


2018 OKLAHOMA EDUCATOR SUPPLY & DEMAND REPORT

Trends, projections and recommendations



OKLAHOMA STATE DEPARTMENT OF
EDUCATION
— CHAMPION EXCELLENCE —



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EXECUTIVE SUMMARY

Oklahoma's public school system has suffered one of the largest national budget cuts over the past decade. As a result, steep reductions to school budgets have forced administrators to implement strategies to reduce expenses, many of which critically hinder instruction and unequivocally contribute to making the teaching profession less attractive. One of the most pervasive outcomes of the public sector fiscal austerity has been a persistent educator shortage – more severe in certain geographies, grades or subject matters than others – that in turn prompted undesired measures such as relaxing qualification requirements during hiring and increasing the workload of educators who remain in the classroom. This approach has created a vicious cycle that has widened teacher shortages and had detrimental effects on student achievement.

The 2018 Oklahoma Educator Supply & Demand Report focuses on data trends for several key variables of educator demand and supply and five indicators of shortage that help explain the depth of the excess demand for educators in the state in the past several years. The demand-side factors assess, for example, recent trends in student enrollment and educator-pupil ratios in the aggregate and by primary position and geographic location. The supply-side factors present the analysis of two main variables, i.e., new and continuing educators. It also evaluates the dynamics of the current and past teaching force by identifying its overall trends and composition, including educator demographics, qualifications and geographic distribution. In addition, the report compares the distribution of several characteristics of the teaching workforce, including pupil-educator ratios, educator certificate type and areas, educator experience, educator highest degree obtained, new hires vs. re-entrants, active vs. reserve pool of qualified educators and all certificates vs. emergency certificates.

The report also analyzes trends in Oklahoma teacher salaries and their comparison to salaries of teachers in public schools in the United States, the South-Central Region and Texas. Compensation is a key factor in recruitment and retention and certainly helps explain Oklahoma's severe teacher shortage.

The report examines the sources of new hires into the profession, including recent teacher preparation program graduates or those who may be re-entering the profession and have some teaching experience. The changes we have seen in the demand for teachers in recent years can have a detrimental effect on education preparation program enrollment, completion rates and the proportion of college graduates entering the teaching profession.

The 2018 Oklahoma Educator Supply & Demand Report also examines educator turnover to better understand the trends in the number of educators who leave public teaching every year and their characteristics, and stresses the importance of the ability to keep educators employed in the public school system as a complement to the turnover analysis.

In addition, the report explores future educator demand, supply and potential teacher shortages using historical educational and population data. The resulting projections are based on data analyses that are broken down by subpopulations including grade, position, region and year, and explore four different supply and demand gap scenarios where established trends are combined in alternative ways. Given the persistence and deterioration of the educator shortages in the state, understanding the possible scenarios of future educator demand can better inform efforts to balance supply and demand, and hopefully, improve the quality of teaching talent.

Finally, differences across subgroups, geographical areas and years are investigated and the projections' accuracy tested using statistical analysis.

The report finds that enrollment in public schools has grown at a generally decreasing rate during the last six years, with very few grades showing a different trend. The average pupil-educator ratios for the state from 2012-13 to 2017-18 generally follow the same upward trend shown in previous years. Positions such as vocational education, foreign languages, and guidance counselor, both at the middle school and high school levels, are listed among the top 10 with the highest ratios. All regions show the same upward trend throughout most of the period of analysis. The percentage of educators leaving the profession has increased over the past six years, representing more than 5,000 educators per year. Declines are occurring in retention of beginning educators, successive cohorts of educators and all year-to-year persistence options.

The data also show an overall downward trend in educator supply at the state and regional level since 2012-13. The distribution of educators across age groups has stayed mostly unchanged, but the average experience level of educators has slightly declined, remaining lower than the national number. In comparison to the national average salary, and that of neighboring states, the average teacher salary in Oklahoma has seen, in the last few years, the highest drop in real terms and the highest annual percentage decrease. Compared with all educators who make up each year's supply, re-entrants are relatively older; they have slightly more years of experience and slightly higher rates of educational attainment. On the other hand, new hires are much younger, have fewer years of experience and less, declining education attainment. Fewer graduates earned an education degree between 2012-13 and 2016-17 regardless of the graduating institution.

The two projected scenarios developed for each supply and demand result in four gap-analysis options with varying implications for future shortages, or surpluses, and some similarities and differences across regions. Scenario 1.1 assumes a projected demand that remains stable at the 2017-18 level and a projected supply that continues to decline until 2022-23. The resulting estimates suggest an increasing shortage of public school educators during the entire 5-year period, resulting in a gap of about 240 educators in 2018-19 that grows to more than 1,400 in 2022-23. Under scenario 1.2, the demand is projected to remain stable (i.e., it stays constant after 2017-18, resulting in decreasing pupil-educator ratios) while the supply is expected to begin to grow again. The resulting projections show a widening gap (i.e., surplus) between supply and demand that is due entirely to a constantly increasing supply of educators after school year 2017-18. Scenario 2.1 postulates a continued downward trend in both supply and demand after school year 2017-18. This scenario projects that, even when the educator demand steadily falls after 2018-19, primarily in response to declining enrollment, the number of eligible and available educators is expected to be increasingly scarce, reaching a 2.5 percent gap by 2022-23. The last scenario developed for the public school educator job market (i.e., Scenario 2.2) depicts what the demand and supply would look like between 2018-19 and 2022-23 if the path of a declining educator demand continues and a shift toward an increasing educator supply is realized.

The report also identifies a six-point action agenda that will help the state achieve a more adequate supply of educators while promoting statewide efforts focused on teacher quality improvement:

Action item 1: Understand the career pathways of teacher preparation program graduates.

Following teacher preparation program completers after graduation will provide otherwise nonexistent information about key aspects of their professional careers – e.g., factors that made teaching the occupation of choice; the proportion who seek traditional teacher certification and those who choose alternative routes; the number of certified educators who are hired annually into public education and their characteristics, including demographics, tenure, retention and turnover rates. This information will help build a more complete picture of the reserve pool of qualified individuals – including their career pathways into the public education system – as well as help address recruitment and retention issues in advance.

Action item 2: Measure and monitor educator quality shortage.

While balancing educator supply and demand is still an urgent priority, efforts to improve the quality of teaching practice, and hence its effectiveness, cannot continue to be compromised. The composition of the teaching workforce – e.g., subject matter knowledge, instructional skills, fluency in multiple languages and demographic characteristics – and its adequacy and distribution across schools, subjects and grade levels must be the way shortages are defined, measured, monitored and addressed.

Action item 3: Understand school districts' shortage difficulties.

Current analysis and indicators of shortages must be complemented and supplemented with data from school districts about priorities, strategies, perceptions and concerns on how to better address the shortages.

Action item 4: Examine teacher working conditions.

Learning about teachers' working conditions will foster an understanding of the most pressing issues and promising strategies that can more effectively and efficiently improve them – positively impacting retention as a result.

Action item 5: Expand recruitment of qualified educators.

In order to enhance the number of educators entering from the reserve pool who can help meet immediate shortage needs in a cost-effective way, specific efforts must be identified to reach out to a larger number of qualified candidates and persuade them to return to teaching with tailored information targeted to individual characteristics and circumstances.

Action item 6: Enhance the mentoring and induction program for new teachers.

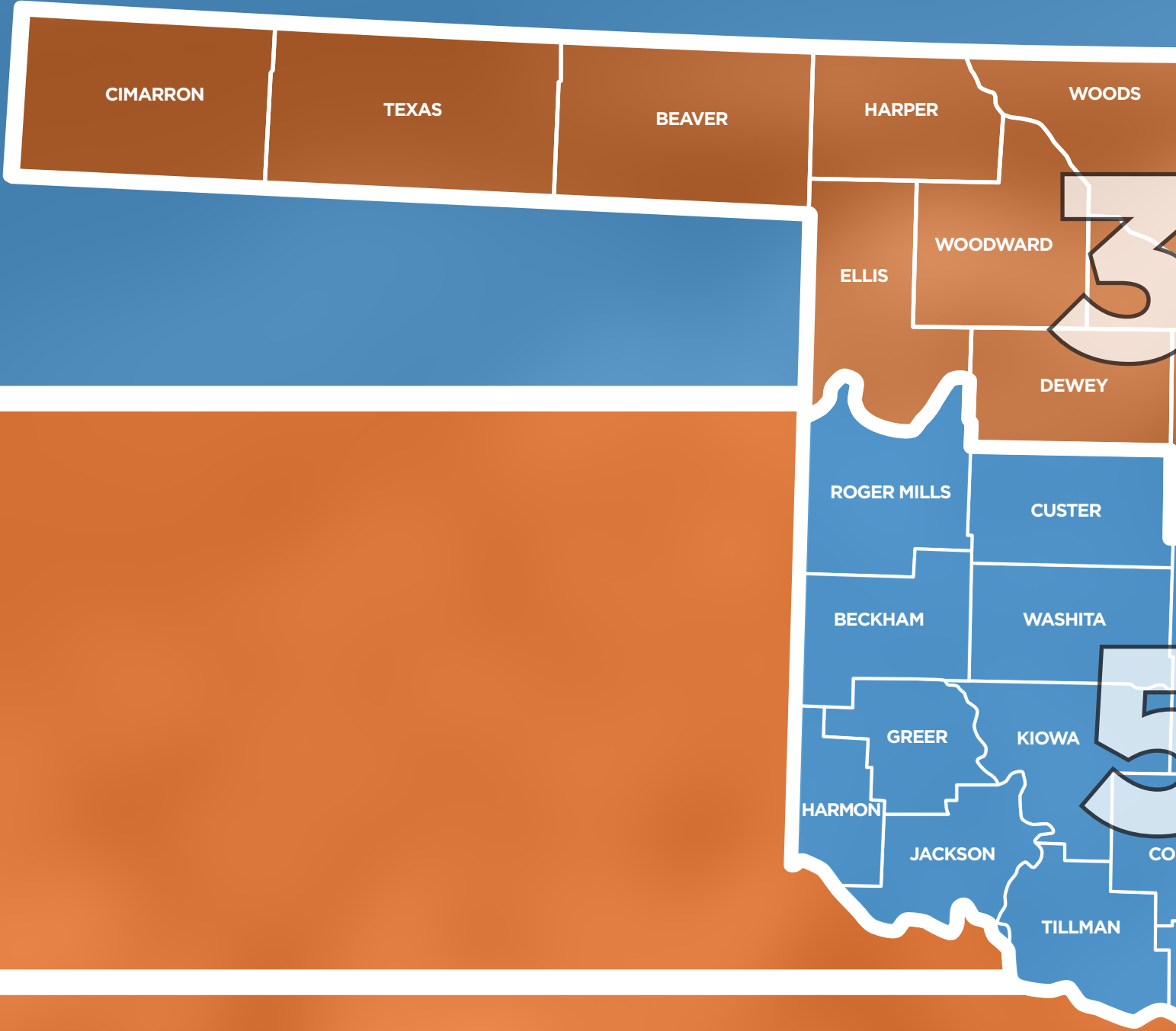
It is crucial to explore ways to provide more effective guidance and information to schools about the legislative requirement that all new teachers, and those who transition to new roles within a school or district, must participate in an induction program; the benefits of a well-structured and evidenced-based program; and the most helpful aspects of the program according to the mentees themselves.

INTRODUCTION

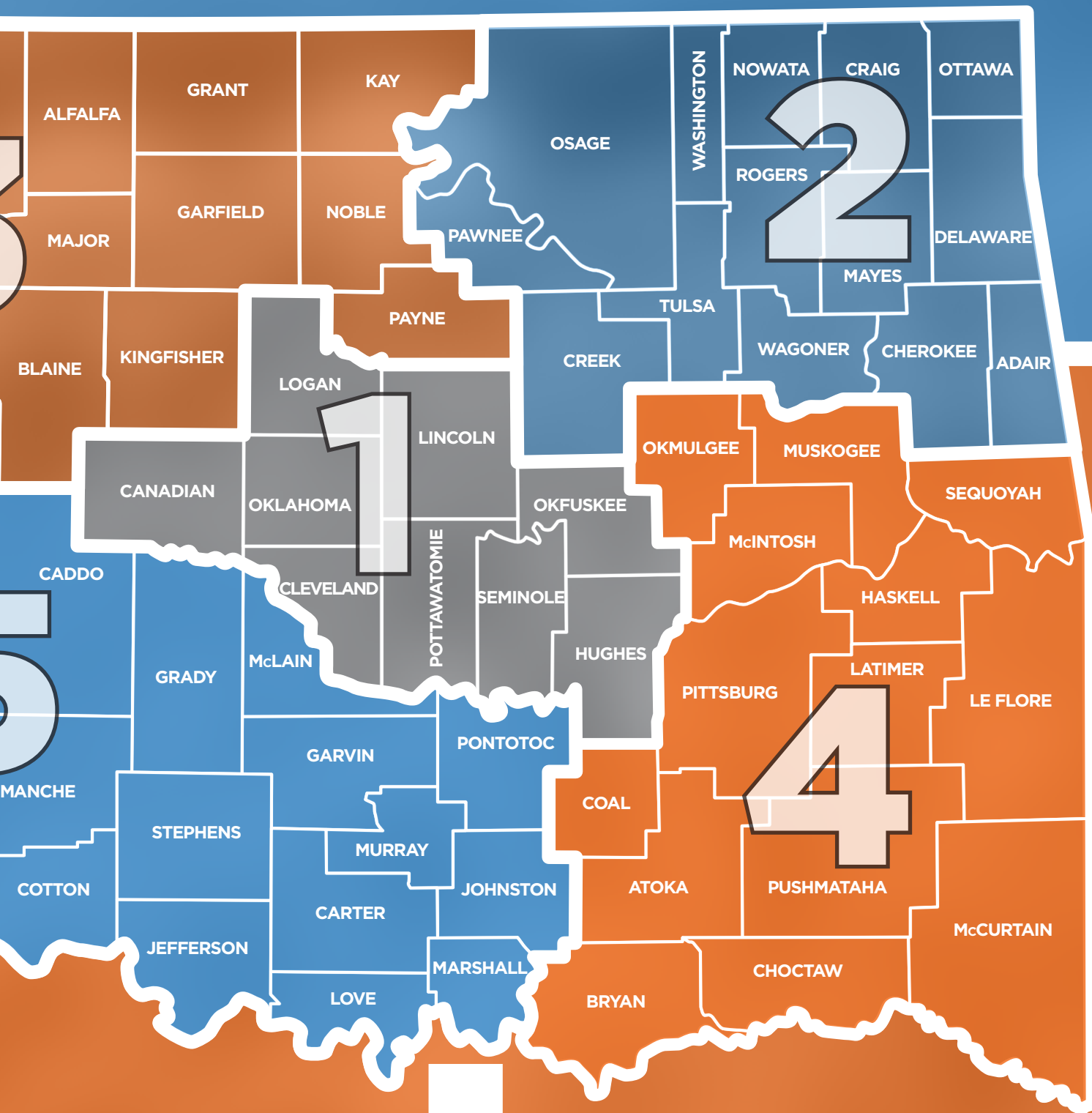
While state-mandated pay raises for all school staff holding a teaching certificate went into effect July 1, 2018, for the 2018-2019 school year for the first time in more than two decades, it is still unclear whether the compensation incentive will abate the acute shortage issues the state faces, and if it does, by what degree. Public school education in Oklahoma has suffered one of the largest national budget cuts over the past decade. As a result, steep reductions to school budgets have occurred, forcing administrators to implement strategies to reduce expenses, many of which critically hinder instruction and unequivocally contribute to making the teaching profession less attractive.

In response to the deepening educator shortage problem, there is a temptation to focus solely on ensuring enough teachers are in the classroom, but this strategy is not without risk. Doing so may further relegate the issue of teaching quality, thus eroding any efforts by educators, administrators and policymakers to improve it and positively impact student achievement.

The 2018 Oklahoma Educator Supply & Demand Report focuses on data trends for several key variables of educator demand and supply and five indicators of shortage that help explain the depth of the excess demand for educators in the state in the past several years. The report is divided into five sections that evaluate the dynamics of the current and past teaching force and propose demand and supply projections for the next five years. Section I describes educator demand and discusses recent trends in key factors including student enrollment and educator-pupil ratios. Section II focuses on educator supply and analyzes the dynamics of the current and past teaching force and the disaggregation by its main factors – i.e., re-entrants and new hires. Section III explores future educator demand and supply and presents two sets of projections for each which are later compared and contrasted under four gap-analysis options presented at the state level and projected for all five geographic regions. Section IV presents the report's action agenda for the coming years and addresses critical aspects of the educator demand and supply intended to strengthen and adapt strategies to improve retention and recruitment efforts. Section V describes several methodological aspects of the data analysis conducted, including the rationale for why specific procedures were chosen. The appendices present a broad set of educator supply and demand data and indicators that are depicted in the main sections of the report and/or offer detailed results for aggregated data trends presented elsewhere in the report.



