar characteristics that hold other occupations, while at the same time the average salaries of educators are higher in neighboring states. Moreover, because the findings indicate that the cost of obtaining an undergraduate degree tends to be lower in Oklahoma relative to other states in the region, it may also be susceptible to out-of-state residents that complete within-state educator preparation programs and are then incentivized to leave the state after graduation to find more lucrative employment.

We hope that by considering the historical trends in components of educator supply and demand alongside the future projections we provide in this report, policymakers in Oklahoma will be better positioned to meet this challenge.

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Appendix A. Technical Description of Methods

Certification Data Limitations

After meeting with representatives from OSDE in April 2015 to discuss issues identified in the certification data, the research team determined that information from this source with an effective date prior to April 2009 could not be used for the purposes of this study. Furthermore, we noted that between April 2009 and July 2009, the certification data experienced a shock in the number of issued certifications. To resolve these issues, we did not report on certification data prior to FY 2009–10.

Identified Issues

We identified the following issues in the data:

1. **Data issues prior to April 2009.** It is our understanding that before April 2009, historical certificate records were not preserved. Specifically, when a certificate was renewed, the record of the initial certificate was overwritten with the renewed certificate. The data from these years therefore are missing all prior years of data on any renewed certifications. For example, if Teacher A was certified with a five-year standard certification from June 30, 2002, to June 30, 2007, and then renewed this certificate to be valid between June 30, 2007, and June 30, 2012, the only record in the data would be the renewed certificate. In other words, this teacher would not have a certificate record between 2002 and 2007, despite the fact that he or she was licensed at this time.
2. **Shock between April 2009 and July 2009.** It is our understanding that beginning in April 2009, all (or the vast majority of) two-year licenses were converted to five-year standard certifications regardless of when these licenses were made effective or were set to expire. For example, if Teacher B had a two-year license valid from June 30, 2008, to June 30, 2010, between April 2009 and July 2009 a new five-year standard certificate record was added for this teacher effective for the following five years. Following this conversion, licenses were phased out and currently are very uncommon. As a result, the number of licenses between FY 2008–09 and FY 2009–10 is abnormally high, relative to the following years when very few licenses were active.

Implemented Solutions

Given these issues, we implemented the following solutions after consulting with the client:

1. **Use only certification data after FY 2009–10 in the project analysis.** Given that an unknown number of missing records exists from certification data prior to April 2009, we determined, in consultation with the client, that we would leave data from FY 2005–06 through FY 2008–09 out of the project analyses requiring certification data. This did not prevent us from conducting an analysis of certification trends in the past five years, as we still had available data in these years (FY 2010–11 through FY 2014–15).
2. **Suggest license data for FY 2009–10 be interpreted with caution because of the shock.** Given that standard certificates were issued in FY 2008–09 and FY 2009–10 to

replace licenses, resulting in an abnormally large number of licenses relative to the following years, we determined, in consultation with the client, that although we would report on the licenses active in FY 2009–10, we would note that these are likely duplicate records for individuals with newly issued standard certifications.

OSDE Recoding

Because of inconsistencies in the coding structure found in some of the data we received from OSDE, we took steps to recode values to harmonize coding across years and relevant data sources.

Inconsistent Coding Across Data Sources

The school-level codes that we found in the enrollment data did not match the codes found in the received personnel data. But we could identify these schools by the names the client provided. Using these names, we converted the enrollment file coding to match the personnel file coding prior to merging these files. Exhibit A.1 displays the affected school names, the enrollment code, and the personnel code.

Exhibit A.1. Schools Converted From Enrollment Codes to Personnel Codes

School Name	Enrollment Code	Personnel Code
Epic One on One Charter School	54-I054-975	54-E005-975
Epic One on One Charter School (alt code)	54-I032-971	54-E001-971
Independence Charter MS	55-I089-971	55-E001-971
Justice A.W. Seeworth Academy	55-I089-972	55-E002-972
Hupfield Acad./Western Village	55-I089-973	55-E003-973
Astec Charter MS	55-I089-974	55-E004-974
Marcus Garvey Leadership CS	55-I089-979	55-E009-979
Astec Charter HS	55-I089-983	55-E004-983
Dove Science Academy (OKC)	55-I089-975	55-E005-975
Santa Fe South HS	55-I089-977	55-E007-977
Harding Charter Preparatory HS	55-I089-978	55-E008-978
Harding Fine Arts Academy	55-I089-980	55-E010-980
Santa Fe South MS	55-I089-981	55-E011-981
Dove Science Academy ES (OKC)	55-I089-984	55-E012-982
Harper Academy	55-I089-986	55-E013-984
Dove Science Academy (Tulsa)	72-I001-971	55-E016-986
Tulsa School of Arts/Sciences	72-I001-974	72-E001-971
Kipp Tulsa Academy College Prep	72-I001-975	72-E004-974
Lighthouse Academies of Tulsa	72-I001-976	72-E005-975
Deborah Brown Community School	72-I001-972	72-E006-976

Inconsistent Coding Across Years

In addition, we found that some unique district codes of the same district changed from year to year. For example, the district Boley had the county/district code of 54-I013 for FY 2005-06 through FY 2006-07, and then changed to 54-C013 for FY 2007-08 through FY2014-15. To harmonize these codes across years, we replaced all codes of the affected districts in all years

with the code in the most recent year available, which was 2014-15. Exhibit A.2 displays a detailed summary of all affected districts and the identified coding issue. Specific codes are available upon request.

Exhibit A.2. District Code Harmonization Across Years

District Name	Coding Issue
Boley	Code in FY2006–FY2007 differs from code in FY2008–FY2015.
Tulsa Charter: Deborah Brown	Code in FY2006–FY2008 differs from code in FY2009–FY2015.
White Oak	Code in FY2006–2010 differs from code in FY2011–2015.
Braman	Code in FY2006–2010 differs from code in FY2011–2015.
Discovery School of Tulsa	Code in FY2010 differs from code in FY2011–FY2015.
Dustin	Code in FY2006–FY2012 differs from code in FY2012–FY2015.
Newkirk	Code in FY2006–FY2012 differs from code in FY2012–FY2015.
Epic One on One Charter	Codes differ across all years (FY2012–FY2015).
OKC Charter: Astec Charters	Code in FY2006–FY2014 differs from code in FY2015.

Alpha-Numeric Educator Numbers

The personnel data included an educator number that uniquely identifies an individual and we used this number to combine a variety of data sources for this analysis. This code was entirely numeric in the received certification data, but we found a handful of these (between 100 and 200 observations per year) to be alpha-numeric in the personnel data. For example, a typical educator identification number would be *123548* whereas an alpha-numeric number might be *E01265*. As a result of this inconsistency, we were unable to analyze certification data for these individuals, although we cannot be sure if such data exists or not. It is possible that these alpha-numeric educator identification numbers in the personnel data correspond to an educator number in the certification data and thus might currently be included as part of the reserve pool. But the size of this subset that could be matched was relatively small each year (3.8 percent at most) and thus we would not expect it to have an effect on the results of the study.

Unmatched Schools and Districts

For many possible reasons, some schools and districts were available in some data sources but not available or applicable in others. This section summarizes these unmatched records, why they did not match, and what we did to resolve the issue.

NCES and Enrollment Data

When we combined the NCES CCD with the enrollment data at the school level many schools were found in the NCES data but not in the enrollment data. Because this study is using as its base the data provided by the client, we did not include these schools in the analysis. However, there were also schools appearing in the enrollment data not found in the NCES data. Specifically, 21 schools were unmatched in 2013–14. We believe the likely explanation is that these were new schools that opened in the 2013-14 school year. Because the NCES data are only

available through 2012-13, such schools would not appear in those data. But in the interest of being able to report on these schools, we did impute values for relevant NCES variables. The methods we used to do this are described below.

At the district level, we found very few instances of districts only appearing in either the NCES data or the enrollment data. As before, we did not include those districts only appearing in the NCES data in our analysis. Only two districts appeared in the enrollment file but not the NCES file. These included "Pleasant Grove" in 2010-11 and "SANKOFA MIDDLE SCHL (CHARTER)" in 2013-14. For these districts, no district-level NCES data are available and thus they could not be included in analyses using these data. A complete list of the affected schools is available upon request.

Enrollment and Personnel Data

When we merged the combined enrollment and NCES data with the personnel data, we also found instances of schools appearing only in the combined enrollment and NCES file and not in the personnel file. Given that these schools do not have personnel data, we could not include them in our analysis of personnel. No schools appeared only in the personnel file.

Some districts, however, did only appear in the personnel file. In particular, these included districts labeled as Indian Learning Center districts. While these districts do have staff, they do not have any enrolled students for any of the available years. Consequently, these districts do not have enrollment or NCES data—but we did include them in our analysis of educators. In addition, because of this lack of enrollment data, we could not include these districts and their staff in the supply and demand projections. A complete list of the affected schools and districts is available upon request.