Dem



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DEMAND

Much like any other service, the labor market for educators is explained by the interaction of supply and demand, each influenced by a specific set of factors.

In the Boe & Gilford (1992) model of the labor market, the demand for public school teachers is formulated in terms of “the total number of teaching positions the local education agencies are able and willing to employ at a given time (p. 24).” In the context of the state of Oklahoma, school districts have the responsibility to determine their teaching positions based on several considerations. This report follows the above definition, and this section discusses in detail two key factors that influence the demand for educators: 1) the number of students enrolled in public schools; and 2) the policies and practices pertaining to educator-pupil ratios. Given the mechanical nature, as opposed to behavioral, of the report, as well as data availability considerations, other factors that influence the demand of educators and the interactions among those factors are not discussed comprehensively here. They are, however, mentioned in the report to help us understand public educator job market trends and projections.

This section focuses on the demand-side factors, assessing recent trends in student enrollment and educator-pupil ratios in the aggregate and by primary position and geographic location. Educator turnover and retention are examined to better

understand the trends in the number of educators who leave public teaching every year and their characteristics. In addition, three shortage indicators (i.e., indicators 1-3) are included throughout the section addressing key demand-side factors.

The data show that enrollment in public schools has grown at a generally decreasing rate during the last six years with very few grades showing a different trend. The average pupil-educator ratios for the state from 2012-13 to 2017-18 generally follows the same upward trend shown in previous years. Positions such as *vocational education*, *foreign languages*, and *guidance counselor*, both at the middle school and high school levels, are listed among the top 10 with the highest ratios. All regions show the same upward trend throughout most of the period of analysis. The percentage of educators leaving the profession has increased over the past six years, representing more than 5,000 educators per year and a cumulative total of 30,000. Not only the retention of beginning educators as their years of experience increase is dropping, but also in successive cohorts, and across all year-to-year persistence options.

DEMAND FACTORS

Multiple factors may create a higher or lower demand for teachers from one year to the next, including new policies around educator-pupil ratios, changes in student enrollment, and the number of educators that leave the public school system.

Every year, schools face a clientele, i.e., student enrollment, to whom they must

provide services. In turn, the size of the clientele depends largely on population and migration shifts, some of which will be analyzed in detail in the *Section: Predictions*. The following paragraphs present and discuss trends in Oklahoma public schools' student enrollment, in the aggregate, and also disaggregated in ways that more effectively inform about the demand for teachers and provide answers for detailed policy questions. Enrollment data are broken down by grade, teaching assignment and geographic location.

Enrollment

Figure 1 shows aggregate student enrollment for kindergarten and grades 1 to 12 from 2012-13 to 2017-18. The data provide evidence that the number of individuals eligible for attending schools

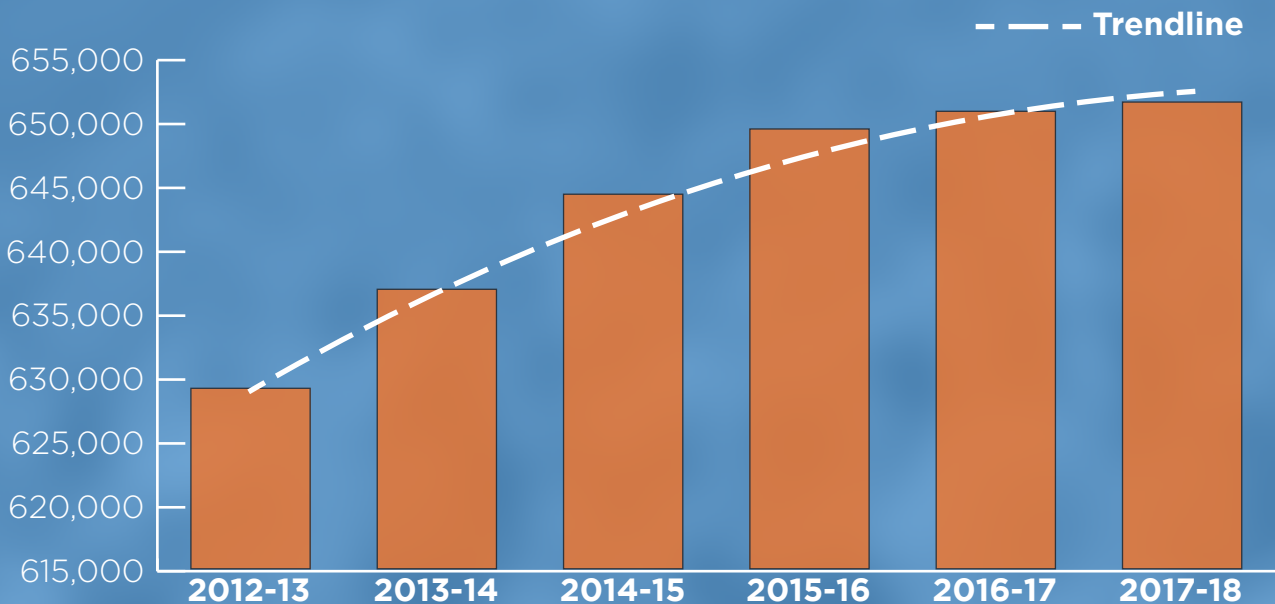
and enrolled in the state has grown at a generally decreasing rate during the last six years—1.2 percent growth at the beginning of the period to 0.1 percent at the end. This finding is also confirmed by the shape of the trendline (i.e., white dotted line) included in the graph, which clearly demonstrates the declining rate of enrollment increase.

It is well known that trends in school enrollment closely mirror population trends (Davis & Bauman, 2013). Statewide and regionally, data show live births have been declining throughout most of the last decade. Appendix A provides more details on these results for all five regions.

Across years, the majority of grades, including kindergarten, display a non-

FIGURE 1

STUDENT ENROLLMENT IN PUBLIC SCHOOLS 2012-13 TO 2017-18



Note: Enrollment headcount includes kindergarten and grades 1 thru 12. Ungraded students such as out-of-home placements are not included. The trendline's R-squared value is 0.971.

increasing enrollment trend with only four grades showing a consistent positive growth: grades 8, 9, 11 and 12. Two grades (i.e., 4 and 5) had a mid-period break in the positive trend between 2014-2015, and another two (i.e., 6 and 7) had the break more recently. Appendix B shows public school student enrollment, by grade and year between 2012-13 and 2017-18.

The size of the yearly student population is also determined by the percentage of students who progress from one grade to the next, year to year. This determination is known as the Grade-Progression Ratio (GPR), which is the key element in the GPR methodology to produce school enrollment projections widely used by demographers (The Demographics Research Group, n.d.; Hussar & Bailey, 2011), and also followed in this report (see *Section: Predictions*).

Figure 2 displays the rates of progression from each to the next grade starting in kindergarten, between 2012-13 and 2017-18. It also shows a dotted white line that denotes a GRP ratio of 1 –i.e., the same number of students enrolled in the previous grade are coming into the following grade the next year. While across years most rates have a value of less than 1, the lowest rates appear in grades 2 and 10-12.

Geographic disparities in enrollment trends and GPR are depicted below. Table 1 shows school enrollment levels, by region, from 2012-13 to 2017-18, and reveals two different trajectories: A positive, linear trend in Region 1, and a decreasing trend

that starts after 2014-15, for all the other regions. The evidence suggests school population in regions 2 (Northeast), 4 (Southeast) and 5 (Southwest) in 2017-18 dropped, on average, by almost one percentage point in the past six years.

Regarding grade ratios, only one region (i.e., Region 1) consistently ranks, across grades and years, above the state average, with all other regions consistently achieving smaller ratios. Appendix C contains the average GPR ratios for all grades and regions, between 2012-13 and 2017-18.

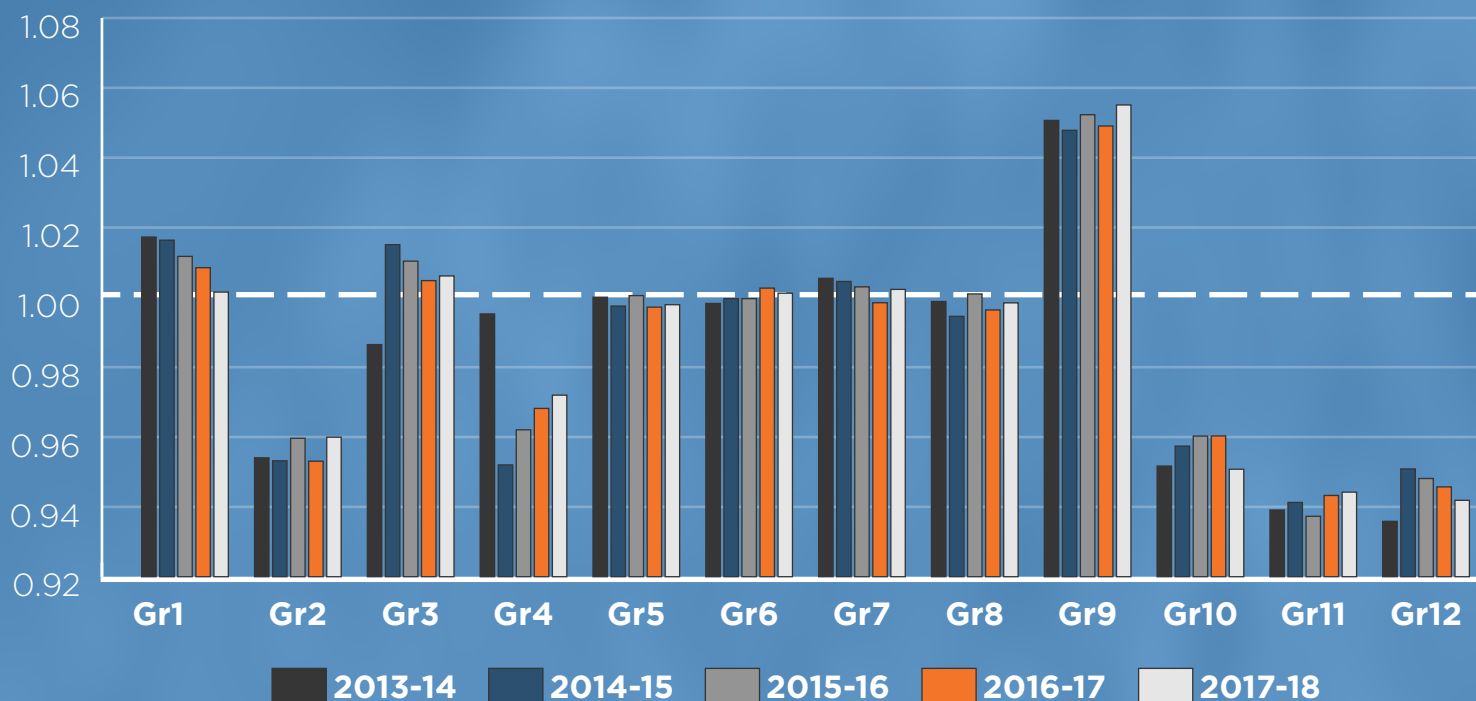
Pupil-educator ratios

Another factor that directly influences teacher demand is pupil-educator ratio. Policy and practice changes in this ratio result in an increase or reduction in the number of educators in need. Empirical evidence suggests that low pupil-educator ratios positively affect student achievement –especially for students with less advantaged family backgrounds–, and that the opposite, i.e., high pupil-educator ratios, can have harmful effects (Schanzenbach, D.W, 2014; Whitehurst & Chingos, 2011). It is worth pointing out that the measurement of this indicator, however, does not represent the actual measure of class size or the number of students a teacher has in the classrooms. In this context, this section looks at Oklahoma’s pupil-educator ratios in the recent past, describing overall and regional patterns at the primary position level.

The average pupil-educator ratios for the state, from 2012-13 to 2017-18, generally followed the same upward trend (Figure 3)

FIGURE 2

GRADE PROGRESSION RATIOS: K-1 THROUGH GRADES 11-12 2012-13 TO 2017-18

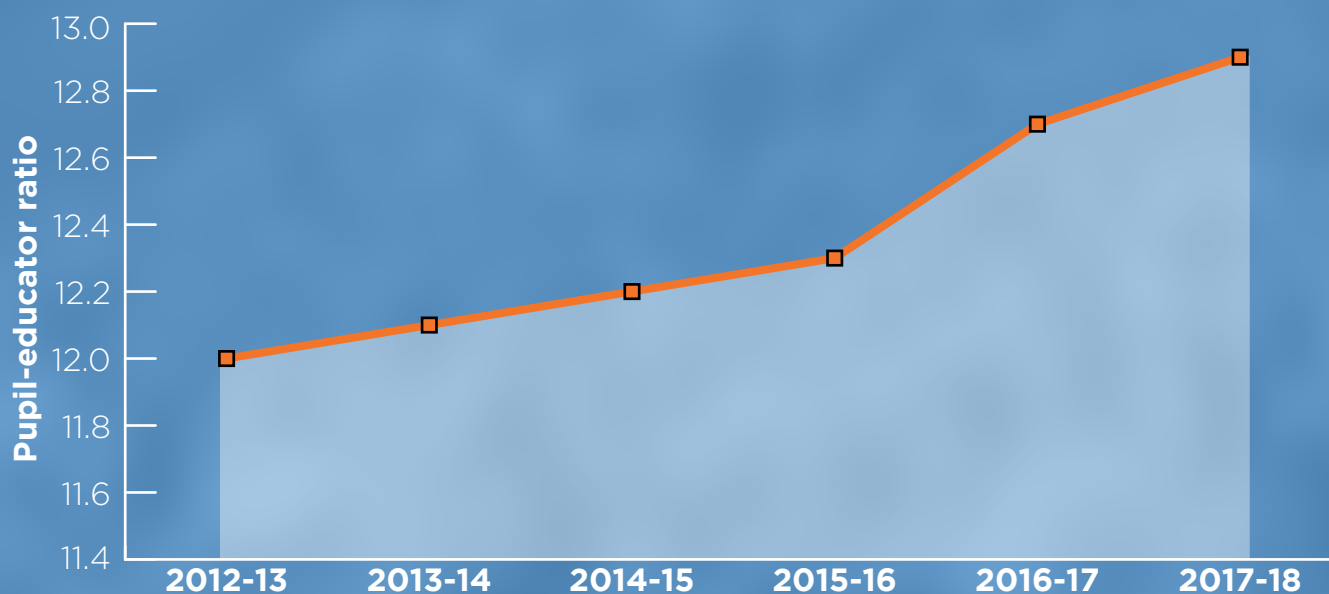
**TABLE 1**

STUDENT ENROLLMENT IN PUBLIC SCHOOLS BY GEOGRAPHY 2012-13 TO 2017-18

Region	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Statewide	629,127	636,877	644,318	649,425	650,809	651,532
Region 1 (Central)	216,869	221,235	226,777	231,396	235,237	239,786
Region 2 (Northeast)	220,520	222,136	222,613	223,412	222,215	220,298
Region 3 (Northwest)	49,966	50,960	51,798	52,133	51,759	51,510
Region 4 (Southeast)	69,769	70,161	70,657	70,586	70,363	69,452
Region 5 (Southwest)	72,003	72,385	72,473	71,898	71,235	70,486

Note: Enrollment headcount includes kindergarten and grades 1 thru 12. Ungraded students such as out-of-home placements are not included.

PUBLIC SCHOOL'S PUPIL-EDUCATOR RATIOS 2012-13 TO 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Enrollment headcount includes kindergarten and grades 1 thru 12. Ungraded students such as out-of-home placements are not included.

shown in previous years (Berg-Jacobson, A., & Levin, J., 2015), though at an accelerated pace after 2015-16 (*Shortage indicator 1: Number of students enrolled in public schools by role, position and geographical location per public school educator*). It is worth mentioning that due to differences in the methodology followed for enrollment predictions in pre-k and k-12 (see *Section: Predictions*), the ratios in Figure 3 include enrollment headcount for kindergarten and grades 1 through 12 only. If we were to include all grades and only teachers in the calculations (i.e., all positions except *district-wide staff, administrative, guidance counselor, librarian, other professional staff, charter, and other positions*), the pupil-teacher ratio in 2017-18 would be around the 17-to-1 level,

which is close to the projections published for Oklahoma by the National Center for Education Statistics. Since the data presented for 2017-18 are preliminary, caution is advised when drawing conclusions based solely on data for this year.

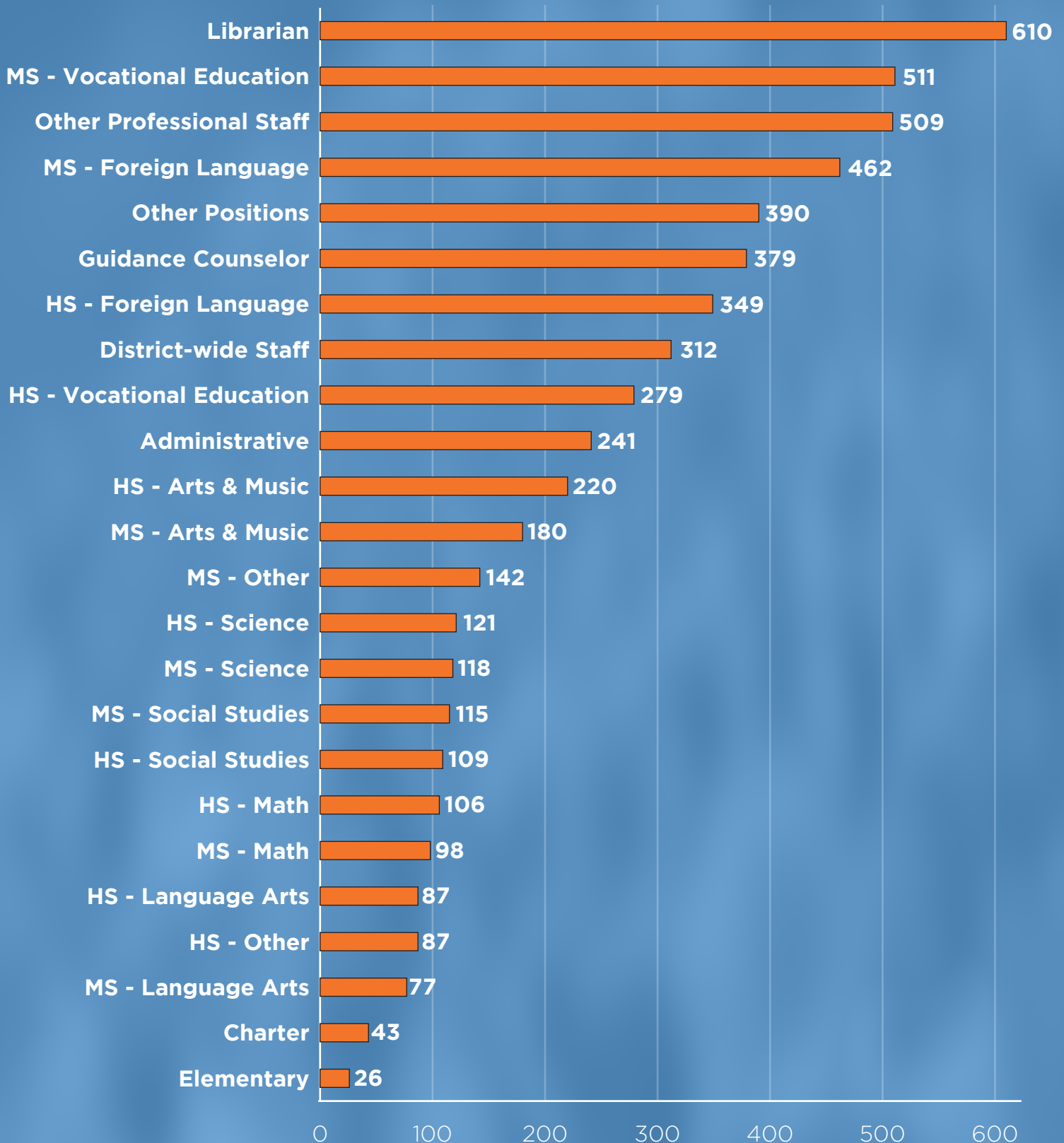
Aggregate ratios, however, are of little use in understanding any inadequacies at the educator position level. Current pupil-educator ratios, by primary position, are displayed in Figure 4. See *Section: Methodology* for a description of the primary position metric.

In the 2017-18 school year, the pupil-educator ratio for *elementary* was lowest and highest for *librarian*. Areas such as

FIGURE 4

PUPIL-EDUCATOR RATIOS BY PRIMARY POSITION

2017-18

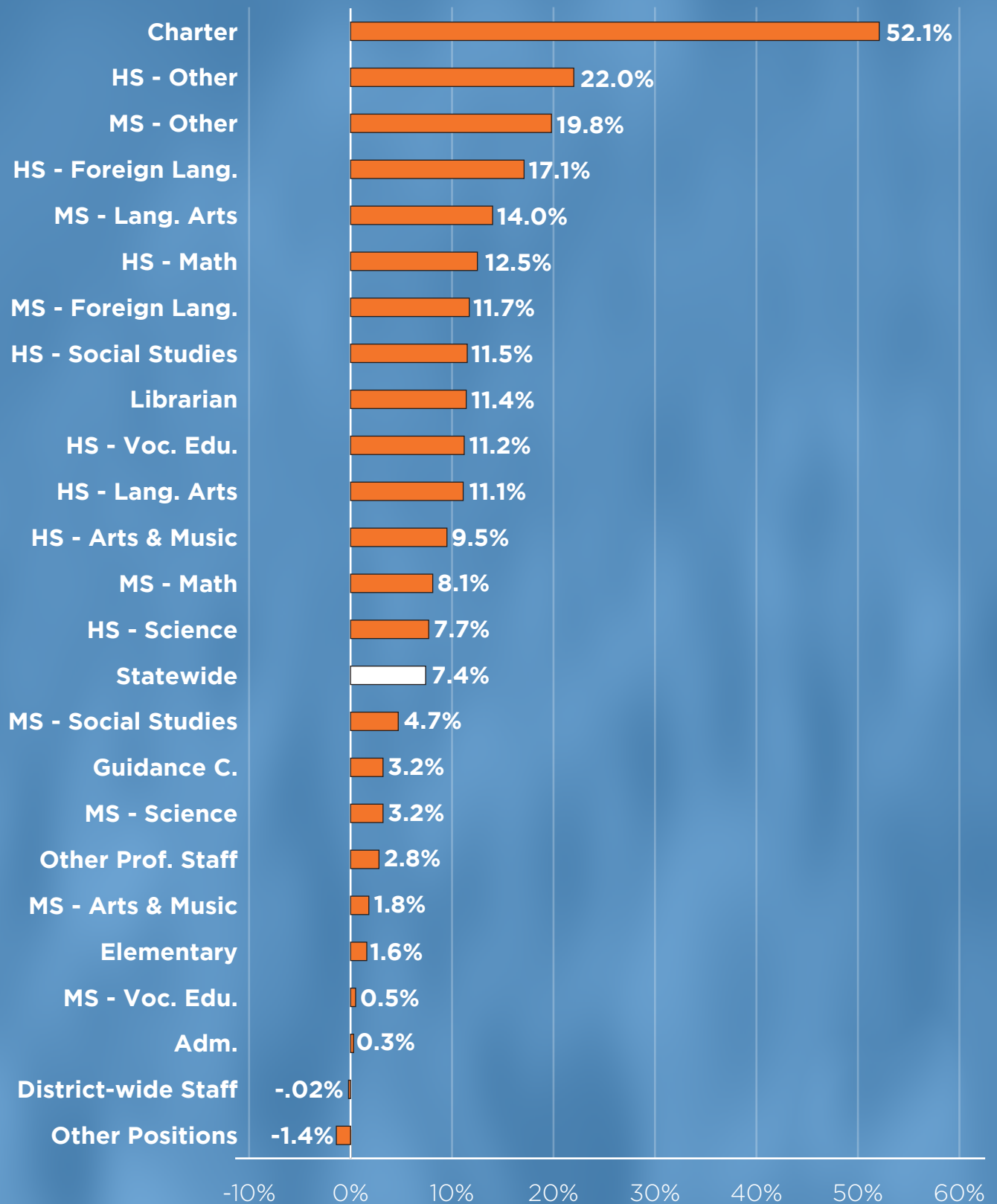


Note: 2017-18 personnel data as of January 24, 2018. Enrollment headcount includes kindergarten and grades 1 thru 12. Ungraded students such as out-of-home placements are not included.

FIGURE 5

PUPIL-EDUCATOR GROWTH RATES BY PRIMARY POSITION

2012-13 TO 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Enrollment headcount includes kindergarten and grades 1 thru 12. Ungraded students such as out-of-home placements are not included.

vocational education, foreign languages, and guidance counselor, both at the middle school and high school levels, are listed among the top 10 with the highest ratios –e.g., there were, on average, 462 students in public schools per each MS foreign language teacher. All core subjects in 2017-18 ranked among those with the lowest ratios. It is worthwhile to recognize that a charter school is reported in the raw data for all years in regions 3 (Northwest) and 5 (Southwest), and only since 2016-17 in Region 4 (Southeast).

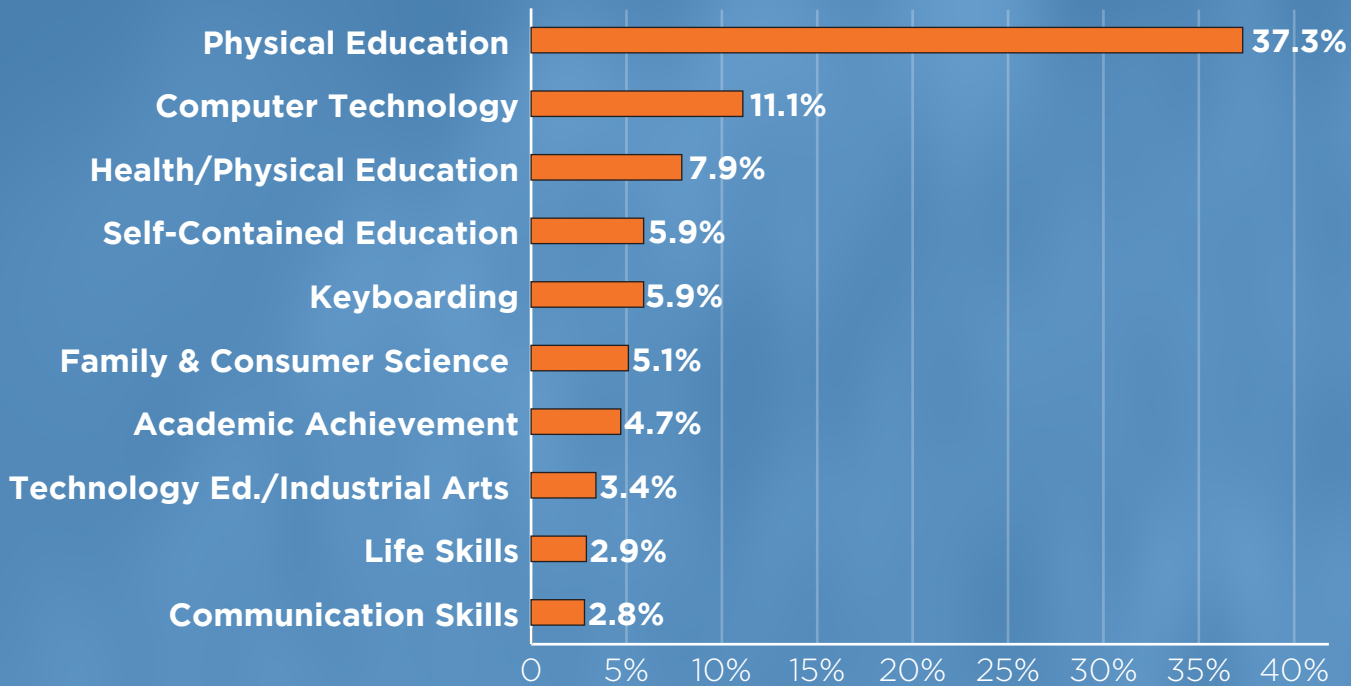
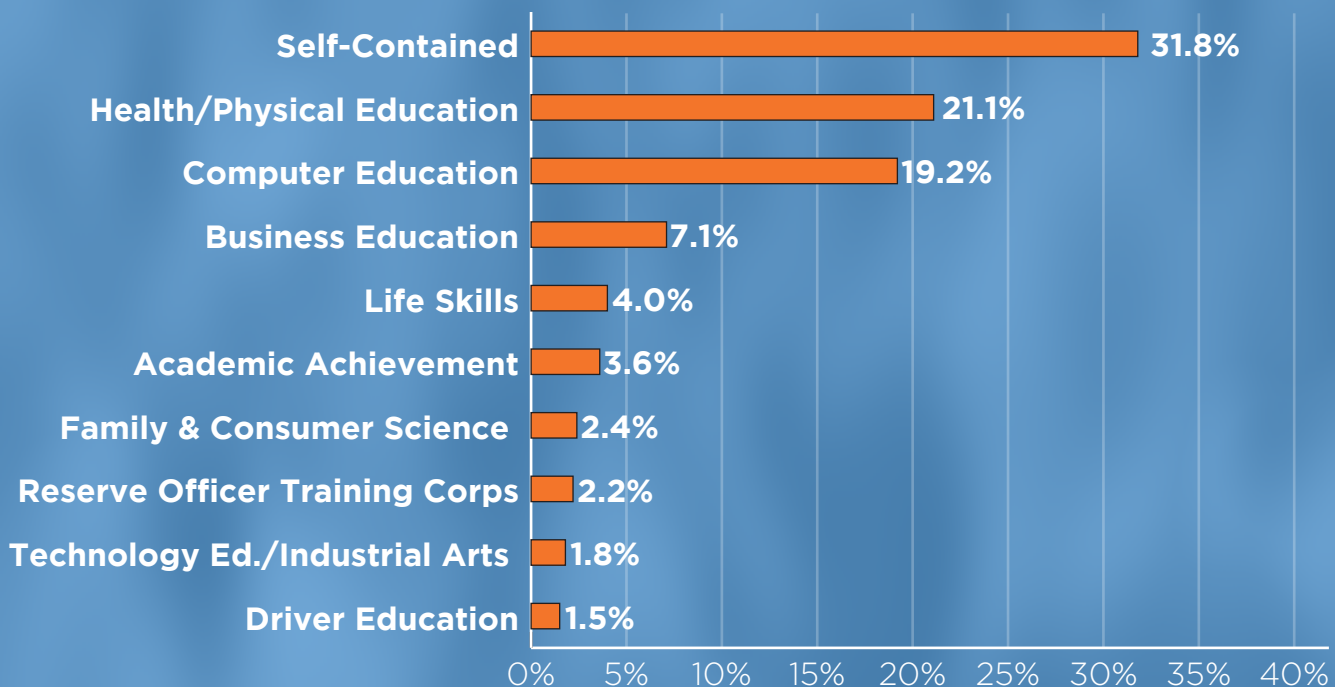
The ratios for all the 24 positions, except three, are mostly increasing over time. The primary positions that are the exception are *district-wide staff, other, and MS vocational education*. The first two of these categories show a decreasing trend in the ratio throughout most of the period, and there is no discernible pattern for the third category. All other positions experienced a steady increase in their pupil-educator ratios, especially after 2015-16. Appendix D contains the yearly ratios for all primary positions and the participation of each position's enrollment on the overall enrollment.

Between 2012-13 and 2017-18, the overall state growth rate in the number of pupils per educator is 7.4 percent – with an annual average of 1.5 percent (Figure 5). There are 14 positions that show a growth rate above that of the state: *Charter* (52.1 percent); *HS other* (20.0 percent); *MS other* (19.8 percent); *HS foreign language* (17.1 percent); *MS language arts* (14.0 percent); *HS mathematics* (12.5 percent); *MS foreign*

language (11.7 percent); *HS social studies* (11.5 percent); *librarian* (11.4 percent); *HS vocational education* (11.2 percent); *HS language arts* (11.1 percent); *HS arts & music* (9.5 percent); *MS mathematics* (8.1 percent); and *HS science* (7.7 percent). Six of these positions are core subjects in high school or middle school. The top 10 subjects grouped under *HS other* and *MS other*, accounting for 94.8 percent and 87.1 percent of all subjects included in each position, respectively, are shown in Figures 6 and 7. The most frequent subjects listed as *other*, holding some of the highest pupil-educator growth rates within the position, include *health/physical education, computer technology, and self-contained education*.