Personnel and Certification Data

Through our review of the data we received, we found that the educator identification numbers in the personnel data differed from those we found in the certification data in that they included both numeric and alpha-numeric codes. The certification data only included numeric educator numbers. Therefore, we could not merge individuals in the personnel data with alpha-numeric educator numbers with the certification data. As noted previously, we were not able to determine whether or not these individuals were truly uncertified or whether they simply had missing certification data. Regardless, we could not include these individuals in our analysis of certification trends. For this reason, the total population in the certification analysis is smaller than the population in the mobility analysis, which relies on personnel data alone.

NCES Data Imputation of Missing Values

The data from the NCES CCD School Universe Survey and Local Education Agency (School District) Universe Survey that we used for this study contained missing values for two of the key contrast variables and missing observations for districts, respectively. In addition, the complete CCD (both school- and district-level data sets) is only available through the 2012–13 school year, leaving the entire 2013–14 school year missing. To produce a more complete data set for analysis, we imputed the missing values and 2014 values using the following methods.

Imputing Missing Values

Percentage of Students Eligible for Free and Reduced-Price Lunch. To impute the missing values for this percentage, we used a historical average value for each school. We first calculated the average value of the percentage of students eligible for free or reduced-price lunch for each school from 2005–06 to 2012–13. We then replaced all missing values across those years with this average.

District-Level Locale. To impute missing values for the district-level locale code, we used the method commonly referred to as the *nearest-neighbor* method. Specifically, we replaced all missing district-level locale codes with the locale code in the nearest available year. Specifically, we used the following year's locale code to impute missing locale codes. For example, if the locale code for District A was missing in 2006-07 but was available in 2007-08, the locale in 2006-07 was imputed with the 2007-08 code.

Imputing Missing Districts. We found that in the district-level files for 2005-06 and 2006-07 a subset of districts that were found in the school-level files were missing. This finding was based on comparing the district identification code variable (leaid) in each file. We determined that these districts were valid and should be included in the analysis. In addition, we needed the district-level locale as a key contrast variable. To impute these missing districts, we also used the nearest-neighbor method. Specifically, we used district-level locales in 2004-05 for 2005-06, and locales in 2005-06 for 2006-07.

Imputing 2014 Values

Because of the fact that survey data for the 2013–14 school year was not available, we used a combination of methods to impute values for the key variables (e.g., counts and percentages of free or reduced-price lunch) in this year. For the majority of values, we again used the nearest-neighbor method and applied the FY2012–13 values to FY 2013–14. But we found 21 schools in the 2013-14 school year that were not in the 2012-13 school year. We believe these are likely schools that opened in 2013-14 and thus no NCES data is available for them in 2012-13. To impute NCES data for these schools, we used a generalized linear regression model to predict free or reduced-price lunch values. Specifically, we modeled the school-level percentage in 2012-13 as a function of 2012-13 student-level enrollment, and enrollment squared, and the 2012-13 school-level percentage minority. We then created 2013-14 predictions based on the 2013-14 values of these control variables. We tested the validity of these predictions by comparing the distribution of the 2012-13 actual free or reduced-price lunch percentages to the predicted percentages as well as actual and predicted membership into quartiles of these variables. Based on our analysis of the results, we were satisfied that these predictions were acceptable and we used these as the free or reduced-price lunch percentages in 2013-14 that underlie membership in a given free or reduced-price lunch quartile for the 21 schools. Similarly, if the free or reduced-price lunch percentage was missing in 2012–13, we imputed values predicted based on the regression described earlier.

Enrollment Projections

We used a Grade Progression Ratio (GPR) model to calculate enrollment projections. The ratios used in the model are constructed based upon the percentages of students who progress from grade to grade each year.

Specifically, we used two basic calculations to create these projections: the percentage of students who progress from one grade to the next each year beginning in Grades K–12 (i.e., GPRs from Grades K–1 through Grades 11–12) and the percentage of children born in a given year who enroll in kindergarten five years later (i.e., birth-to-kindergarten GPR).

Note that we calculated enrollment projections at the regional level. We did this to protect against the chance that errors would be created as a result of projecting grades with small enrollment counts. In their evaluation of enrollment projection methods used in Washington state, Berk and Hodgins (2008) found that errors were more common when the enrollment counts were low, specifically below 1,000. At the regional level, no grades had enrollment counts below this amount, improving the overall accuracy of our projections.

Calculating Grades K–1 Through Grades 11–12 GPR

We used the following equation to calculate the progression ratio from Grade *x* in Year 1 to Grade *y* in Year 2:

$$\text{GPR}x\text{-}y = \frac{y \text{ Enrollment in Year 2}}{x \text{ Enrollment in Year 1}}$$

We calculated a GPR for each consecutive pair of Grades K–12 from 2005-06 through 2013-14 and projections for these grades were then created using the average of each grade combination-specific GPR across the years.

Calculating Birth-to-Kindergarten GPRs

To calculate the progression ratio from birth to kindergarten, we used birth counts five years prior to in place of Year 1 enrollment. We based this on the assumption that kindergarten enrollment in a given year represents the proportion of children born five years earlier who will progress to kindergarten. The equation we used is in essence the same as for Grades K–12 and we used the average across the same available years.

Calculating Projected Enrollment

Finally, to calculate one-year to five-year enrollment projections, we paired the appropriate average GPRs with the most recent cohort of students in a given grade to forecast enrollment in a future period. For example, students in Grade 1 in the most recent year of data will be in Grade 4 when we calculate three-year projections. The GPR estimates the proportion of students in a given cohort who will progress those three years. Exhibit A.3 displays the equation we used to calculate five-year projections as an illustration of the calculation described earlier.

Exhibit A.3. Calculations for Five-Year Forecasts (From 2013–14 School Year)

Grade in 5 Years	Status in 2013–14	Calculations for 2018-19 Forecast
12	Grade 7	grade 7* gpr7-8* gpr8-9* gpr9-10*gpr10-11*gpr11-12
11	Grade 6	grade 6* gpr6-7*gpr7-8*gpr8-9*gpr9-10*gpr10-11
10	Grade 5	grade 5* gpr5-6*gpr6-7*gpr7-8*gpr8-9*gpr9-10
9	Grade 4	grade 4* gpr4-5*gpr5-6*gpr6-7*gpr7-8*gpr8-9
8	Grade 3	grade 3* gpr3-4*gpr4-5*gpr5-6*gpr6-7*gpr7-8
7	Grade 2	grade 2* gpr2-3*gpr3-4*gpr4-5*gpr5-6*gpr6-7
6	Grade 1	grade 1*gpr1-2*gpr2-3*gpr3-4*gpr4-5*gpr5-6
5	Grade K	grade K*gprK-1*gpr1-2*gpr2-3*gpr3-4*gpr4-5
4	born 2009	births2009*Birth-K*gprK-1*gpr1-2 *gpr2-3*gpr3-4
3	born 2010	births2010*Birth-K*gprK-1*gpr1-2 *gpr2-3
2	born 2011	births2011*Birth-K*gprK-1*gpr1-2
1	born 2012	births2012*Birth-K*gprK-1
K	born 2013	births2013*Birth-K

Validation Testing

To test for the bias and accuracy of the enrollment, supply, program completer, and certification-area projections, we compared projected values with actual values using the chosen methodology. Specifically, we calculated two metrics commonly used to assess validity, the Average Percent Error (APE), and the Absolute Mean Percent Error (MAPE). APEs generally are used to determine whether projected values are biased in a particular direction, while MAPEs are used to assess the magnitude of the discrepancy. The equations we used to calculate these metrics are displayed in Exhibit A.4.

Exhibit A.4. Equations We Used to Calculate the APE and MAPE Metrics

$$APE = \frac{(predicted - actual)}{actual}$$
$$MAPE = \frac{\lvert(predicted - actual)\rvert}{actual}$$

While no industry standard exists for an acceptable amount of bias and inaccuracy that we are aware of, others have suggested some guidelines. Berk and Hodgins (2008) suggest that an MAPE of more than 10 percent suggests that future projections should be interpreted with caution. But the 2014 *Minnesota Teacher Supply and Demand Report* found that for three- and five-year enrollment projections, the best method tested produced MAPEs no higher than 5

percent. With these reports in mind, we have chosen to consider a MAPE of 7.5 percent high enough to warrant caution.

Results of the Validation Tests

The results of these tests for each projection analysis are displayed in Exhibit A.5. Those MAPEs that exceed the 7.5 percent threshold have been shaded.