The upward trend in the pupil-educator ratios we have seen is usually the result of one of the following: 1) a reinforced effect of an increased student enrollment, and a decreasing number of educators employed in the state's public education system (e.g., *HS mathematics, HS social studies, and HS arts & music*), or most likely, 2) a combined effect of reduced enrollment and a decreasing number of educators (e.g., *MS language arts, MS social studies, and MS mathematics*). The change in the latter being greater than in the former.

When the 24 primary positions are grouped into two categories: teachers and other educators, and are further broken down between core and elective subjects, the data suggest certain patterns for both the numerator (i.e. enrollment) and denominator (i.e. number of educators)

FIGURE 6**TOP 10 SUBJECTS IN THE *MIDDLE SCHOOL OTHER* POSITION
2017-18****FIGURE 7****TOP 10 SUBJECTS IN THE *HIGH SCHOOL OTHER* POSITION
2017-18**

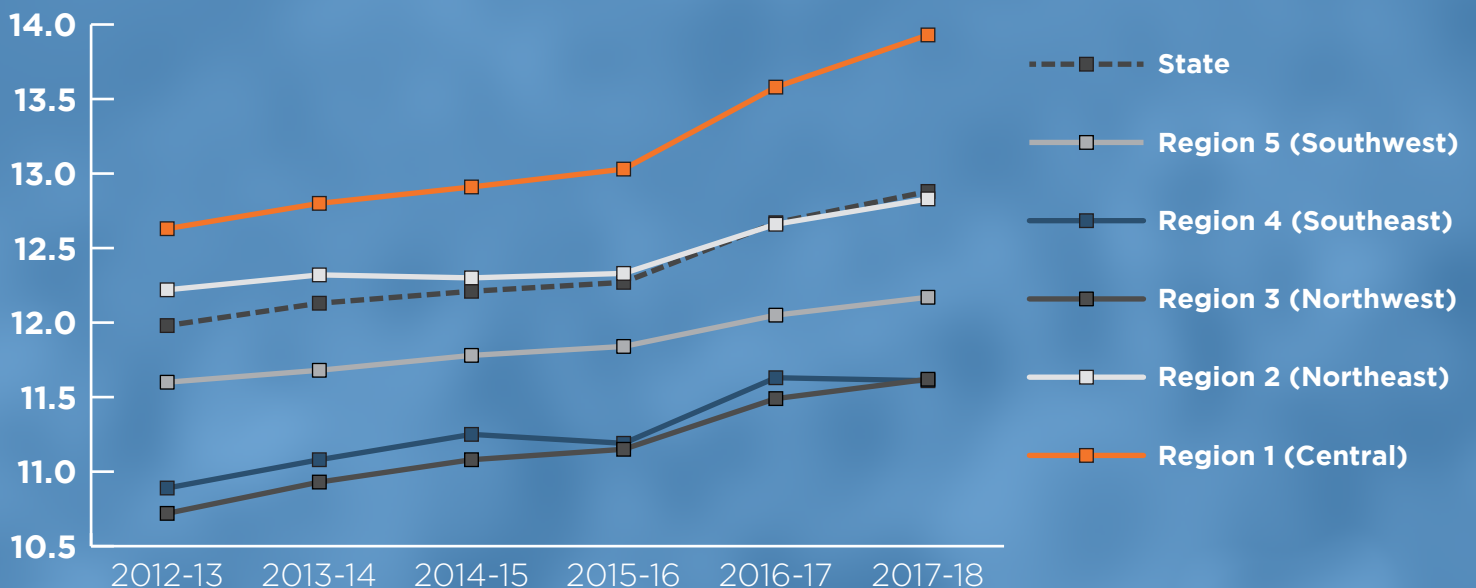
of the pupil-educator ratios. First, student enrollment for positions in the other educators group shows a decreasing trend, usually occurring after 2015-16. The number of educators in this group shows no clear trend. Second, both enrollment and number of teachers generally move in tandem for elementary schools, showing a decreasing trend since 2015-16. Third, both variables (i.e., student enrollment and number of teachers) have been trending downward across the 6-year period for all middle school core subjects. The same applies to all elective subjects (i.e., *arts & music, foreign language, and other*) except for *vocational education*, which displays an increasing trend for both variables

throughout most of the period. Fourth, enrollment and number of teachers in high school show the same trajectory for both core and elective subjects: an increase in student enrollment that often disappears around 2016-17 and a persistent decline in the number of teachers, more recent for some subjects than for others.

The pupil-educator data were geographically disaggregated into regions (Figure 8). Similar to that of the statewide ratios, all regions show the same upward trend throughout most of the period between 2012-13 and 2017-18. Region 1 (Central) has the highest pupil-educator ratios, consistently above those shown statewide, while Region 3

FIGURE 8

PUBLIC SCHOOLS' PUPIL-EDUCATOR RATIOS BY REGION 2012-13 TO 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Enrollment headcount includes kindergarten and grades 1 thru 12. Ungraded students such as out-of-home placements are not included.

(Northwest) shows the lowest ratios, closely followed by Region 4 (Southeast). Both regional data series are below the statewide numbers throughout the period.

Although all regions show similar overall trends, differences exist in the ranking of positions in comparison to the statewide average.

As statewide, the pupil-educator ratio in Region 1 has increased for most primary positions, except for *district-wide staff* and *elementary* that show a consistent decline between 2012-13 and 2017-18. The upward trend, however, could be experiencing a slowdown in 2017-18 for positions such as *guidance counselor*, *MS social studies*, *MS vocational education*, *MS arts & music*, and *administrative*. As already explained, since the data presented for 2017-18 are preliminary, caution is advised when drawing conclusions based solely on data for this year. The growth of the ratio in Region 1 (Central), between 2012-13 and 2017-18, was 10.3 –which represents an annual average of 2.1 percent –36.9 percent above the overall state rate. Among the positions that show pupil-educator ratios that grow faster than the regional average are five positions that are core subjects in middle school and/or high school (See Appendix E, Figure E1).

The average pupil-educator ratio across primary positions in Region 2 (Northeast) generally follows the same increasing trend as those at the state level, except for four positions (i.e., *HS vocational education*, *MS science*, *charter*, and *MS foreign language*) that experienced a clear decline. Two

positions (*administrative* and *other*) saw a recent break in the upward trend with declining ratios between 2016-17 and 2017-18. *District-wide staff*, *MS vocational education*, and *MS arts & music* do not show any clear trend during 2012-13 thru 2017-18 but have a higher ratio at the end of the period than at the beginning. The regional growth rate for the period under analysis is 5.0 percent –with an annual average of 1.0 percent– more than 30 percent lower than the state rate (Appendix E, Figure E2). Thirteen primary positions grew more rapidly than the regional rate, with four core subjects’ ratios (i.e., *MS language arts*, *HS language arts*, *HS math*, and *HS science*) growing at more than four times the rate of the region. (See Appendix E, Figure E2).

Region 3 (Northwest) also shows the same upward trend as those statewide, but with different position specificity. Four positions, including *MS vocational education*, *HS science*, *HS arts & music*, and *MS science*, show a reduction in the ratios starting on 2015-16 or before; despite this downward trend, the last three positions have a higher ratio at the end of the period than at the beginning. The growth for three positions declines after 2016-17: *librarian*, *guidance counselor*, and *other positions*. When the regional growth rate (8.5 percent) is compared with that of the state, a difference of less than one percent point is found. There are 11 primary positions in Region 3 with a higher growth than 8.5 percent. Five of those positions are core subjects in middle school and/or high school (Appendix E, Figure E3).

The majority of primary positions in Region 4 (Southeast) show a consistent increase in their pupil-educator ratios for the period between 2012-13 and 2017-18. During those years, eight positions experience an interruption in the upward trend –usually in the last year–, and they include *elementary*, *HS science*, *other professional staff*, *MS vocational education*, *administrative*, *librarian*, *HS arts & music*, and *other positions*. *MS language arts* and *MS math* (after 2012-13) are the only two positions with a consistent decreasing trend during the period of analysis. The growth of the number of pupils per educator in Region 4, between 2012-13 and 2017-18, is 6.6 percent –with an annual average of 1.3 percent– 12.2 percent below the state rate. Thirteen positions’ ratios show a faster growth rate than the regional average of 6.6 percent, with the two positions at the top of the ranking (*MS foreign language* and *MS other*) growing at more than seven times the rate of the region. *HS math*, *HS language arts*, *HS social studies*, and *MS science* are the three core subjects included in the group (Appendix E, Figure E4).

For about half of the primary positions in Region 5 (Southwest), the average pupil-educator ratio follows an upward trend similar to those in the rest of the regions. For three of the remaining positions (i.e., *guidance counselor*, *MS vocational education*, and *MS foreign language*) a persistent decline in the ratio is evident. Six other positions, including *MS language arts*, *administrative*, *librarian*, *HS arts and music*, *HS vocational education*, and

other positions saw a recent break in the general upward trend with declining ratios between 2016-17 and 2017-18. The changes in the pupil-educator ratio of *MS arts and music* do not show a definite direction. The regional growth rate for the period between 2012-13 and 2017-18 is 4.9 percent –with an annual average of 1.0 percent– 34.3 percent lower than the state rate. More than half of the primary positions whose pupil-educator ratio grew more rapidly than the regional rate were core subjects in middle school and/or high school: *MS math*, *HS science*, *HS math*, *HS social studies*, *MS social studies*, *HS language arts*, and *MS science* (Appendix E, Figure E5).

Turnover

The number of educators who leave public teaching between two consecutive years (i.e., leavers) and those who move between school districts and/or change position (i.e., movers) are critical components of the teaching market because of two important reasons. First, turnover (i.e., leavers and movers) creates vacancies that increase the annual demand of educators, and recruitment and hiring of new educators is costly (Barnes, Crowe, & Schaefer, 2007; Milanowski & Odden, 2007; Shockley, Guglielmino, & Watlington, 2006). Second, turnover has been shown to have negative effects on student achievement (Ronfeldt, Lankford, Loeb, & Wyckoff, 2012; Balu, Betteille, & Loeb, 2009). Of course, if those who are less effective are the ones leaving, turnover is not necessarily bad (Goldhaber, Gross, & Player, 2007; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008). However, in times of critical teacher

shortages, which is the context in Oklahoma for the past several years, the top priority becomes minimizing turnover and the number of unfilled positions, rather than maximizing the quality of the workforce. The following paragraphs discuss the most relevant characteristics of educator turnover, including its composition and distribution.

The percentage of educators leaving the profession in Oklahoma (i.e., attrition rate) has increased over the past six years: 9.8 percent of public school teachers left the workforce in 2012-13, while 11.3 percent left in 2016-17 (Figure 9). This exodus represents an average of 10.0 percent, or more than 5,000 educators, per year. The national attrition rate in 2012-13 was 7.7 percent, close to one-third lower than the state rate (Goldring, Taie, & Riddles, 2014).

In addition to the 10.0 percent of educators who on average leave the profession each year, an average of 12.0 percent shifts school districts and/or position every year. Unlike attrition, the rate of movers has decreased from 12.9 percent in 2012-13 to 12.3 percent in 2016-17 (Figure 9). This movement leaves the current educator turnover rate at 23.6 percent, showing a recent increase after hovering around 21.0 percent for most of the period of analysis (***Shortage indicator 2: Proportion of public schools' educators who move and leave by turnover component, position and geographical location***).

Similar to the statewide pattern, all regions, except Region 2 (Northeast), which showed a recent shift in its trend (i.e., 2015-16), indicate

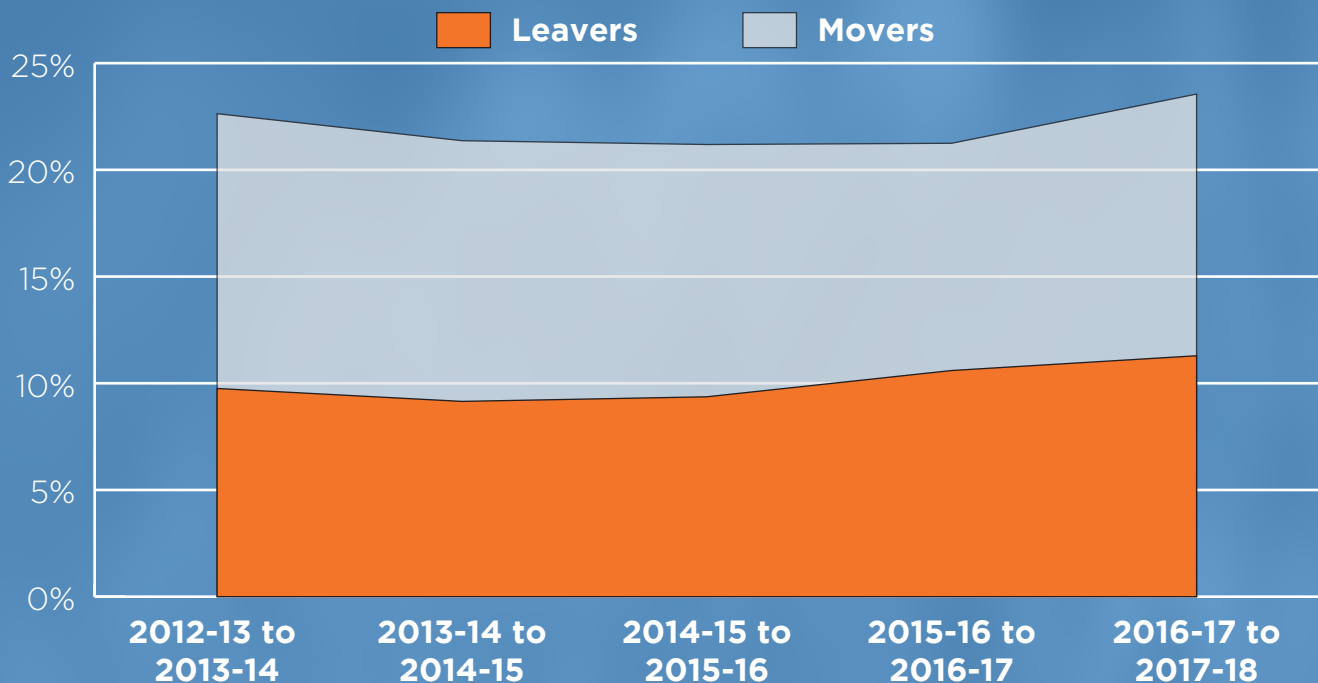
that the year-over-year rate of movers is higher than the rate of leavers. All of the regional graphs are given in Appendix F.

Figure 10 shows the trends of movers by category. About 48.6 percent of movers between 2016-17 and 2017-18 were educators staying in the same district but with a different position (movers-2). The other two elements of the movers category (i.e., movers-1 and movers-3) made up roughly 25 percent each. Across years, both educators moving to a different position and district (i.e., movers-1) and those staying in the same district but with a different position (i.e., movers-2) have slightly increased their participation rate, with the opposite trend occurring for educators staying in the same position but moving to a different district (i.e., movers-3).