Exhibit A.5. Estimated APEs and MAPEs for All Projection Analyses

Analysis	APE	MAPE
Enrollment Projections (3-year)	-0.1%	1.3%
Enrollment Projections (5-year)	0.8%	2.1%
Supply Projections - Administrative	-1.2%	2.1%
Supply Projections - Arts & Music - High School	0.8%	4.5%
Supply Projections - Arts & Music - Middle School	-3.5%	5.9%
Supply Projections - Charter	13.9%	14.9%
Supply Projections - District-wide Staff	-6.3%	8.6%
Supply Projections - Early Childhood	2.9%	4.6%
Supply Projections - Elementary	1.1%	1.3%
Supply Projections - Foreign Language - High School	0.9%	4.0%
Supply Projections - Foreign Language - Middle School	3.0%	21.6%
Supply Projections - Guidance Counselor	1.6%	2.2%
Supply Projections - Language Arts - High School	0.0%	1.7%
Supply Projections - Language Arts - Middle School	0.4%	2.6%
Supply Projections - Librarians	3.7%	3.7%
Supply Projections - Math - High School	-0.1%	1.9%
Supply Projections - Math - Middle School	2.5%	4.7%
Supply Projections - Other	6.1%	11.0%
Supply Projections - Other - High School	2.7%	3.3%
Supply Projections - Other - Middle School	0.2%	5.2%
Supply Projections - Other Professional Staff	4.7%	6.9%
Supply Projections - Science - High School	0.6%	3.4%
Supply Projections - Science - Middle School	1.3%	3.9%
Supply Projections - Social Studies - High School	-0.4%	3.3%
Supply Projections - Social Studies - Middle School	-0.8%	3.8%
Supply Projections - Vocational Education - High School	0.2%	2.5%
Supply Projections - Vocational Education - Middle School	4.6%	10.2%
Program Completer Projections	0.1%	2.6%
Certification Area Projections - Administrative	0.02%	1.2%

Analysis	APE	MAPE
Certification Area Projections - Pupil Support	0.01%	0.6%
Certification Area Projections - Instructional Support	0.01%	0.9%
Certification Area Projections - Early Childhood	0.02%	1.1%
Certification Area Projections - Elementary	0.01%	0.7%
Certification Area Projections - Language Arts	0.01%	0.7%
Certification Area Projections - Arts/Music	0.01%	1.0%
Certification Area Projections - Social Studies	0.01%	1.2%
Certification Area Projections - Foreign Language	0.01%	1.0%
Certification Area Projections - Math	0.01%	1.0%
Certification Area Projections - Science	<0.00%	0.5%
Certification Area Projections - Special Education	<0.00%	0.5%
Certification Area Projections - ELL	0.06%	2.7%
Certification Area Projections - Vocational Education	0.01%	0.6%
Certification Area Projections - Other	0.06%	2.0%

Additional Test of Enrollment Projection Accuracy

In addition to considering the APE and MAPE of the enrollment projections, we also compared the projections with those that NCES produced in 2013-14 using enrollment data through 2010-11 (Hussar & Bailey, 2014). We found that our projections at the state level were comparable although slightly higher than NCES, averaging about a 0.33 percentage point difference. But it is important to note some key differences between the data underlying these two sets of projections. First, NCES projections included prekindergarten enrollments as part of their statewide total enrollment, whereas we do not.[54] In addition, the actual enrollments that are the basis of the NCES projections only go through 2010-11, whereas our projections use actual enrollments through 2013-14. In fact, actual enrollment in Oklahoma grew faster than NCES projected—an average of 0.5 percentage points each year. It is not surprising, therefore, that our projections predict faster growth in enrollment than those that NCES calculated.

Projection Limitations

Because all projections are based on an analysis of the rate at which particular components have changed historically, they are dependent on a percentage change in these metrics. Smaller metrics (i.e., enrollment in rural schools) might seem to change quite a bit percentage wise, but only a small amount in terms of actual enrollment counts. For example, consider two districts, one with 50 students in Grade 1 and one with 200 students in Grade 1. If 20 first-grade students are added in each district, this will represent a much larger relative change in the small district (40 percent) than in the large district (10 percent). As a result, small differences in counts over time can result in large differences in the percent changes over time if the initial underlying counts are small to begin with. For this reason, any projection based on applying a rate of change

[54] This decision is covered in detail in the Data and Methods section of this report.

observed in the past to future periods will be more prone to error the smaller the metric under consideration on average. This is a particular problem in Oklahoma due to the fact that a large number of districts have small student enrollments and thus correspondingly small counts of staff. This difficulty is recognized in the literature (Berk & Hodgins, 2008). In addition, as is the case with all projections, future shocks are inherently difficult to be anticipate with a high degree of accuracy.

Despite these limitations, we believe the projections presented in this report represent an illustration of educator supply and demand if historical trends in enrollment, Oklahoma births, and the educator workforce persist over the next five years.

Appendix B. User Guide to Oklahoma Educator Supply and Demand Databases

To facilitate our analysis of the supply-and-demand indicators, and provide the client with an interactive tool for reviewing the data in a variety of ways, the research team developed a series of five spreadsheet-based interactive table and chart tools. These five spreadsheet tools allow users to specify what information they would like to view in a table and chart and the tool automatically generates this information. The five tools are connected to the four main analyses in the study, but offers the client and its partners the opportunity to investigate further than the selected findings included in this report.

Each tool is formatted in a similar way. All have "I-Table" and "I-Chart" spreadsheets, and use dropdown menus for data selection. In general, Table 1 in the "I-Table" spreadsheet reports overall numbers across years, while Table 2 reports data for a single year by a contrast metric (i.e., gender, race). All "I-Chart" spreadsheets have three different interactive charts (or figures), but because of differences in the data being reported, these figures vary across tools.

This section provides a more detailed description of the data reported in each tool, as well as instructions that will help users navigate the tools.

Aggregate Pipeline Interactive Tables and Charts

Data Reported

We used the data reported in this file to answer Research Questions 1 and 3. This file includes aggregate pipeline data by IHE, major field of study, and original state of residence. In addition, this file includes disaggregated aggregate pipeline data by three contrast metrics (i.e., race, gender, and pipeline steps).

Tables

Table 1

In Table 1, users can view aggregate counts and row percentages of educator-preparation program completers from academic year 2009–10 to 2013–14 by each category using the "Category" dropdown menu. For example, by selecting the category "Major Field of Study," a user can create a table displaying the trends in program completion over time by major.

Table 2

In Table 2, users can view these data for a single academic year by a contrast metric—including race, gender, and pipeline steps—using the "Category," "Contrast," and "Year" dropdown menus. For example, by selecting the category "Graduating IHE," the contrast "Race," and the year "2014," a user can create a table displaying the count and column percentages of program completers by race for each reported IHE in 2013–14.

Charts

Figure 1

In Figure 1, users can create a line graph of the counts of program completers in components of the category metrics from academic year 2009–10 to 2013–14. For example, if users select "Graduating IHE," they can then select two IHEs to include in the line graph. This allows users to compare trends in the number of program completers over time.

Figure 2

In Figure 2, users can create a stacked column chart displaying the percentage of program completers in each pipeline step for a component of a given category from academic year 2009–10 to 2012–13. For example, if users select the category "Original State of Residence," they can then select one of the reported state categories to view in the stacked column chart. This allows users to compare trends in program-completer outcomes over time.

Figure 3

In Figure 3, users can create a column chart displaying the count of program completers by a particular category in a given year. For example, if users select the contrast "Graduating IHE" and the year "2013," they can identify the IHEs producing the most program completers in a given year.

Effective Pipeline Interactive Tables and Charts

Data Reported

We used the data reported in this file to answer Research Question 2. This file includes effective pipeline data for each primary position by IHE, major field of study, and original state of residence. In addition, this file includes disaggregated effective pipeline data by three contrast metrics (i.e., gender, race, and age).

Tables

Table 1

In Table 1, users can view counts and row percentages of recent educator preparation program completers newly employed in the state's public education system in each primary position from FY 2009–10 to 2013–14 by each of the categories listed earlier using the "Primary Position" and "Category" dropdown menus. For example, by selecting the position "Middle School–Science," and the category "Original State of Residence," users can create a table displaying the trends in program completers entering public education as middle school science teachers over time by their state of origin.

Table 2

In Table 2, users can view these data for a single fiscal year for each primary position by a contrast metric—including race, gender, and age—using the "Primary Position," "Category," "Contrast," and "Year" dropdown menus. For example, by selecting the position "Elementary," the category "Original State of Residence," the contrast "Age," and the year "2012," users can create a table displaying the count and column percentages of recent program completers newly entering the state's public education system as elementary teachers by age for each reported major field of study in 2011–12.

Charts

Figure 1

In Figure 1, users can create a line graph of the counts of recent program completers entering the state's public education system in each primary position from FY 2009–10 to 2013–14 by components of the category metrics. For example, if users select the position "Teachers" and "Major Field of Study," they can then select two majors to include in the line graph. This allows users to compare trends in recent program completers with these majors entering the state's public education system as teachers.

Figure 2

In Figure 2, users can create a column chart displaying the count of recent program completers entering from FY 2009–10 to 2013–14 by components of a category and a contrast. For example, if users select the position "High School–Science," the category "Graduating IHE," and the contrast "Race," they can then select one of the reported IHEs and one of the racial categories to view in the column chart. This allows one to compare trends in recent program completers of the selected race and graduating IHE entering the state's public education system as high school science teachers.

Figure 3

In Figure 3, users can create a stacked bar chart displaying the percentage of recent program completers by a particular contrast from FY 2009–10 to 2013–14. For example, if users select the contrast "Race" and the position "High School–Math," they can view the racial breakdown of recent program completers entering the state's public education system as high school math teachers over time.

Certification Interactive Tables and Charts

Data Reported

We used the data reported in this file to answer Research Questions 4–6. This file also includes certification data for each primary position by certification type. In addition, this file includes disaggregated certification data by nine contrast metrics (i.e., gender, race, region, age, free or

reduced-price lunch and minority quartiles, locale, certification area, and membership in the reserve pool).

Tables

Table 1

In Table 1, users can view counts and row percentages of individuals employed in the state's public education system with active certifications in each primary position from FY 2009–10 to 2014–15 by certification type using the "Primary Position" dropdown menu. For example, by selecting the position "Early Childhood," users can create a table displaying the trends in certification type for individuals employed as early childhood teachers over time.

Table 2

In Table 2, users can view these data for a single fiscal year for each primary position by a contrast metric—including gender, race, region, age, free or reduced-price lunch and minority quartiles, locale, certification area, and membership in the reserve pool—by using the "Primary Position," "Contrast," and "Year" dropdown menus. For example, by selecting the position "Charter," the contrast "Locale," and the year "2013," users can create a table displaying the count and column percentages of the certification types of charter teachers by the locale of their primary assignment in 2012–13.

Charts

Figure 1

In Figure 1, users can create a line graph of the counts of two certification types for educators in each primary position from FY 2009–10 to 2014–15. For example, if users select the position "High School–Social Studies," and "Alternative" and "Provisional" certifications, they can view trends in these certification types over time for those employed as high school social studies teachers.

Figure 2

In Figure 2, users can create a stacked column chart displaying the percentage of educators with each certification type from FY 2009–10 to 2014–15 by each primary position and a specific component of a contrast metric. For example, if users select the position "Middle School–Arts & Music," and the contrast "Region," they can then select one of the regions of the state to view in the chart. This allows users to compare trends in certification types of the selected region for those employed as middle school arts and music teachers.

Figure 3

In Figure 3, users can create a stacked bar chart displaying the percentage of educators with each certification type from FY 2009–10 to 2014–15 for each primary position. For example, if users select the position "District-wide Staff," they can view the breakdown of certification types for individuals employed to provide districtwide services over time.

Mobility Interactive Tables and Charts

Data Reported

We used the data reported in this file to answer Research Questions 8 and 9. This file also includes mobility trend data for each primary position. In addition, this file includes disaggregated mobility trend data by eight contrast metrics (i.e., gender, race, region, age, free or reduced-price lunch and minority quartiles, locale, and size).

Tables

Table 1

In Table 1, users can view counts and row percentages of individuals in each primary position by mobility category[55] from FY 2009–10 to 2014–15 using the "Primary Position" dropdown menu. For example, by selecting the position "Middle School–Language Arts," users can create a table displaying the trends in mobility for middle school language arts teachers over time.

Table 2

In Table 2, users can view these data for a single fiscal year for each primary position by a contrast metric—including gender, race, region, age, free or reduced-price lunch and minority quartiles, locale, and size[56]—using the "Primary Position," "Contrast," and "Year" dropdown menus. For example, by selecting the position "High School–Vocational Education," the contrast "Gender," and the year "2015," users can create a table displaying the count and column percentages of high school vocational education teachers in each mobility category by gender in 2014—15.

Charts

Figure 1

In Figure 1, users can create a line graph of the counts of educators in each primary position and two mobility categories[57] from FY 2009—10 to 2014—15. For example, if users select the position "Teachers," and the mobility categories "New" and "Leavers," they can compare trends in teachers newly entering and leaving the state's public education system over time.

Figure 2

In Figure 2, users can create a stacked column chart displaying the percentage of educators in each mobility category from FY 2009—10 to 2014—15 by each primary position and a specific component of a contrast metric. For example, if users select the position "Administrative," and

[55] Mobility categories include leavers, new, stayers, movers: different district and different position; movers: same district but different position; and movers: different district but same position.
[56] Note that the size contrast metric divides school and district enrollments in quartiles labeled as small, small–medium, large–medium, and large.
[57] Note that for Figure 1, Figure 2, and Figure 3, all mover categories have been rolled into one.

the contrast “Size,” they can then select one of the size categories to view in the chart. This allows users to compare trends in mobility for those employed in an administrative position with their primary assignment in a school of the selected size.

Figure 3

In Figure 3, users can create a stacked bar chart displaying the percentage of educators in each mobility category from FY 2009–10 to 2014–15 for each primary position. For example, if users select the position “Librarians,” they can view the breakdown of mobility categories for individuals employed as librarians over time.

Supply and Demand Interactive Tables and Charts

Data Reported

We used the data reported in this file to answer Research Questions 11–13. This file also includes supply and demand projections for each primary position by region. In addition, this file includes a comparison of supply-and-demand projections for each primary position by region.

Tables

Table 1

In Table 1, users can view counts and year-to-year relative changes in historical and projected supply from FY 2009–10 to 2018–19 for each primary position by region using the “Primary Position” dropdown menu. For example, by selecting the position “Middle School – Social Studies” users can create a table displaying trends in the historical and projected supply of middle school social studies teachers over time by region.

Table 2

In Table 2, users can view counts and year-to-year relative changes in historical and projected demand from FY 2009–10 to 2018–19 for each primary position by region using the “Primary Position” dropdown menu. For example, by selecting the position “High School – Arts & Music,” users can create a table displaying trends in the historical and projected demand of high school arts and music teachers over time by region.

Table 3

In Table 3, users can count and year-to-year relative difference between historical and projected supply and demand from FY 2009–10 to 2018–19 for each primary position by region using the “Primary Position” dropdown menu. For example, by selecting the position “Elementary,” users can create a table displaying trends in the difference between historic as well as projected supply and demand of elementary teachers over time by region.

Charts

Figure 1

In Figure 1, users can create a column chart of the counts of historical as well as projected supply or demand in each primary position from FY 2009–10 to 2018–19 for a particular region of the state using the "Supply or Demand," "Position," and "Region" dropdown menus. For example, if users select "Supply," the position "Teachers," and the region "Southeast," they can view trends in the historical as well as projected supply of teachers over time.

Figure 2

In Figure 2, users can create a line graph displaying historical as well as projected counts of supply and demand for each primary position from FY 2009–10 to 2018–19 in a particular region of the state. For example, if users select the position "High School – Science" and the region "Central," they can compare trends in the historical as well as projected supply and demand of high school science teachers in the central region over time. By considering which is projected to be larger, users can assess whether a shortage or surplus is expected in future years.

Appendix C. Codebooks for New Variables

Here are the new codes we used for the metrics that were created, including the Region Metric (Exhibit C.1); the Consolidated Certification Area Code (Exhibit C.2); Consolidated Certification Type Code (Exhibit C.3); the Consolidated Personnel Data Subject Code (Exhibit C.4); and the Primary Position Metric (Exhibit C.5). Note that all components listed here do not necessarily appear in the overarching categories in all years of the data. The Personnel Data Subject Codes also were coded inconsistently from 2005–06 to 2009–10, and thus we provided separate coding for each of these years.

Exhibit C.1. Region Metric

County	Region
ALFALFA	Northwest
BEAVER	
BLAINE	
CIMARRON	
DEWEY	
ELLIS	
GARFIELD	
GRANT	
HARPER	
KAY	
KINGFISHER	
MAJOR	
NOBLE	
PAYNE	
TEXAS	
WOODS	
WOODWARD	
ADAIR	Northeast
CHEROKEE	
CRAIG	
CREEK	
DELAWARE	
MAYES	
MC INTOSH	
MUSKOGEE	
NOWATA	
OKMULGEE	
OSAGE	
OTTAWA	
PAWNEE	
ROGERS	
SEQUOYAH	
TULSA	
WAGONER	
WASHINGTON	

County	Region
BECKHAM	Southwest
CADDO	
COMANCHE	
COTTON	
CUSTER	
GRADY	
GREER	
HARMON	
JACKSON	
JEFFERSON	
KIOWA	
MC CLAIN	
ROGER MILLS	
STEPHENS	
TILLMAN	
WASHITA	
ATOKA	Southeast
BRYAN	
CARTER	
CHOCTAW	
COAL	
GARVIN	
HASKELL	
JOHNSTON	
LATIMER	
LE FLORE	
LOVE	
MARSHALL	
MC CURTAIN	
MURRAY	
PITTSBURG	
PONTOTOC	
PUSHMATAHA	
CANADIAN	Central
CLEVELAND	
HUGHES	
LINCOLN	
LOGAN	
OKFUSKEE	
OKLAHOMA	
POTTAWATOMIE	
SEMINOLE	