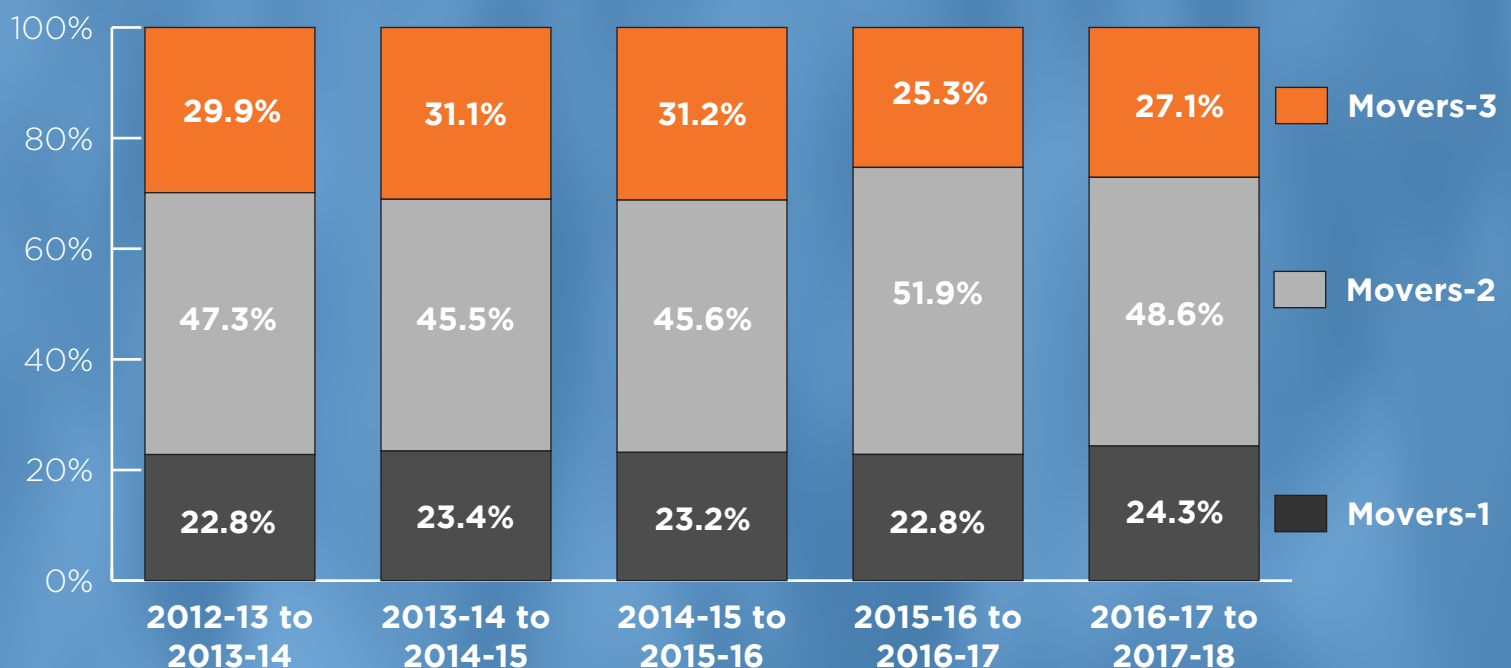
As illustrated in Figure 11, regional turnover rates in the state show a u-shaped trend since 2012-13, with a peak in 2017-18 for all but Region 3 (Northwest). Between 2012-13 and 2017-18—using year-over-year comparison—the turnover ratio for three regions (i.e., central, northwest, and southwest) is usually higher than that of the state. In contrast, all turnover rates for regions 2 (Northeast) and 4 (Southeast) are consistently below the state benchmark. The highest regional turnover rate in Oklahoma in 2017-18 was recorded in the central region (24.5 percent), while the lowest rate was 21.3 percent, registered southeast. Appendix G lists the annual turnover rates for the state and each region from 2012-13 to 2016-17.

FIGURE 9

RATE OF LEAVING EDUCATORS 2012-13 TO 2017-18

**FIGURE 10**

MOVERS BY CATEGORY 2012-13 TO 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region. Movers are educators who move between school districts and/or change position between two consecutive years.

Following Carver-Thomas & Darling-Hammond (2017), turnover is further disaggregated into five components: retirement, voluntary preretirement, involuntary preretirement, voluntary movers, and involuntary movers. It is well known that turnover associated with reasons other than retirement can account for a large share of school/district staffing challenges (Ingersoll, 2001; Rupard, 2014; Sutchter *et al.*, 2016). Next, the role of each component on the overall turnover rate is examined statewide and regionally.

Figure 12 breaks down the data by turnover component for 2017-18. About half of the statewide educator turnover (i.e., 23.6 percent) is made up of voluntary movers, the same as it was six years ago. In addition to the state average of 12.0 percent of educators who voluntarily moved between school districts and/or changed positions, more than one-third (9.0 percent), on average, left the profession altogether. This rate has increased by three percentage points since 2012-13, a relatively modest increase that has a tremendous impact on the size of the teaching workforce –it reduced the supply of teachers by more than 1,300 educators each year since 2012-13.

Retirement is another component of educator turnover and it explains about one-tenth of it in 2017-18 (i.e., 2.0 percent). The rate has oscillated between 3.0 and 2.0 percent since the beginning of the period under analysis.

Finally, involuntary leavers and involuntary movers have a marginal participation in

the turnover rate, 0.7 percent in 2017-18, which is the same rate as in 2012-13.

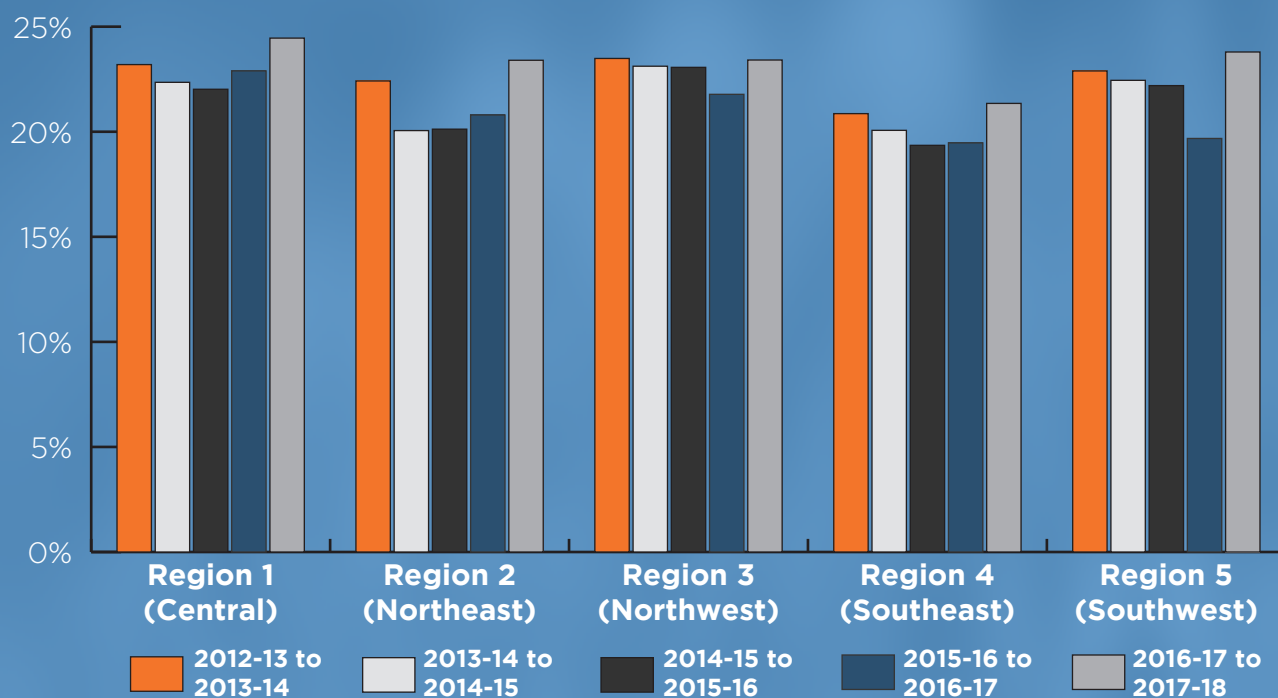
The distribution of turnover regionally is generally similar to those statewide. Only regions 2 (Northeast) and 5 (Southwest) show a slightly different rate (i.e., 11.0 percent and 13.0, respectively) of voluntary movers. In addition, regions 4 (Southeast) and 5 (Southwest) show a lower rate (7.0 percent) of voluntary preretirement leavers, and all but Region 5 have the same retirement rate. Figures showing the sources of educator turnover for each region appear in Appendix H for reference.

Previous research has significantly associated turnover to differences in educator characteristics and across different populations (Sutchter *et al.*, 2016; Struyven & Vanthourmout, 2014). For example, it has been shown that mathematics, science, and special education teachers are more likely to quit teaching than other subject specialties. The primary position variable is used to enhance our understanding of such turnover differences within the public schools system in Oklahoma.

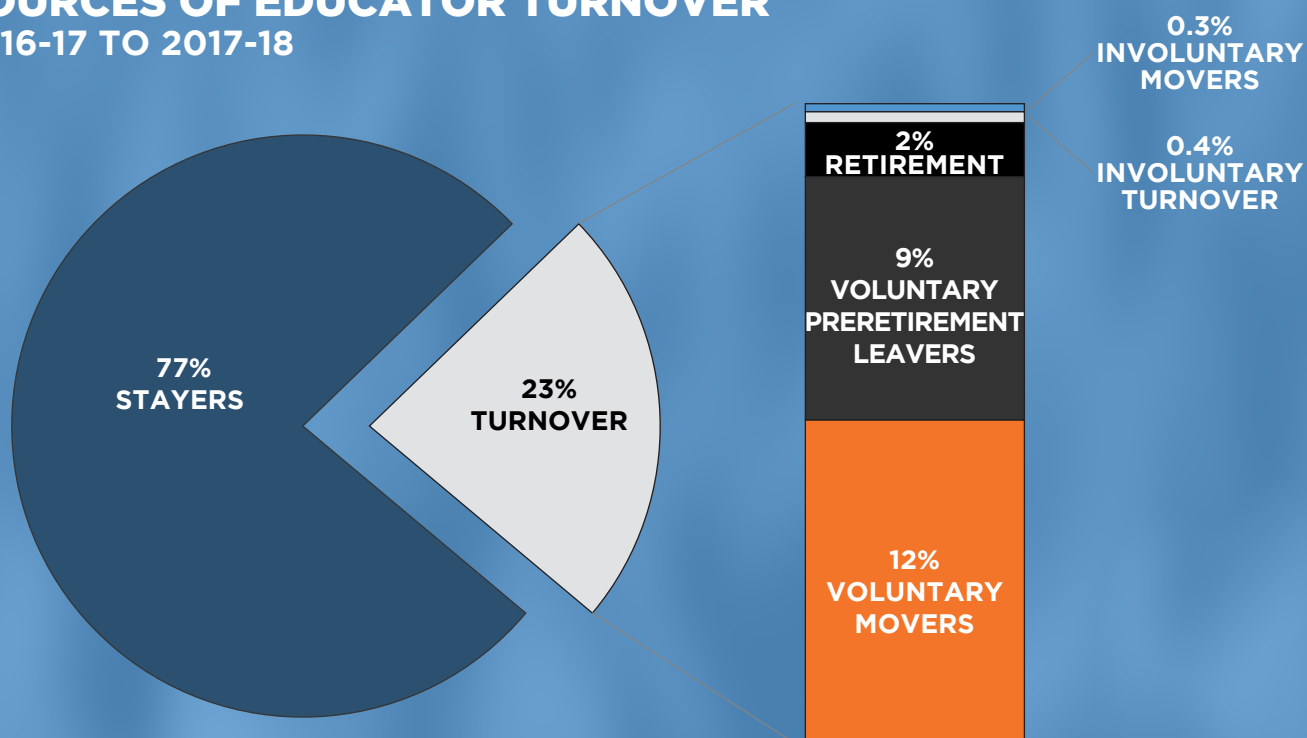
Figure 13 shows turnover rates, disaggregated into leavers and movers, for all 24 primary positions in 2017-18. The *charter* position has the highest rate of educator turnover—about 41.9 percent—followed by *MS other* and *HS other*. All three positions have a turnover rate greater than 35.0 percent. Consistent with these findings, the descriptive data show the position with

FIGURE 11

TURNOVER RATES BY REGION 2012-13 TO 2017-18

**FIGURE 12**

SOURCES OF EDUCATOR TURNOVER 2016-17 TO 2017-18

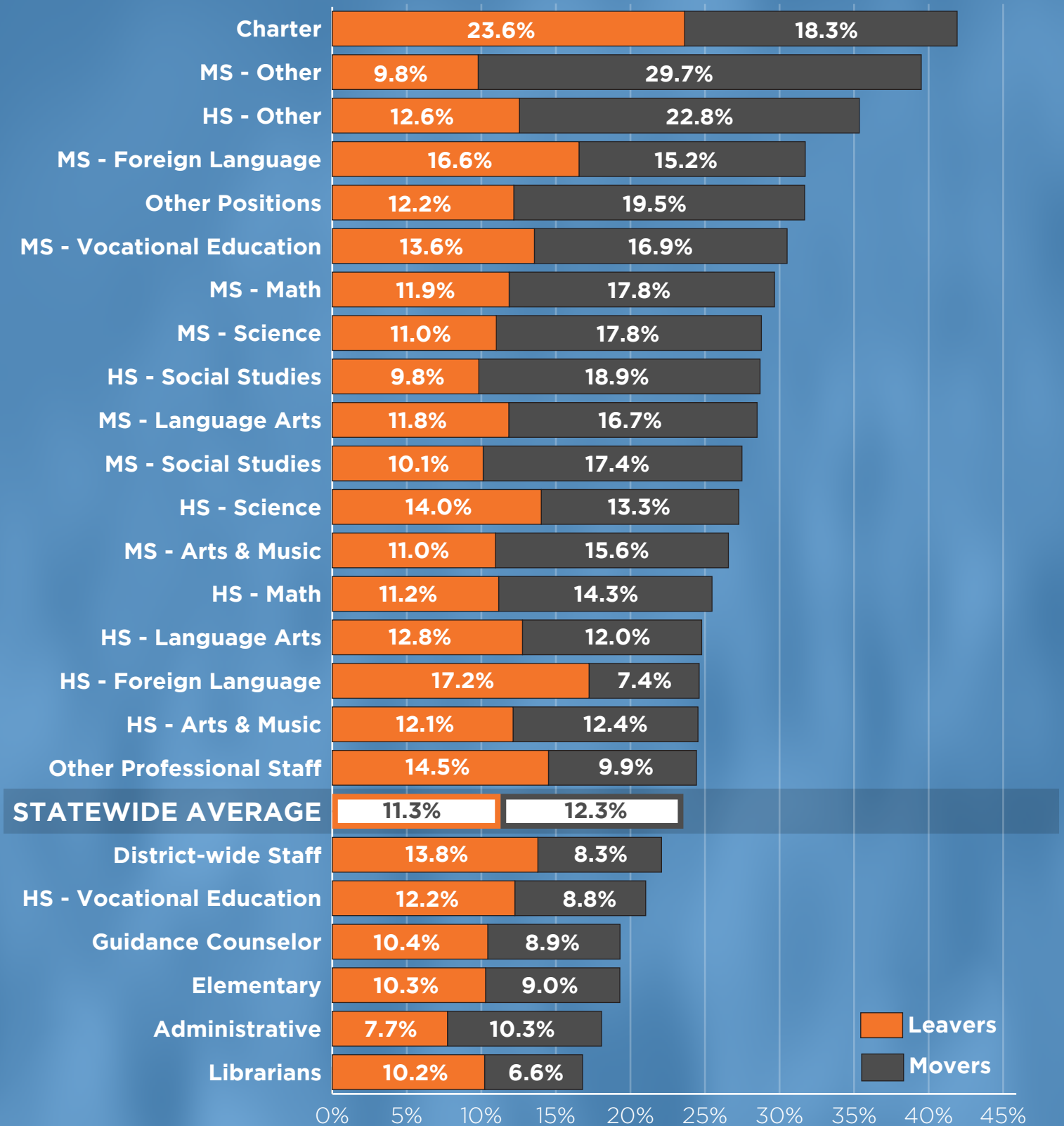


Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

FIGURE 13

TURNOVER RATES BY PRIMARY POSITION

2016-17 TO 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

the highest rate of movers is *MS other* (29.7 percent), and that with the highest rate of leavers is *charter* (23.6 percent).

By contrast, at 16.8 percent, *librarian* is the position with the lowest turnover rate, and the lowest rate of movers (6.6 percent). When the data for teachers versus other educators –*district-wide staff, administrative, guidance counselor, librarian, other professional staff, and other positions*– are examined, the results suggest high turnover is slightly more frequent among teachers than other educators (23.7 and 22.3 percent, respectively).

Figure 13 also highlights the state average rates for leavers (11.3 percent) and movers (12.3 percent) across primary positions, and reveals that all core subjects –defined as *language arts, mathematics, science, and social studies*– in middle and high school, rank above the state benchmark, i.e., educators in those subject fields leave the public school system at a higher rate.

Turnover rates by subject area also vary across the state. While *charter* ranks 1st in regions 1 and 2, non-core subject areas in middle school rank at the top in the other 3 regions. *MS vocational education* is the position with the lowest turnover rate across regions, and it corresponds to Region 4 (Southeast). As evidenced at the state level, high turnover in each of the five regions is more frequent among teachers than among other educators. Regionally, at least one core subject is persistently classified among the positions with the

highest turnover rates. It is worth noting that one position consistently ranks among the six with the lowest turnover rates: *elementary*. Appendix I contains graphs depicting the primary position turnover rates for each region.

Retention

The ability to keep educators employed in the public school system is the complement to turnover, and should be simultaneously tracked and analyzed to better inform personnel management practice and policy. This section provides data on retention of beginning (i.e., new hires) educators in public schools, covering up to five years of the educators' careers. The data analysis performed addresses one specific recommendation –i.e., to compare the retention rate of new educators across types of certificates– emanating from the Institutions of Higher Education Survey conducted by the Oklahoma State Department of Education early in 2018.