Exhibit C.2. Certification Area Code

Area Code	New Category	New Code
501-SUPERINTENDENT	Administrative	100
502-ELEMENTARY SUPERINTENDENT		
503-SECONDARY PRINCIPAL		
504-MIDDLE LEVEL PRINCIPAL		
505-ELEMENTARY PRINCIPAL		
506-CAREER TECHNOLOGY SUPERINTENDENT		
507-VOCATIONAL ADMINISTRATION		
511-CENSUS & ATTENDANCE		
517-SCHOOL PSYCHOLOGIST	Pupil Support	110
519-SCHOOL PSYCHOMETRIST		
524-ELEMENTARY COUNSELOR		
525-SCHOOL COUNSELOR		
526-SECONDARY COUNSELOR		
527-TEACHER COUNSELOR		
529-VISITING COUNSELOR		
7005-SCHOOL NURSE		
509-AUDIO VISUAL SPECIAL	Instructional Support	120
513-LIBRARIAN		
515-LIBRARY MEDIA SPECIALIST		
531-CURRICULUM		
2021-READING SPECIALIST		
8021-CURRICULUM SUPERVISOR		
1001-EARLY CHILDHOOD	Early Childhood	200
1002-Spec E.C. Kindergarten		
1003-EARLY CHILDHOOD		
1004-FOUR YEAR OLDS AND YOUNGER		
1501-ELEMENTARY EDUCATION	Elementary	300
1600-ELEMENTARY EDUCATION		
4001-AMERICAN LITERATURE	Language Arts	400
4003-ENGLISH LITERATURE		
4005-GRAMMAR & COMPOSITION		
4015-WORLD LITERATURE		
4050-ENGLISH		
4150-MID-LEVEL ENGLISH		
2001-ART	Art /Music	500
2013-INSTRUMENTAL/GENERAL MUSIC		
2014-GENERAL MUSIC		
2015-VOCAL/GENERAL MUSIC		
2050-MUSIC		
2075-ART		
2085-MUSIC		
3515-ECONOMICS	Social Studies	600
6503-ANCIENT/MEDIEVAL HISTORY		
6505-BLACK HISTORY		
6515-INTERNATIONAL PROBLEMS		
6517-OKLAHOMA HISTORY		
6519-SOCIOLOGY/ANTHROPOLOGY		

Area Code	New Category	New Code
6552-WORLD HISTORY/GEOGRAPHY	Social Studies	600
6554-PSYCHOLOGY/SOCIOLOGY		
6560-MID-LEVEL SOCIAL STUDIES		
8013-PSYCHOLOGY		
2003-FRENCH	Foreign Language	700
2005-GERMAN		
2006-RUSSIAN		
2007-LATIN		
2008-ITALIAN		
2009-OTHER FOREIGN LANGUAGE		
2010-NATIVE AMERICAN LANGUAGE		
2011-SPANISH		
2012-CHINESE		
2025-CHEROKEE		
2026-SAUK		
2027-CHOCTAW		
2080-FOREIGN LANGUAGE		
3701-FRENCH		
3703-GERMAN		
3705-LATIN		
3707-OTHER FOREIGN LANGUAGE		
3711-SPANISH		
5501-ALGEBRA	Math	800
5503-ANALYSIS		
5505-CALCULUS		
5511-GEOMETRY		
5513-LINEAR ALGEBRA		
5515-STATISTICS		
5517-TRIGONOMETRY		
5550-ADVANCED MATHEMATICS		
5553-ELEMENTARY MATH SPECIALIST		
5554-MID-LEVEL MATH - NOT FOR HIGH SCHO		
5555-MID-LEVEL MATH FOR HIGH SCHOOL CR		
5575-MATH		
6001-ANATOMY/PHYSIOLOGY	Science	900
6003-BIOLOGY		
6006-CHEMISTRY		
6009-EARTH SCIENCE		
6013-PHYSICAL SCIENCE		
6017-ZOOLOGY		
6050-BIOLOGICAL SCIENCES		
6052-EARTH/PHYSICAL SCIENCE		
6507-CONSERVATION OF NATURAL RESOURCES		
520-SPEECH-LANGUAGE PATHOLOGY ASSISTANT	Special Education	1000
521-SPEECH-LANGUAGE PATHOLOGIST		
522-SPEECH-LANGUAGE THERAPIST		
523-SPEECH PATHOLOGIST		
621-SPEECH PATHOLOGIST-EMERGENCY		
2501-EMOTIONALLY DISTURBED		

Area Code	New Category	New Code
2503-HEARING IMPAIRED	Special Education	1000
2505-LEARNING DISABILITY		
2507-MENTALLY HANDICAPPED		
2509-PHYSICALLY HANDICAPPED		
2550-BLIND/VISUAL IMPAIRMENT		
2552-DEAF/HARD OF HEARING		
2556-MILD-MODERATE DISABILITIES		
2558-SEVERE-PROFOUND/MULTIPLE DISABILIT		
2601-EMOTIONALLY DISTURB - EMERGENCY		
2607-MENTALLY HANDICAPED-EMERGENCY		
2609-PHYSICALLY HANDICAPED -EMERGENCY		
9804-OTHER HEALTH IMPAIRMENT		
9805-TRAUMATIC BRAIN INJURY		
8011-ENGLISH AS A SECOND LANGUAGE	ELL	1100
3001-AGRICULTURE-GENERAL	Vocational Education	1200
3501-ACCOUNTING		
3503-BUSINESS ENGLISH		
3507-BUSINESS MACHINES		
3509-BUSINESS MATH		
3511-CAREER/ OCCUPATIONAL INFORMATION		
3513-COMPUTERS IN BUSINESS/INFORMATION		
3519-GENERAL BUSINESS		
3521-MANAGEMENT		
3523-MARKETING		
3525-OFFICE PROCEDURES/MANAGEMENT		
3527-SHORTHAND		
3550-BUSINESS EDUCATION		
4501-HOME ECONOMICS		
4505-CAREER EDUCATION		
4507-CHILD DEVELOPMENT/PARENT EDUCATION		
4509-CONSUMER EDUCATION		
4511-NUTRITION EDUCATION		
4513-TEXTILES/CLOTHING		
5001-DRAFTING TECHNOLOGY		
5003-ELECTRIC/ELECTRONICS		
5005-GENERAL INDUSTRIAL ARTS		
5007-GRAPHICS		
5009-METAL TECHNOLOGY		
5013-WOOD TECHNOLOGY		
5507-COMPUTER SCIENCE/APPLICATIONS		
6007-COMPUTER APPLICATIONS		
7501-MARKETING EDUCATION		
7503-OCCUPATIONAL AGRICULTURE		
7511-VOCATIONAL AGRICULTURE		
7513-VOCATIONAL BUSINESS-OFFICE		
7514-CAREER TECH BUSINESS		
7559-OCCUPATIONAL FAMILY/CONSUMER SCI		
7575-CAREER TECH FAMILY/CONSUMER SCIEN		
8001-AERONAUTICS		

Area Code	New Category	New Code
8009-DRIVER/SAFETY EDUCATION	Vocational Education	1200
8501-GENERAL TECHNOLOGY EDUCATION		
8503-COMMUNICATIONS TECHNOLOGY		
8550-TECHNOLOGY ENGINEERING		
9001-TECHNOLOGY ENGINEERING/INDUSTRIAL		
9003-TECHNOLOGY ENGINEERING/INDUSTRIAL		
2017-HEALTH	Other	1300
2019-PHYSICAL EDUCATION/HEALTH/SAFETY		
4007-JOURNALISM		
4011-NEWSPAPER		
4013-SPEECH & DRAMA		
4017-YEARBOOK		
4101-JOURNALISM		
4201-SPEECH & DRAMA		
4250-SPEECH/DRAMA/DEBATE		

Exhibit C.3. Certification Type Code

Certificate Code	New Category	New Code
S - Standard	Standard	10
ALT - Alternative	Alternative	20
J - Alternative Administrative		
M - Alternative License		
N - Alternative License		
O - Alternative License		
Y - Alternative Standard		
Z - Alternative Standard (Coursework Not Completed)		
E - Emergency	Emergency	30
A - Provisional I	Provisional	40
B - Provisional II		
C - Provisional I CareerTech		
D - Provisional II CareerTech		
F - Provisional		
H - License (July 01-02 - Residency)	License	50
I - License (July 01-02 - No Residency)		
L - License		
PSTND - Paraprofessional Standard	Paraprofessional	60
Q - Certified Paraprofessional Path		
R - Certified Paraprofessional Path		
G - One-Time Extension	Other	70
Guest - Visiting Teacher		
INF - Infant Toddler and Three-Year Olds		
K - ABCTE		
NAL - Native American Languages		
P - Professional		
SLTA - Speech Language Therapy Assistant		
SPED - Non-Traditional Special Education Provisional		
T - Teach For America		
U - Career Tech License		

Exhibit C.4. Personnel Data Subject Code

2005–06 to 2006–07

Original Subject Code/Description	Consolidated Subject Code/Description
0-NONSUBJECT	100 – Non-Subject
1011-EARLY CHILDHOOD A.M.	200 – Early Childhood
1012-EARLY CHILDHOOD P.M.	
1013-EARLY CHILD. FULLDAY	
1020-KINDERGARTEN	300 – Elementary
1030-TRANS/DEVELOP 1ST GD	
1040-M-G INCL KINDGTN	
1050-ELEM ED (SC GD CD)	
1060-M-G NO KINDGTN	
1110-LANG ARTS	400 – Language Arts
1130-READING	
4000-LANGUAGE ARTS	
4010-AP LIT & COMP	
4020-CREATIVE WRITING	
4046-FOUND FOR ENGLISH	
4050-ENGLISH	
4100-LANGUAGE ARTS	
4200-LANGUAGE ARTS	
4900-REMEDIAL READING	
1170-ART (GENERAL-ELEM)	500 – Arts & Music
1180-MUSIC (ELEM)	
1210-DANCE (ELEM)	
1310-ART	
1350-MUSIC	
2800-ART EDUCATION	
2900-MUSIC EDUCATION	
4040-DRAMA	
1150-SOCIAL STUDIES	600 – Social Studies
5400-SOCIAL STUDIES	
1200-ELEM FOREIGN LANG	700 – Foreign Language
3100-FOREIGN LANGUAGE	
1120-MATHEMATICS	800 - Math
4400-MATHEMATICS	
1140-SCIENCE	900 - Science
5000-SCIENCE	
1330-ESL	1100 - ESL
4060-ESL	
8110-EQUINE MGMT & PRODUC	1200 – Vocational Education
8130-HORTICULTURE	
8210-AGRISCIENCE	
8220-AG PWR & TECH	
8230-FUND AG SCIENCES	
8250-AGRIBUSINESS	
8270-ENV SCI & NAT RESC	
8290-AG ORIENTATION GRD 8	

Original Subject Code/Description	Consolidated Subject Code/Description
8280-PRINC OF AGRIC TECH	1200 – Vocational Education
8290-AG ORIENTATION GRD 8	
8331-BUS MGMT & SUPERV	
8333-COOP MKTG FUND	
8335-FASHION MERCHANDSG	
8336-MARKETING FUND	
8337-INTRO TO BUS & MARKT	
8348-SPORTS ENT.MKT MGN	
8430-BUS MGT/ADMIN CLUSTER	
8450-COMPUTERIZED ACCOUNTING	
8460-INFORMATION TECHNOLOGY CLUSTER	
8511-HEALTH CAREER CERT	
8517-PRAC NURSING ED	
8530-HEALTH CLUSTER	
8540-HEALTH SCIENCE TECH	
8593-TECHNOLOGY ED	
8597-TECHNOLOGY CONNECT I (9-10)	
8599-TECHNOLOGY CONNECT DIV PRGMS	
8600-CT FMY & CONS SC	
8710-CT FMY & CONS SC	
8720-CAREER ORIENTATION	
8740-CT COOP FMY & CONS S	
8810-EARLY CARE & EDU.	
8830-CULINARY ARTS	
8850-HOME MG & IND SVC	
8870-OCCUPATIONAL SERVICES	
8880-INTRO TO CT Career	
8920-BUS DEVEL PROG (BDP)	
8980-LEA ASSIGNED	
8990-TIPS PROJECTS	
9010-AC & REFRIG	
9040-AUTOMOBILE TECH	
9060-AVIATION AVIONICS	
9070-BLDG MAINT TRNG	
9080-CABINET MAKING	
9090-CARPENTRY	
9130-COMP AIDED DRFTG	
9140-COMPUTER REPAIR	
9160-COSMETOLOGY	
9290-HORTICULTURE	
9330-IND ELECTRICITY	
9350-IND TECHNOLOGY	
9410-MASONRY	
9470-PLUMBING	
9480-GRAPHIC COMM	
9540-WELDING	
9570-INTRO TO CAREER TECH	
9610-AT/AE CONST	
9620-AT/AE MECHAN	

Original Subject Code/Description	Consolidated Subject Code/Description
9660-AT/AE MFG METAL	1200 – Vocational Education
9710-ICE-INDIV COOP ED	
9980-ALL CT AND T&I PROG	
9990-OTH CT PROGS	
1321-COMPUTER LITERACY	1300 – Other
1322-KEYBOARDING	
1340-HLTH/NUTR	
1360-PE/HLTH	
1370-REMEDIAL RDG	
1380-GIFTED & TALENTED	
1385-COMPETITIVE ATHL	
1390-OTHER CLASSES	
2000-AGRICULTURE	
2100-BUSINESS ED	
2500-COMP ED-PROGRAM ONLY	
2710-DRIVER EDUCATION	
2720-SAFETY EDUCATION	
2790-OTH DRIVER/SAFETY ED	
3300-HLTH/PE	
3400-FAM & CONS SCIENCES	
3500-IND ARTS/TECH ED	
4030-DEBATE	
4110-JOURNALISM	
6510-ROTC	
6511-GIFTED & TALENTED	
6512-REMEDIATION	
6513-ALTERNATIVE ED	
6590-OTHER TEACHING ASSG	
7610-MIDDLE SCHOOL	
7620-JR. HIGH SCHOOL	
7630-MID-HIGH SCHOOL	
7640-SR. HIGH SCHOOL	
7650-DISTRICT WIDE	
7660-ALL SECONDARY SCHOOL	

2007–08

Original Subject Code/Description	Consolidated Subject Code/Description
0-NONSUBJECT	100 – Non-Subject
1011-EARLY CHILDHOOD A.M.	200 – Early Childhood
1012-EARLY CHILDHOOD P.M.	
1013-EARLY CHILD. FULLDAY	
1020-KINDERGARTEN	300 – Elementary
1030-TRANS/DEVELOP 1ST GD	
1040-M-G INCL KINDGTN	
1050-ELEM ED (SC GD CD)	
1060-M-G NO KINDGTN	
1110-LANG ARTS	400 – Language Arts
1130-READING	
4000-LANGUAGE ARTS	
4010-AP LIT & COMP	
4020-CREATIVE WRITING	
4046-FOUND FOR ENGLISH	
4050-ENGLISH	
4100-LANGUAGE ARTS	
4200-LANGUAGE ARTS	
4900-REMEDIAL READING	
1170-ART (GENERAL-ELEM)	500 – Arts & Music
1180-MUSIC (ELEM)	
1200-HUMANITIES (ELEM)	
1210-DANCE (ELEM)	
1310-ART	
1350-MUSIC	
2800-ART EDUCATION	
2900-MUSIC EDUCATION	
4040-DRAMA	
2300-SOCIAL STUDIES (ELEM)	600 – Social Studies
5400-SOCIAL STUDIES	
2100-FOREIGN LANGUANGE (ELEM)	700 – Foreign Language
3100-FOREIGN LANGUAGE	
2200-MATHEMATICS (ELEM)	800 - Math
4400-MATHEMATICS	
2250-SCIENCE (ELEM)	900 - Science
5000-SCIENCE	
1310-ENGLISH AS A 2ND LAN (ELEM)	1100 - ESL
4060-ESL	
8100-AG EXPLOR & ORIENT	1200 – Vocational Education
8201-INTRO TO AGSCIENCE	
8202-AGRISCIENCE II	
8210-PLNT & SOIL SCI PATH	
8220-AGRI POW STRUC TECH	
8230-ANIMAL SCIENCE PATH	
8250-AGRISCIENCE PATHWAY	
8260-AGRI COMM PATHWAY	
8270-NAT RES & ENV SCI P	
8280-HORTICULUTRE	

Original Subject Code/Description	Consolidated Subject Code/Description
8300-BUYING/FASHION MERCH	1200 – Vocational Education
8315-SPORTS & ENTRTN MKT	
8320-MRKT COMM & PROMO	
8330-ENTREPRENEURSHIP	
8400-BUS & INFO TECH FOUN	
8405-ADMIN & INFO SUPPORT	
8410-ADM & INFO SUPP LEG	
8420-AD & INFO SUPP MED	
8430-BUS MANGMT ACCT	
8446-HUMAN RESOURCES	
8460-FINANCE & INVEST PLN	
8465-BUS FIN MGMT	
8480-NTWK SYS-NTWK SER	
8500-INFO SUPP & SER-SYS	
8505-INFO SUPP & SER DB	
8521-INTER MEDIA DSKTP PB	
8526-INTER MEDIA-VIDEO	
8530-INTR MEDI-WEB SER	
8538-PROG & SOFTWARE DEV	
8550-C & T HEALTH EDU	
8600-CA & TCH FA & CS EDU	
8710-CA & TCH FA & CS	
8720-CAREER ORIENTATION	
8740-C&T COOP F&C SCI	
8810-EARLY CARE & EDU	
8840-INTERIOR DESIGN	
8850-HM MGT & IND SER	
8870-OCCUPATIONAL SERVICE	
8880-INT TO C&T CAREERS	
8920-BUS DEVELOP PRGRAM	
8980-ASSIGNED BY LEA	
9010-TECHNOLOGY EDUCATION	
9020-TECHCONNECT	
9040-AIR CONDITIONG & REF	
9070-AUTO SER COLL TCH	
9090-BLD MAINT TECH	
9110-CABINET MAKING	
9120-CARPENTRY	
9150-CPU AIDED DRAFTING	
9160-CPU RPR NTWG	
9170-CONST MCH TR TECH	
9180-COSMETOLOGY	
9200-DRAFTING	
9310-IND ELECT	
9410-MASONRY	
9470-PLUMBING	
9480-GRAPHIC COM	
9540-WELDING	
9620-SM ENGINES	