Figure 14 shows how the average retention of public school educators changes with the number of years of experience. Among all beginning educators between 2012-13 and 2016-17, 81.8 percent taught after 1 year, 68.7 percent after 2 years, 62.8 percent taught after 3 years, 57.9 percent remained teaching after 4 years, and 53.9 percent of new educators taught after 5 years. In all follow-up years, the drop in the percentage of beginning educators not teaching shows a steady decline, changing from 18.2 percentage points after 1 year of teaching to 4.0 percentage points after 5 years.

(*Shortage indicator 3: Proportion of public schools' educators who stay by number of years of experience, number of years retained and certification type*). Appendix J contains the retention cumulative percentages of beginning educators in 2012-13 through 2016-17, by certificate type.

The analysis shows that not only the retention of beginning educators as their years of experience increase drops –at least during the educators' initial years–, but also in successive cohorts of educators, and across all year-to-year persistence options. For example, Figure 15 shows the retention rates at the 2-year mark for cohorts 2012-13 thru 2015-16. Almost every certificate type's rate continuously decreased from the earliest to the more recent cohorts of new teachers.

In Oklahoma, career teachers are defined as those with more than three years of experience. Figure 16 presents the percentage of beginning educators who did not leave the public school system after three years (i.e. career teachers), for seven of the eight types of certificates under analysis. Due to the small number of yearly observations (i.e. fewer than seven), the license category is not included in the graph.

Between 2015-16 and 2017-18(p), the overall 3-year retention rate was on average 62.8 percent. There are four certificate types that show a retention rate above that of the overall average: *paraprofessional* (71.9 percent), *standard* (68.0 percent), *multiple* (66.5 percent), and *alternative* (65.8 percent). *Paraprofessional* are life-

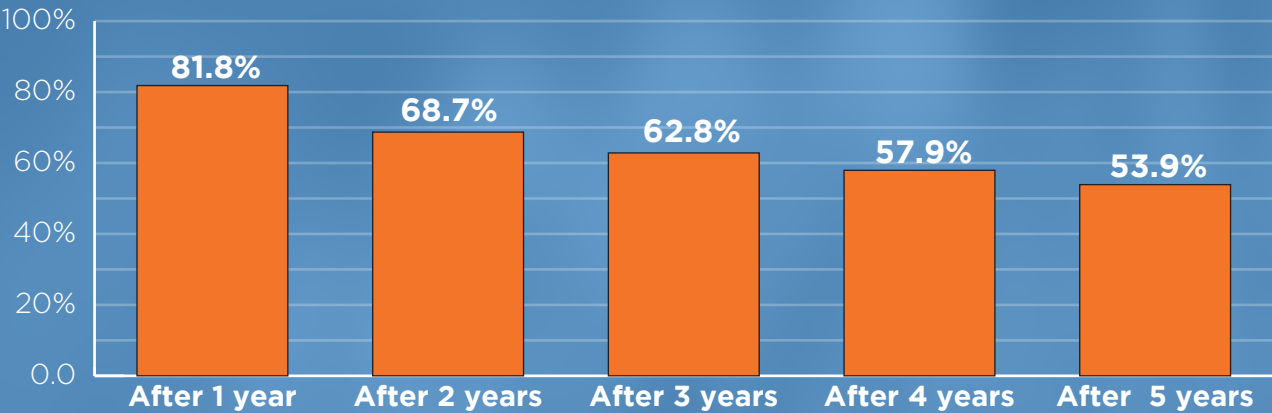
long certificates, whereas the validity period for *standard* and *alternative* certificates are five years renewable and three years non-renewable, respectively.

The certificate type with the lowest retention rate is *other* (31.2 percent). As explained previously, this category mainly includes individuals with an issued Non-Traditional Special Education Provisional Certificate, and those with the Teach for America program, which are issued a credential valid for teaching two years in the state.

Some similarities and differences across certificate types in terms of retention rates are also evident when the overall average data is disaggregated by type of certificate (Appendix K). The steady decline in the retention rate for all certificate types, as the educators' number of years of experience increases, closely resembles that of the overall average after 1, 2, 3, 4, and 5 years. After 1 year, educators with a *paraprofessional* certificate show the highest retention rate at 91.0 percent, while those with an *emergency* certificate rank the lowest at 73.6 percent. Each year after the 1-year mark, *other* is the certificate type with the lowest retention rate, falling from 85.9 percent after 1 year to 14.8 percent after 5 years. On the other hand, the retention rate for the *paraprofessional* category is consistently the highest across types, dropping from 91.0 percent after 1 year to 69.1 percent after 5 years.

FIGURE 14

RETENTION RATES OF PUBLIC SCHOOL EDUCATORS
IN THE FIRST FIVE YEARS



Note: Rates are averages of cumulative percentages of beginning educators, each year since starting teaching: 2012-13 through 2016-17. The number of years included in the averages decreases as more recent data are involved. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g., county/region.

FIGURE 15

TWO-YEAR RETENTION RATES OF PUBLIC SCHOOL EDUCATORS
BY COHORT AND INITIAL TYPE OF CERTIFICATE

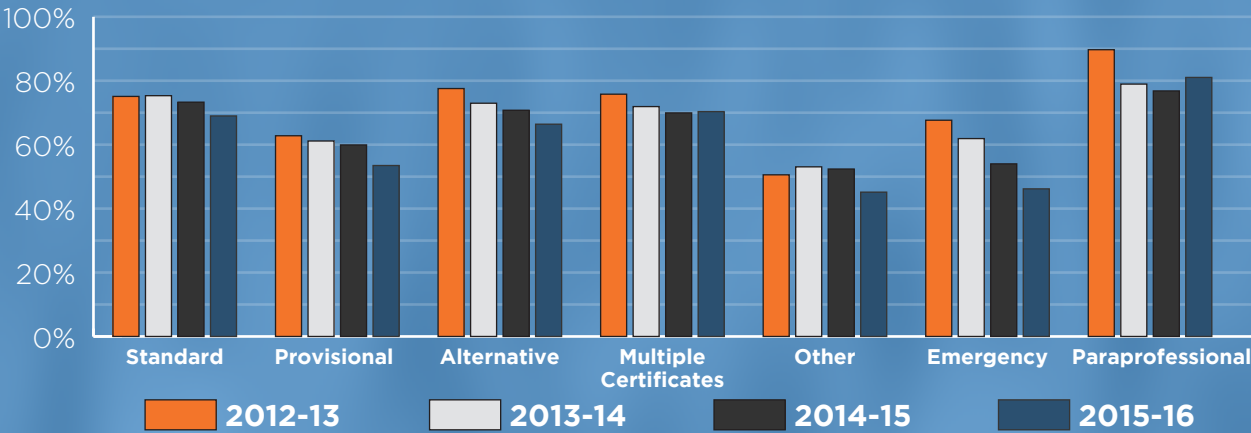
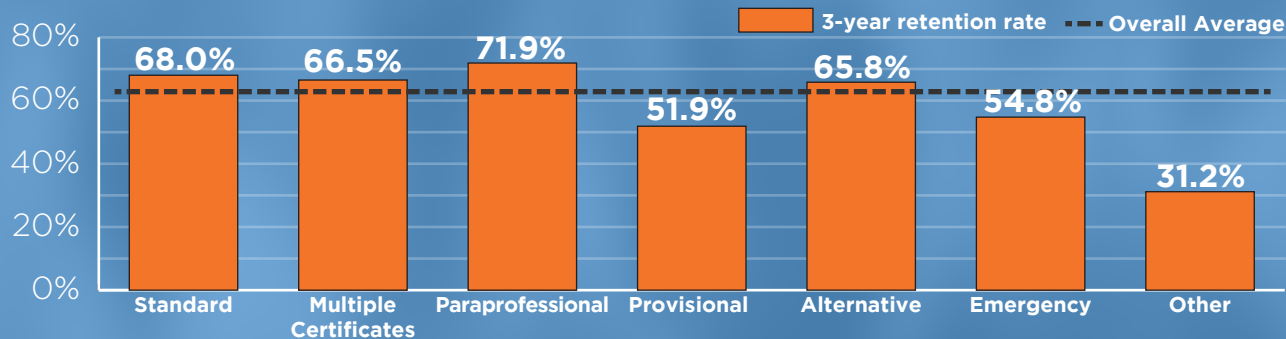


FIGURE 16

RETENTION RATES OF PUBLIC SCHOOL EDUCATORS
BY TYPE OF INITIAL CERTIFICATE



Note: Rates are averages of cumulative percentages of beginning educators after three years since they started teaching: 2012-13 through 2014-15. License certificates are not included due to its small number of observations.

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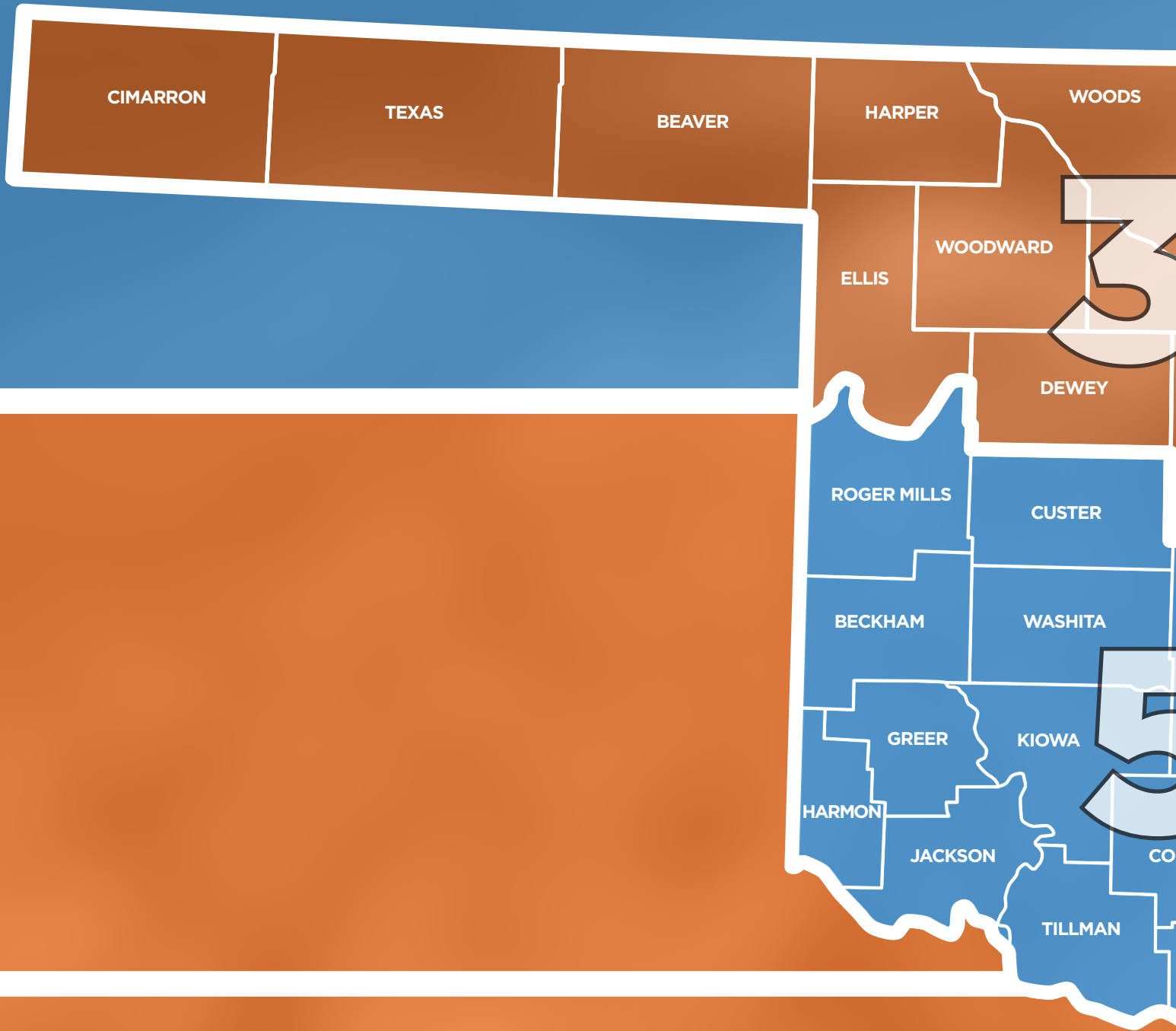
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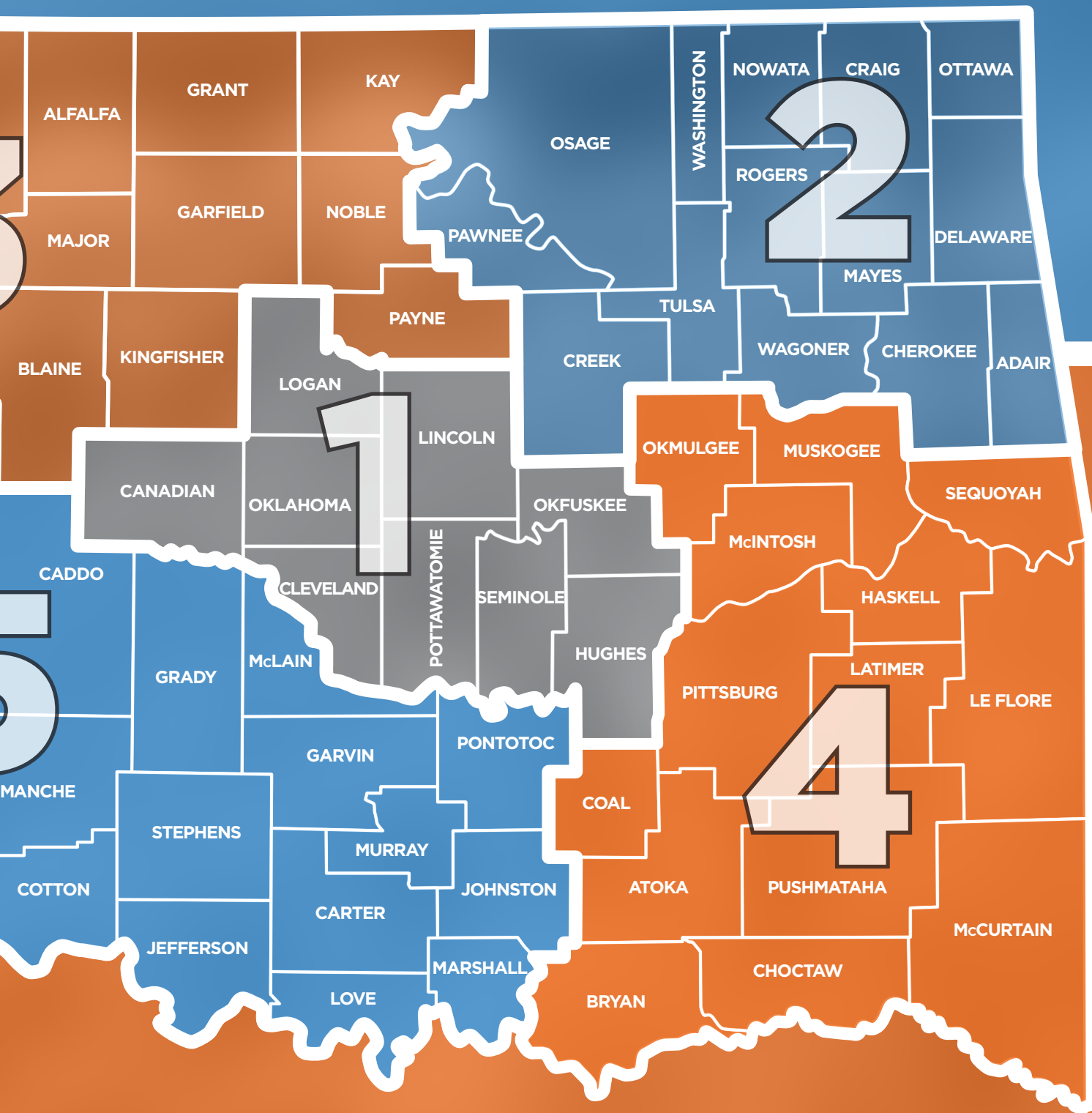
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SUPPLY

The supply of educators can be defined as the number of eligible and available individuals –from all sources– who are willing to offer their services under prevailing conditions (Boe & Gilford, 1992). In practice, what is known with precision is the total number of educators who are hired annually. For example, the educator workforce in public school classrooms across the state in the 2017-18 academic year was 50,598. This number includes eligible individuals who applied for open positions and were newly hired (i.e., new educators), and those who stayed from the previous year (i.e., re-entrants).