Original Subject Code/Description	Consolidated Subject Code/Description
9640-COMMUNICATIONS	1200 – Vocational Education
9710-ICE IND COOP EDU	
9730-VIDEO PRODUCTION	
1120-SPEECH (ELEM)	1300 – Other
1140-LIBRARY SCIENCE (ELEM)	
1150-NEWSPAPER/YEARBOOK (ELEM)	
1164-FAMILY & CONS SCI (ELEM)	
1220-TECH ED/INDUST ARTS (ELEM)	
1230-AGRICULTURE (ELEM)	
1320-COMPUTER TECH ED (ELEM)	
1335-KEYBOARDING (ELEM)	
1340-HEALTH/NUTRITION (ELEM)	
1350-CAREERS/EXPLORATION (ELEM)	
1360-PHYSICAL EDUCATION (ELEM)	
1383-LEAP-PREK-GRADE 8 (ELEM)	
1384-STDY SKLS-PREK-GR 8 (ELEM)	
1385-CHAR ED-PREK-GRADE 8 (ELEM)	
1386-COMM SKLS-PREK-GR 8 (ELEM)	
2400-BUSINESS EDUC	
2500-COMPUTER EDUC	
2600-AGRICULTURE	
2710-DRIVER EDUCATION	
2720-ROTC	
2725-STUDY SKILLS	
2735-ACADEMIC TEAM	
2740-ACT SAT PSAT NMQT	
2745-CHARACTER EDUCATION	
2750-COMMUNICATION SKILLS	
2755-CRITICAL THINK SKLS	
2760-LEADERSHIP	
2765-LIFE SKILLS	
2775-SERVICE LEARNING	
2950-HUMANITIES	
3300-HEALTH/PHYSICAL ED	
3400-FAM & CONSUMER SCI	
3500-INDUS ARTS/TECH ED	

2008–09

Original Subject Code/Description	Consolidated Subject Code/Description
0-NONSUBJECT	100 – Non-Subject
1010-PREKINDERGARTEN	200 – Early Childhood
1020-KINDERGARTEN	300 – Elementary
1030-TRANSITION/DEV 1STGR	
1050-ELEM ED (SELF CONT)	
1110-LANGUAGE ARTS (ELEM)	400 – Language Arts
1130-READING (ELEM)	
4000-LANGUAGE ARTS	
1170-FINE ARTS	500 – Arts & Music
1200-HUMANITIES (ELEM)	
2800-ARTS	
3000-MUSIC	
2300-SOCIAL STUDIES (ELEM)	600 – Social Studies
5400-SOCIAL STUDIES	
2100-WORLD LANGUAGES	700 – Foreign Languages
3100-WORLD LANGUAGES	
2200-MATHEMATICS (ELEM)	800 – Math
4400-MATHEMATICS	
2250-SCIENCE (ELEM)	900 – Science
5000-SCIENCE	
1310-ENGLISH AS A 2ND LAN (ELEM)	1100 - ELL
8100-AG EXPLOR & ORIENT	1200 – Vocational Education
8201-INTRO TO AGSCIENCE	
8202-AGRISCIENCE II	
8210-PLNT & SOIL SCI PATH	
8220-AGRI POW STRUC TECH	
8230-ANIMAL SCIENCE PATH	
8250-AGRISCIENCE PATHWAY	
8260-AGRI COMM PATHWAY	
8270-NAT RES & ENV SCI P	
8280-HORTICULUTRE	
8300-BUYING/FASHION MERCH	
8315-SPORTS & ENTRTN MKT	
8320-MRKT COMM & PROMO	
8330-ENTREPRENEURSHIP	
8345-DISTRIBUTION/LOGIST	
8400-BUS & INFO TECH FOUN	
8405-ADMIN & INFO SUPPORT	
8410-ADM & INFO SUPP LEG	
8420-AD & INFO SUPP MED	
8430-BUS MANGMT ACCT	
8446-HUMAN RESOURCES	
8460-FINANCE & INVEST PLN	
8480-NTWK SYS-NTWK SER	
8500-INFO SUPP & SER-SYS	
8505-INFO SUPP & SER DB	
8521-INTER MEDIA DSKTP PB	
8526-INTER MEDIA-VIDEO	

Original Subject Code/Description	Consolidated Subject Code/Description
8530-INTR MEDI-WEB SER	1200 – Vocational Education
8538-PROG & SOFTWARE DEV	
8550-C & T HEALTH EDU	
8600-CA & TCH FA & CS EDU	
8710-CA & TCH FA & CS	
8720-CAREER ORIENTATION	
8740-C&T COOP F&C SCI	
8810-EARLY CARE & EDU	
8830-CULINARY ARTS	
8850-HM MGT & IND SER	
8980-ASSIGNED BY LEA	
8990-TIP PROJECTS	
9010-TECHNOLOGY EDUCATION	
9020-TECHCONNECT	
9040-AIR CONDITIONG & REF	
9070-AUTO SER COLL TCH	
9090-BLD MAINT TECH	
9120-CARPENTRY	
9150-CPU AIDED DRAFTING	
9160-CPU RPR NTWG	
9170-CONST MCH TR TECH	
9180-COSMETOLOGY	
9310-IND ELECT	
9410-MASONRY	
9470-PLUMBING	
9480-GRAPHIC COM	
9540-WELDING	
9620-SM ENGINES	
9640-COMMUNICATIONS	
9710-ICE IND COOP EDU	
9730-VIDEO PRODUCTION	
1060-HIGH SCHOOL EDUCATION	1300 – Other
1120-SPEECH (ELEM)	
1140-LIBRARY SCIENCE (ELEM)	
1150-NEWSPAPER/YEARBOOK (ELEM)	
1164-FAMILY & CONS SCI (ELEM)	
1220-TECH ED/INDUST ARTS (ELEM)	
1230-AGRICULTURE (ELEM)	
1320-COMPUTER TECH ED (ELEM)	
1330-KEYBOARDING	
1340-HEALTH/NUTRITION (ELEM)	
1350-CAREERS/EXPLORATION (ELEM)	
1360-PHYSICAL EDUCATION (ELEM)	
1383-LEADERSHIP ACHV PRG (LEAP)	
1384-ACADEMIC ACHIEVEMENT	
1385-CHARACTER EDUCATION	
1386-COMMUNICATION SKILLS	
1450-PERSONAL FINANCIAL LITERACY	
2400-BUSINESS EDUC	

Original Subject Code/Description	Consolidated Subject Code/Description
2500-COMPUTER EDUC	1300 – Other
2600-AGRICULTURE	
2710-DRIVER EDUCATION	
2715-SAFETY EDUCATION	
2720-ROTC	
2725-ACADEMIC ACHIEVEMENT	
2735-ACADEMIC TEAM	
2740-ACT SAT PSAT NMQT	
2745-CHARACTER EDUCATION	
2750-COMMUNICATION SKILLS	
2755-CRITICAL THINK SKLS	
2760-LEADERSHIP	
2765-LIFE SKILLS	
2775-SERVICE LEARNING	
2950-HUMANITIES	
3300-HEALTH/PHYSICAL ED	
3400-FAM & CONSUMER SCI	
3500-INDUS ARTS/TECH ED	