In this section, the dynamics of the current and past teaching force are evaluated by identifying its overall trends and composition, including educator demographics, qualifications, and their geographic distribution. Further, the analysis of the disaggregation of the supply by its two main factors, i.e., new and continuing educators is presented. The supply of educators is affected by multiple factors, including salaries and working conditions. Data are used on relevant variables to explain current trends and future estimates. In addition, information about teacher preparation programs –a critical source of educator supply– is presented. Two shortage indicators (i.e., indicators 4 and 5) are included in this section addressing key supply-side factors.

The state's supply shows an overall downward trend at the state and regional level since 2012-13. The distribution of educators across age groups has stayed mostly unchanged, but the average experience level of educators has slightly declined remaining lower than the national number. In comparison to the national average salary, and that of neighboring states, the average teacher salary in Oklahoma has seen, in the last few years, the highest drop in real terms, and the highest annual percentage decrease. Compared with all educators that make up each year's supply, re-entrants are relatively older; they have slightly more years of experience; and slightly higher rates of educational attainment. On the other hand, new hires are much younger, have fewer years of experience and less declining education attainment. Fewer graduates earned an education degree between 2012-13 and 2016-17 regardless of the graduating institution.

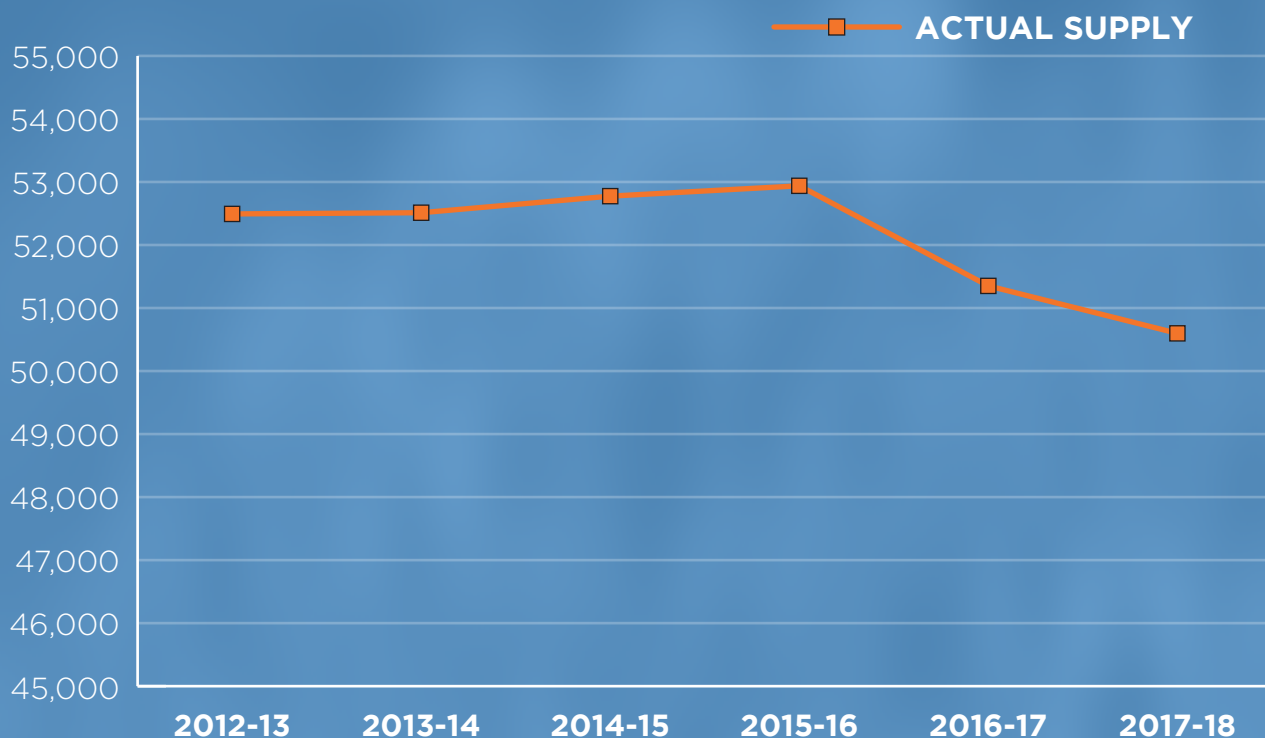
WORKFORCE TRENDS

Data on both educators who stay working for the public school system from one year to the following, and those that are new hires were compiled by primary position and region from 2012-13 to 2017-18 (Figure 1). Overall, there was a downward trend in educator supply, though with some fluctuation. After reaching a peak in 2015-16, the teaching workforce dropped from 52,939 to 50,598 in 2017-18. A similar pattern is seen in regions 1, 2, and 3, while a more persistent decline was observed in regions 4 and 5 (Table 1).

FIGURE 1

STATEWIDE EDUCATOR SUPPLY

2012-13 TO 2017-18

**TABLE 1**

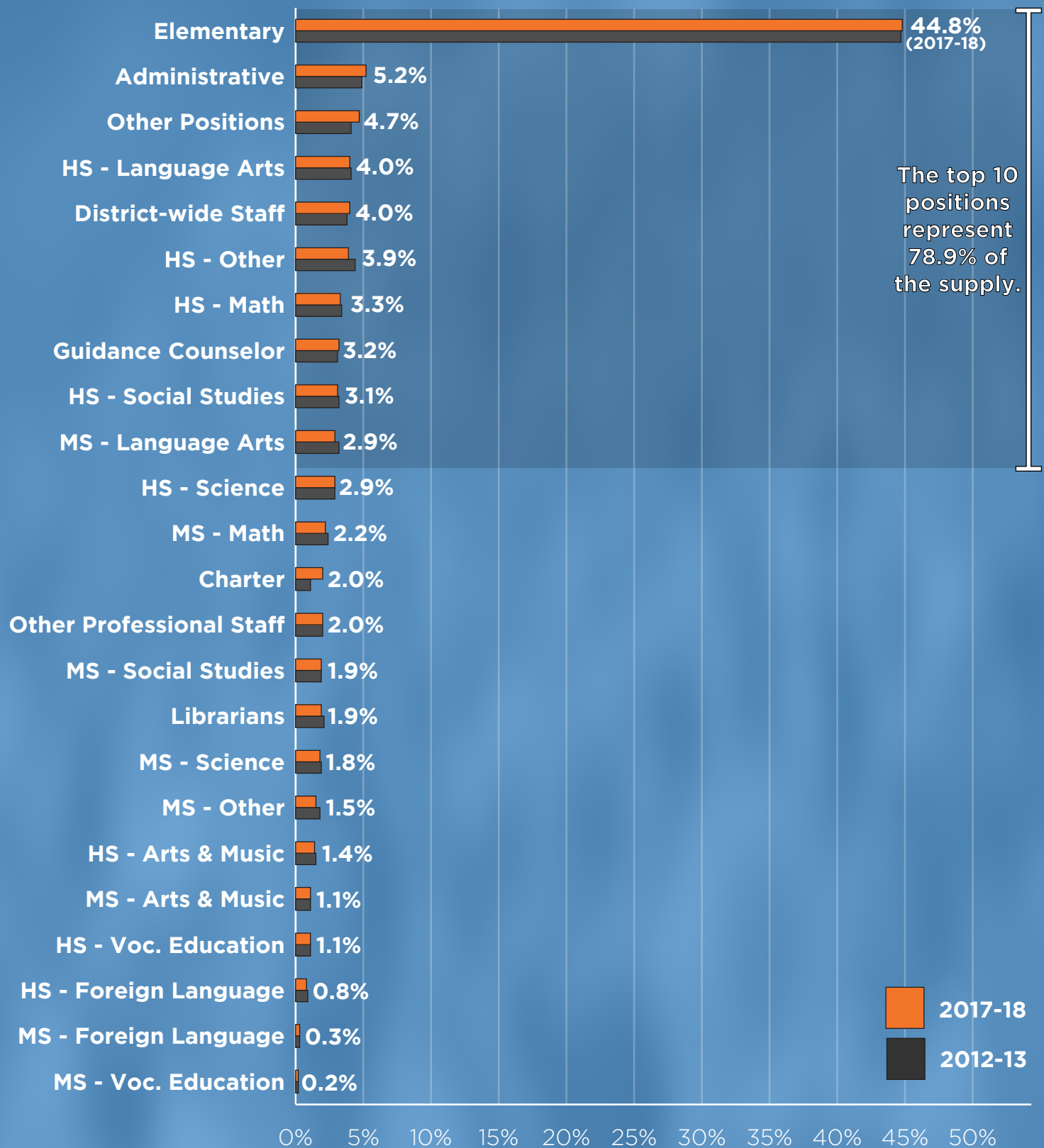
EDUCATOR SUPPLY BY GEOGRAPHY

Region	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18p
STATEWIDE	52,493	52,512	52,775	52,939	51,351	50,598
Region 1 (Central)	17,171	17,283	17,569	17,763	17,321	17,218
Region 2 (Northeast)	18,049	18,035	18,104	18,122	17,559	17,177
Region 3 (Northwest)	4,662	4,663	4,674	4,675	4,506	4,431
Region 4 (Southeast)	6,404	6,334	6,278	6,307	6,052	5,981
Region 5 (Southwest)	6,207	6,197	6,150	6,072	5,913	5,791

Note: 2017-18 data as of January 24, 2018

FIGURE 2

SUPPLY BY PRIMARY POSITION 2012-13 TO 2017-18



Note: 2017-18 data as of January 24, 2018

To better understand the trends in supply, data from 2012-13 through 2017-18 were decomposed by primary position; Figure 2 summarizes the results for the first and last years of the period. Detailed data for each position across years and regions appear in Appendix A. The largest positions statewide in both years include *elementary*, *administrative*, *other*, *High School (HS) language arts*, *district-wide staff*, *HS other*, *HS math*, *guidance counselor*, *HS Social Studies*, and *Middle School (MS) language arts*. Together, they represent 78.9 percent of the total supply for each year. Looking at the percentages in Figure 2, it is evident the distribution in both years remained largely similar.

There were, however, some regional growth differences across positions. The growth rate of *HS vocational education* and *MS foreign language* positions; *district-wide staff*, *MS vocational education*, and *other positions*; *district-wide staff*, *elementary*, *HS social studies*, and *MS language arts* positions; *MS mathematics*, *MS other*, and *other professional staff* positions, were significantly¹ higher than statewide in regions 1, 2, 3, and 5, respectively. By contrast, the growth rate of *charter*, *HS vocational education*, and *MS foreign language* positions; and *HS vocational education*, *MS foreign language*, and *MS language arts* positions, were significantly² lower than statewide in regions 2 and 5, respectively.

1 Based on the chi-squared statistic and $P < .01$.

2 Based on the chi-squared statistic and $P < .01$.

Regionally, the primary position composition of the teaching workforce also remained very similar between 2012-13 and 2017-18. There was a modest increase (average of 0.5%) in the concentration of primary positions in all regions, except Region 3.

The composition of the teaching workforce is vital to understanding the attributes of educators, how those attributes may be changing over time, and their impact on teacher recruitment, retention and costs (Organization for Economic Cooperation and Development, 2005). The relevance of factors such as age and experience comes from different sources, including the current compensation system for educators, promotion decisions, and employability (Fugate, Kinicki, & Ashforth, 2004), all of which are structured to reward career service. Improved learning outcomes, through enhanced educator effectiveness, is arguably the most critical factor in explaining experience importance (Rice, 2009).

The impact of educator experience on effectiveness, however, is strongest during the early years of teaching (Clotfelter, Ladd, & Vigdor, 2007). Teaching qualifications, including certification, have also been found to improve student's achievement, although to a limited extent (Clotfelter, Ladd, & Vigdor, 2010; Kane, Rockoff, & Staiger, 2008; Goe, 2007).

Following is an examination of the distribution of educators across selected age groups, years of experience, type of certification, and education level. A brief description of salary trends is included at the end of the section.

Age composition

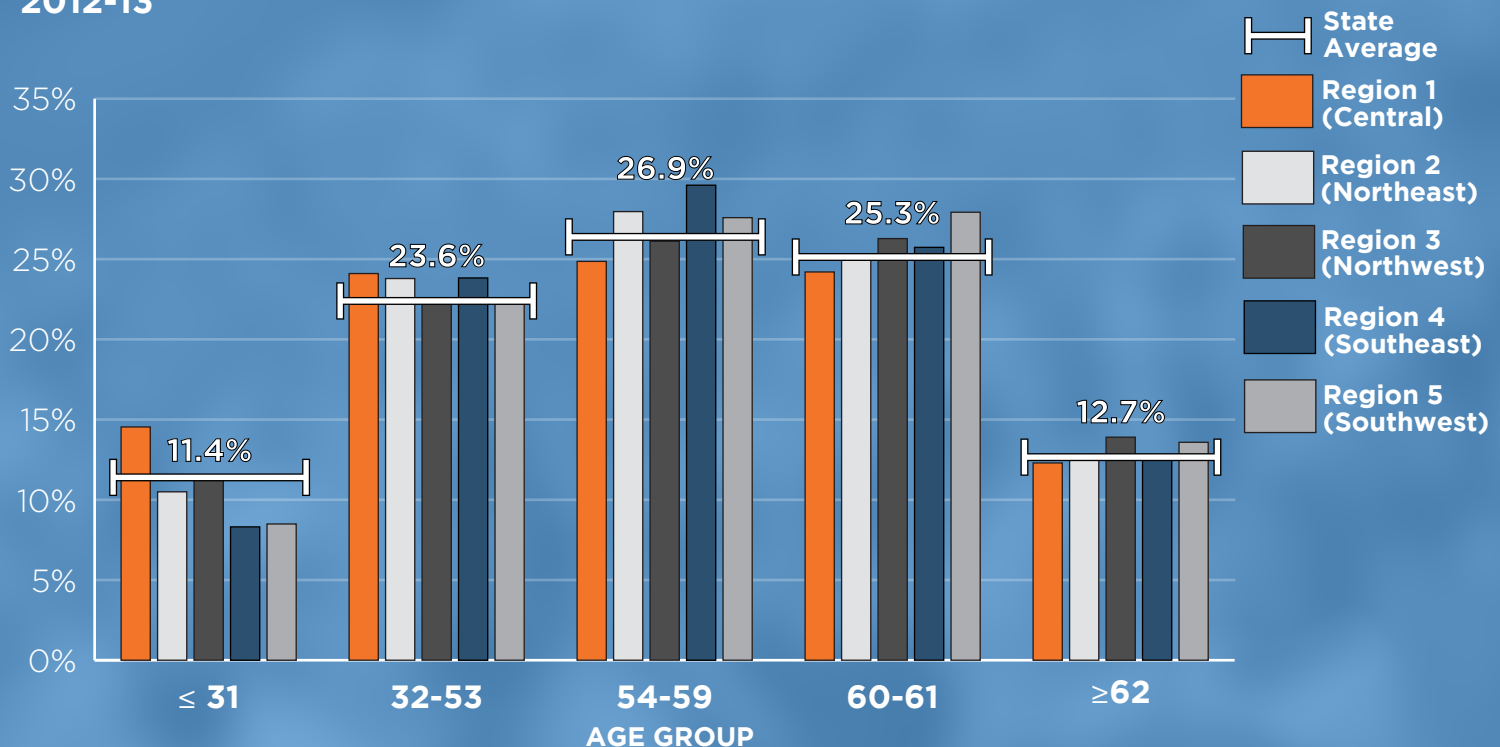
Public school educators in 2017-18 were 3.7 percent fewer than those in 2012-13, but the average age of educators employed by school districts in the state remained steady since 2012-13 at 45 years. The median age also showed a similar pattern, both in value and trends, fixed at 45 years. Both values are higher than the national numbers (42 and

41, respectively) (Taie & Goldring, 2018). Analogously, the statewide distribution of educators across age groups has stayed mostly unchanged since 2012-13, with a slight reduction in all categories –an average decrease rate of less than 0.5 percentage points– except the 54-59 age group, whose participation increased from 27.0% to 28.7% (Figures 3 and 4).