2009–10 to 2014–15

Original Subject Code/Description	Consolidated Subject Code/Description
0-NONSUBJECT	100 – Non-Subject
1010-PREKINDERGARTEN *(2010-2013)*	200 – Early Childhood
1012-PREKINDERGARTEN *(2014-2015)*	
1013-PREKINDERGARTEN *(2014-2015)*	
1020-KINDERGARTEN *(2010-2013)*	300 – Elementary
1022-KINDERGARTEN (HALF DAY) *(2014)*	
1023-KINDERGARTEN (FULL DAY) *(2014)*	
1022-TRANS. KINDERGARTEN *(2015)*	
1023-KINDERGARTEN *(2015)*	
1024-KINDERGARTEN *(2015)*	
1030-TRANSITION/DEV 1STGR	
1041-TRANS. FIRST GRADE (K TO 1) *(2015)*	
1042-TRANS. SECOND GRADE (1 TO 2) *(2015)*	
1044-TRANS. FOURTH GRADE (3 TO 4) *(2015)*	
1050-ELEM ED (SELF CONT)	
1110-LANGUAGE ARTS (ELEM)	400 – Language Arts
1130-READING (ELEM)	
4000-LANGUAGE ARTS	
1170-FINE ARTS	500 – Arts & Music
1200-HUMANITIES (ELEM)	
2800-ARTS	
3000-MUSIC	
2300-SOCIAL STUDIES (ELEM)	600 – Social Studies
5400-SOCIAL STUDIES	
2100-WORLD LANGUAGES	700 – Foreign Languages
3100-WORLD LANGUAGES	
2200-MATHEMATICS (ELEM)	800 – Math
4400-MATHEMATICS	
2250-SCIENCE (ELEM)	900 – Science
5000-SCIENCE	
1310-ENGLISH AS A 2ND LAN (ELEM)	1100 - ELL
8000-AGRICULTURE ED	1200 – Vocational Education
8100-BUSINESS AND IT	
8400-FAMILY & CONSUMER SCI	
8550-HEALTH CAREERS	
8600-MARKETING EDUCATION	
8700-SCIENCE/TECH/ENGINEER/MATH	
8800-TECHNOLOGY EDUCATION	
8900-TRADE & INDUST EDUC	
9000-AG/FOOD/NATURAL RESOURCES	
9050-ARCHITECTURE & CONSTR	
9125-ARTS/AV TECH AND COMM	
9200-BUISNESS/MGMT/ADMINISTRATION	
9240-EDUCATION AND TRAINING	
9250-FINANCE	
9290-GOVERNMENT/PUBLIC ADMIN	
9300-HEALTH SCIENCE	
9425-HOSPITALITY AND TOURISM	

Original Subject Code/Description	Consolidated Subject Code/Description
9475-HUMAN SERVICES	1200 – Vocational Education
9525-INFORMATION TECHNOLOGY	
9675-MANUFACTURING	
9775-MARKETING SALES & SERVICE	
9850-SCIENCE/TECH/ENGINEER/MATH	
9900-TRANS/DISTRIBUTION/LOGISTICS	
1060-HIGH SCHOOL EDUCATION	1300 – Other
1120-SPEECH (ELEM)	
1140-LIBRARY SCIENCE (ELEM)	
1150-NEWSPAPER/YEARBOOK (ELEM)	
1164-FAMILY & CONS SCI (ELEM)	
1220-TECH ED/INDUST ARTS (ELEM)	
1230-AGRICULTURE (ELEM)	
1320-COMPUTER TECH ED (ELEM)	
1330-KEYBOARDING	
1340-HEALTH/NUTRITION (ELEM)	
1350-CAREERS/EXPLORATION (ELEM)	
1360-PHYSICAL EDUCATION (ELEM)	
1383-LEADERSHIP ACHV PRG (LEAP)	
1384-ACADEMIC ACHIEVEMENT	
1385-CHARACTER EDUCATION	
1386-COMMUNICATION SKILLS	
1387-ACADEMIC TEAM	
1450-PERSONAL FINANCIAL LITERACY	
2400-BUSINESS EDUC	
2500-COMPUTER EDUC	
2600-AGRICULTURE	
2710-DRIVER EDUCATION	
2715-SAFETY EDUCATION	
2720-ROTC	
2725-ACADEMIC ACHIEVEMENT	
2735-ACADEMIC TEAM	
2740-ACT SAT PSAT NMQT	
2745-CHARACTER EDUCATION	
2750-COMMUNICATION SKILLS	
2755-CRITICAL THINK SKLS	
2760-LEADERSHIP	
2765-LIFE SKILLS	
2770-ACE	
2775-SERVICE LEARNING	
2950-HUMANITIES	
3300-HEALTH/PHYSICAL ED	
3400-FAM & CONSUMER SCI	
3500-INDUS ARTS/TECH ED	

Exhibit C.5. Primary Position Metric

Position	Job Codes	Subject Codes	Site Levels
District-wide Staff	*All job codes assigned to the "DISTRICT-WIDE SERVICES" site level.*	*All subject codes assigned to the "DISTRICT-WIDE SERVICES" site level.*	6-DISTRICT WIDE SERVICES
Administrative	101-SUPERVISOR	100 - Non-Subject	*All site levels for the given job codes.*
	104-DEAN		
	105-ASST/VICE PRINCIPAL		
	106-ASST SUPERINTENDENT		
	107-EXECUTIVE ASSISTANT		
	108-INST PROG DIRECTOR		
	109-MANAGER		
	110-NONINST PROG DIRECTOR		
	112-PRINCIPAL		
	115-SUPERINTENDENT		
Guidance Counselor	203-COUNSELOR	100 - Non-Subject	*All site levels for the given job codes.*
Librarians	206-LIBRARIAN/MEDIA CONS	100 - Non-Subject	*All site levels for the given job codes.*
Other Professional Staff	301-ACCOUNTANT	100 - Non-Subject	*All site levels for the given job codes.*
	303-ADMINISTRATIVE INTRN		
	304-ADMISSIONS OFFICER		
	305-ANALYST		
	307-ATHLETIC TRAINER		
	308-ATTENDANCE OFFICER		
	309-AUDIOLOGIST		
	312-PAYROLL SPECIALIST		
	313-CASEWORKER		
	314-COMPUTER PROGRAMMER		
	315-COMP SYSTEM ANALYST		
	321-EVALUATOR		
	322-FAMILY/COMM SUP COOR		
	324-FUNC APP SUPP SPEC		
	325-GRANT DEVELOPER		
Other Professional Staff	328-INTERPRETER	100 - Non-Subject	*All site levels for the given job codes.*

Position	Job Codes	Subject Codes	Site Levels
Other Professional Staff	331-NEGOTIATOR	100 - Non-Subject	*All site levels for the given job codes.*
	332-NETWORK ADMIN		
	333-NURSE PRACTITIONER		
	334-OCCUPATIONAL THERAP		
	337-PERSONNEL OFF/SPEC		
	338-PHYSICAL THERAPIST		
	342-PSYCHIATRIST		
	343-PSYCHOLOGIST		
	344-PR/INFOR SERV OFF		
	346-RECREATION WORKER		
	347-REGISTERED NURSE		
	348-REGISTRAR		
	350-RESEARCH & DEV SPEC		
	351-SPEECH LANG THERAPIST		
	352-SOCIAL WORKER		
	353-SPEECH PATH/THERAPST		
	354-STAFF DEV/TEACH TRNR		
	356-STUDNT PERSONNEL OFF		
	358-TRANSISTION COOR		
Early Childhood	210-TEACHER	200 - Early Childhood	1-Elementary
	213-RESOURCE TEACHER		
Elementary	210-TEACHER	300 - Elementary	1-Elementary
	213-RESOURCE TEACHER	*And all subject codes assigned to the "Elementary" site level.*	*And all site levels assigned to the "Elementary" subject code.*
Middle School - Language Arts	210-TEACHER	400 - Language Arts	2-Junior High
	213-RESOURCE TEACHER		3-Middle
Middle School - Arts & Music	210-TEACHER	500 - Arts/Music	2-Junior High
	213-RESOURCE TEACHER		3-Middle
Middle School - Social Studies	210-TEACHER	600 - Social Studies	2-Junior High
	213-RESOURCE TEACHER		3-Middle
Middle School - Foreign Language	210-TEACHER	700 - Foreign Language	2-Junior High
	213-RESOURCE TEACHER		3-Middle
Middle School - Math	210-TEACHER	800 - Math	2-Junior High

Position	Job Codes	Subject Codes	Site Levels
Middle School - Math	213-RESOURCE TEACHER	800 - Math	3-Middle
Middle School - Science	210-TEACHER	900 - Science	2-Junior High
	213-RESOURCE TEACHER		3-Middle
Middle School - Vocational Education	210-TEACHER	1200 - Vocational Education	2-Junior High
	213-RESOURCE TEACHER		3-Middle
Middle School - Other	210-TEACHER	100 - Non-Subject	2-Junior High
	213-RESOURCE TEACHER	1300 - Other	3-Middle
High School - Language Arts	210-TEACHER	400 - Language Arts	4-High School
	213-RESOURCE TEACHER		
High School - Arts & Music	210-TEACHER	500 - Arts/Music	4-High School
	213-RESOURCE TEACHER		
High School - Social Studies	210-TEACHER	600 - Social Studies	4-High School
	213-RESOURCE TEACHER		
High School - Foreign Language	210-TEACHER	700 - Foreign Language	4-High School
	213-RESOURCE TEACHER		
High School - Math	210-TEACHER	800 - Math	4-High School
	213-RESOURCE TEACHER		
High School - Science	210-TEACHER	900 - Science	4-High School
	213-RESOURCE TEACHER		
High School - Vocational Education	210-TEACHER	1200 - Vocational Education	4-High School
	213-RESOURCE TEACHER		
High School - Other	210-TEACHER	100 - Non-Subject	4-High School
	213-RESOURCE TEACHER	1300 - Other	
Charter	210-TEACHER	*All subject codes assigned to the "Charter" site level.*	5-Charter
	213-RESOURCE TEACHER		
Other Positions	*All job codes not assigned to a position based on the above criteria.*	*All subject codes not assigned to a position based on the above criteria.*	*All site levels not assigned to a position based on the above criteria.*

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