Likewise, the age composition of educators across regions has not changed much during the 6-year period of analysis. In 2012-13, the average age was 44 years in Region 1 (Central), 45 in regions 2 (Northeast) and 3 (Northwest), and 46 in

FIGURE 3

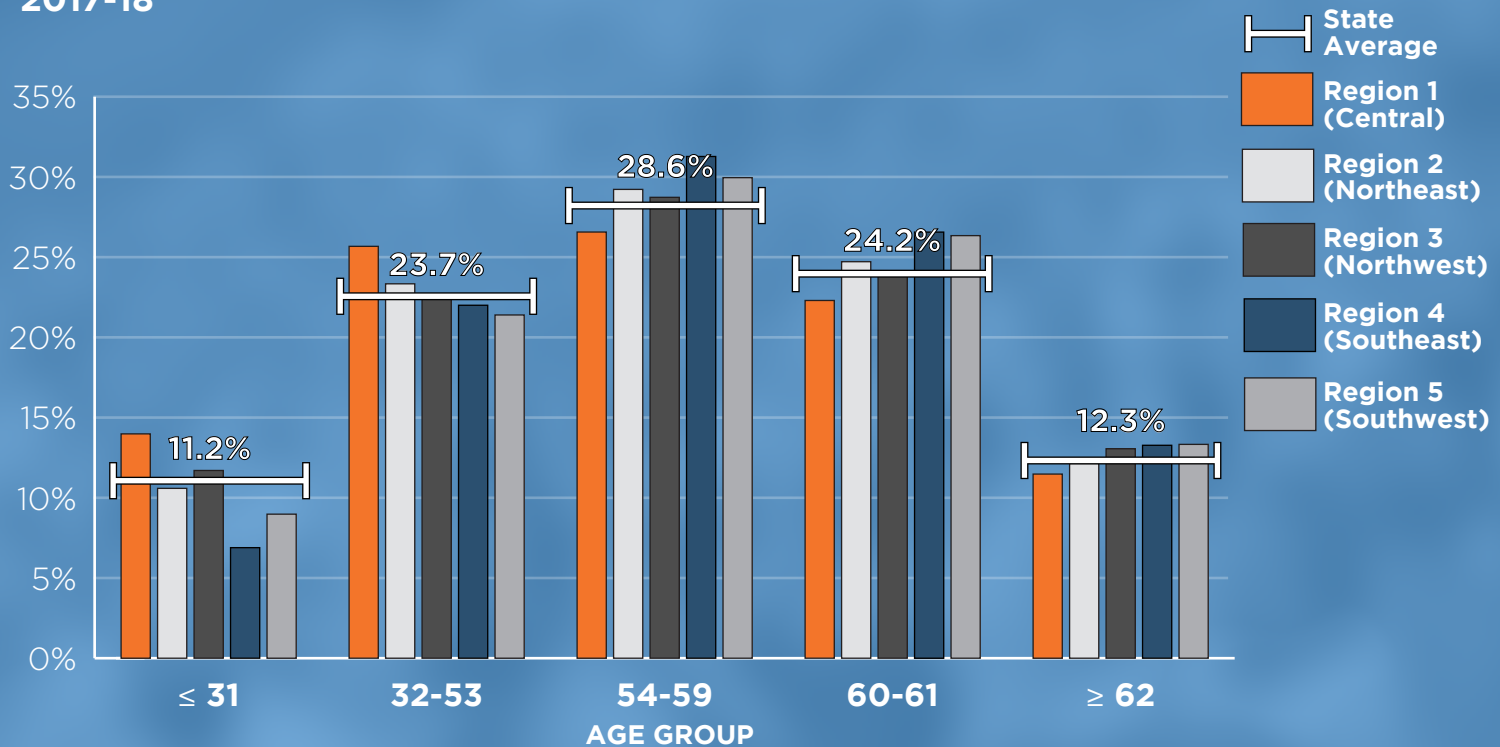
AGE GROUP PERCENTAGE DISTRIBUTION BY REGION 2012-13



Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

FIGURE 4

AGE GROUP PERCENTAGE DISTRIBUTION BY REGION 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

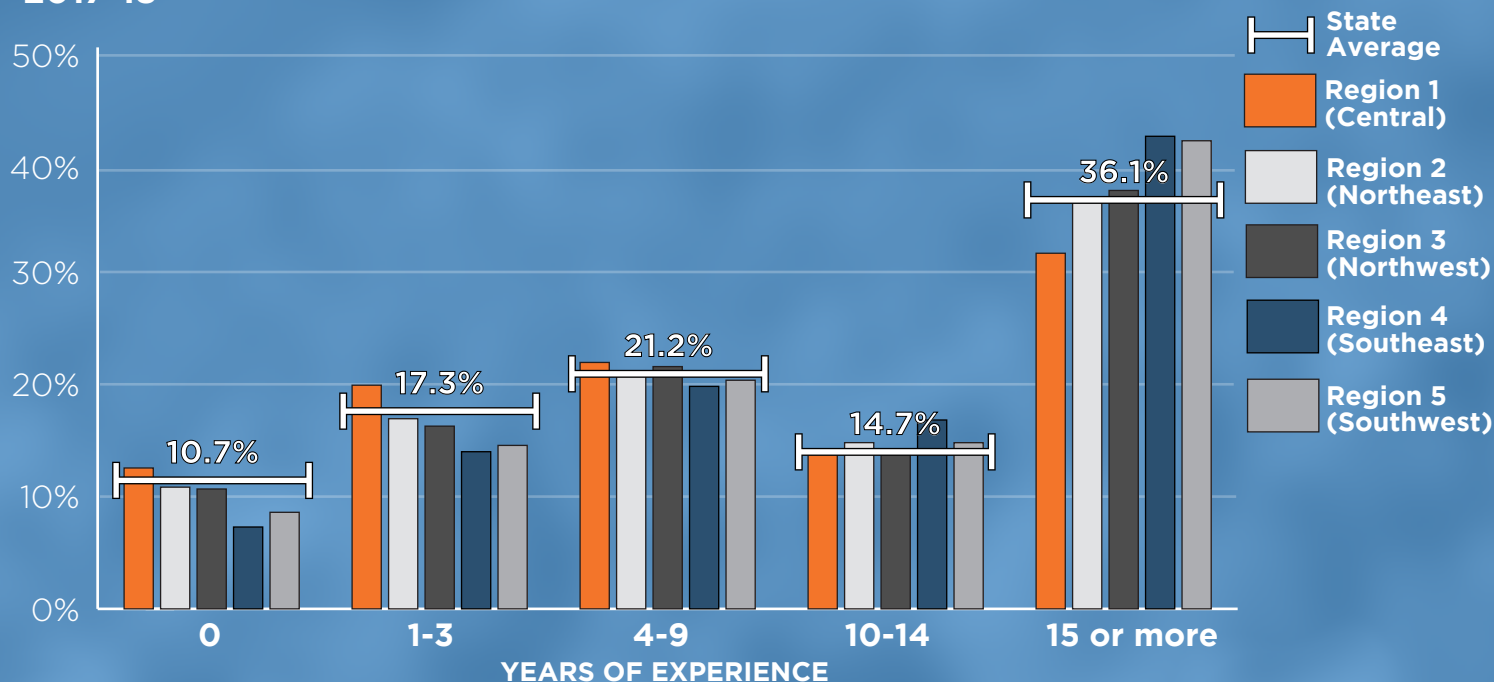
regions 4 (Southeast) and 5 (Southwest). This remains the same in 2017-18. The median age shows a similar pattern for all regions, i.e., the values between 2012-13 and 2017-18 remained constant, except for Region 4 where it increased from 45 to 47 years. Since 2012-13, the age composition across regions has varied modestly –the highest positive change has been 2.4 percentage points for the 60-61 group, while the highest negative change of 2.6 percentage points occurred in the 54-59 age group, both in Region 3. Figures 3 and 4 show regional positive and negative distribution changes for all age groups. The difference between the largest and smallest proportion of educators in both years is highest for those at age 31 or younger, and lowest for everyone 62 or older.

Experience

This section of the report provides a snapshot of the extent in which experienced educators teach Oklahoma public school students.

On average, Oklahoma public school educators had about 12 years of experience in 2017-18, one year fewer than in 2012-13, and two years fewer than the national average (Taie & Goldring, 2018). Median tenure (i.e., experience) also declined; it was 12 years in 2012-13 compared with 10 in 2017-18. Overall, the vast majority of the educator experience continues to come from working in the same school district or in other district within the state.

EDUCATOR EXPERIENCE DISTRIBUTION BY REGION 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

The experience composition of active public school educators in 2017-18 (Figure 5) shows that approximately 36.1 percent have 15 or more years, 21.2 percent 4–9 years, 17.3 percent 1–3 years, 14.7 percent 10–14 years, and 10.7 percent have no experience. The shape of the distribution in 2017-18 looks similar to that in 2012-13 (Figure 6), but with a higher percentage of educators with 1–3 years of experience (17.3 percent vs. 12.2 percent) and no experience (10.7 percent vs. 7.1 percent) and a lower participation for the remainder groups. These findings apply to most of the period under analysis.

Educator experience varies slightly across regions. In 2017-18, the average number of years of experience is highest in regions 4 and 5 (13 years) and lowest in Region 1 (11

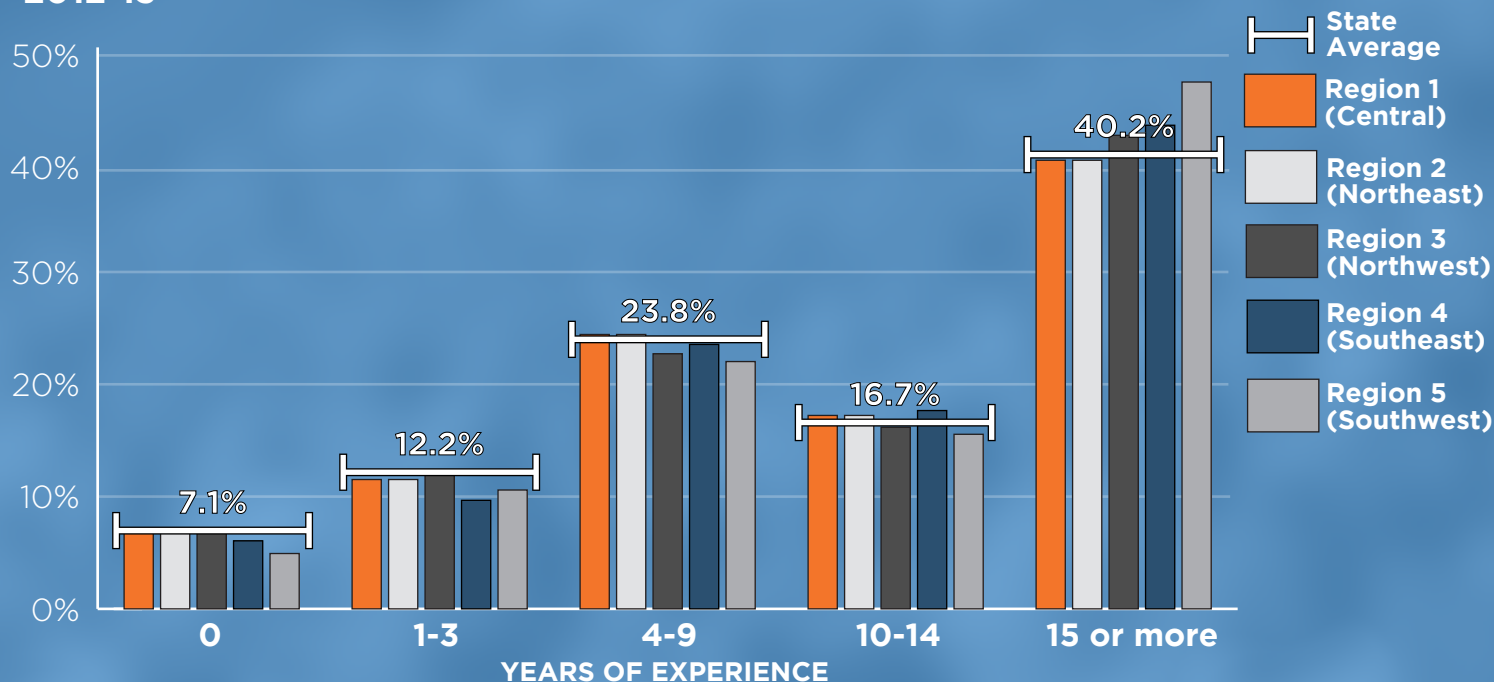
years), all lower than six years ago. During the 2017-18 school year, the percentage of educators with no experience, 1–3 years of experience, and 4–9 years of experience, is highest in Region 1 (12.5, 19.9, and 21.9 percent, respectively) and lowest in Region 4 (7.3, 14.0, and 19.8 percent, respectively). By contrast, the region with the highest rates of educators holding 10–14 years of experience, or 15 years or more, is Region 4 (16.8 and 42.1 percent, respectively), while the one with the lowest rates is Region 1 (13.9 and 31.7 percent, respectively).

Qualifications Certification

By comparing the number of individuals in the reserve pool of the work force, evidence of a statewide widening gap is found, especially after 2015-16. While 60.3

FIGURE 6

EDUCATOR EXPERIENCE DISTRIBUTION BY REGION 2012-13



Note: Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

percent of certified educators were working in an Oklahoma public school in 2012-13, only 57.3 percent were doing so in 2017-18. A combination of a recent increasing trend in the number of educators with a valid certificate, and a recent drop in the number of certified educators working in public schools, helps explain the growing divergence (Figure 7).

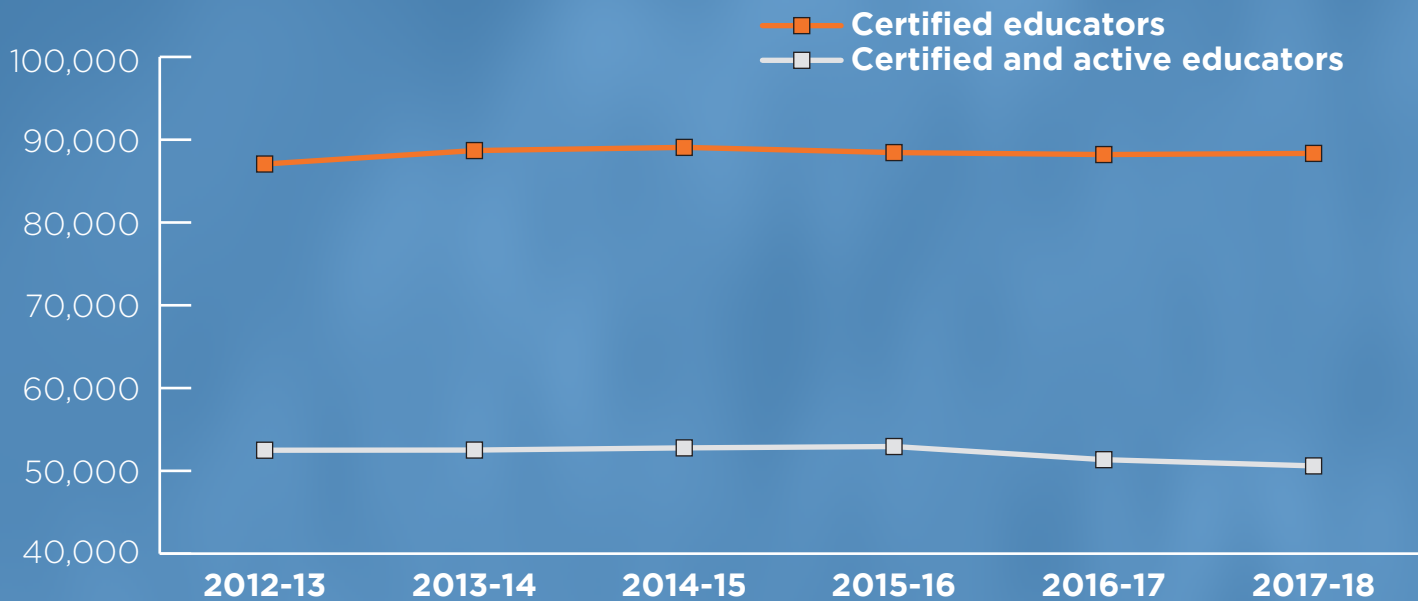
The percentage distribution of valid certificates for each year between 2012-13 and 2017-18, by certification type, is shown in Figure 8. Note that this includes all individuals holding at least one valid certificate, but not necessarily working in a public school. Altogether, the data suggest the existence of two distinguishable patterns statewide and regionally: 1) an increasing trend for the *standard*,

alternative, *emergency*, and *other* certificate categories, and 2) a declining trend for the remaining three, which include *multiple*, *provisional*, and *license*. The participation rate of educators with a *standard* certification grew from 73.7 percent, at the beginning of the period of analysis, to 79.7 percent at the end, the highest percentage point increase across all certification types.

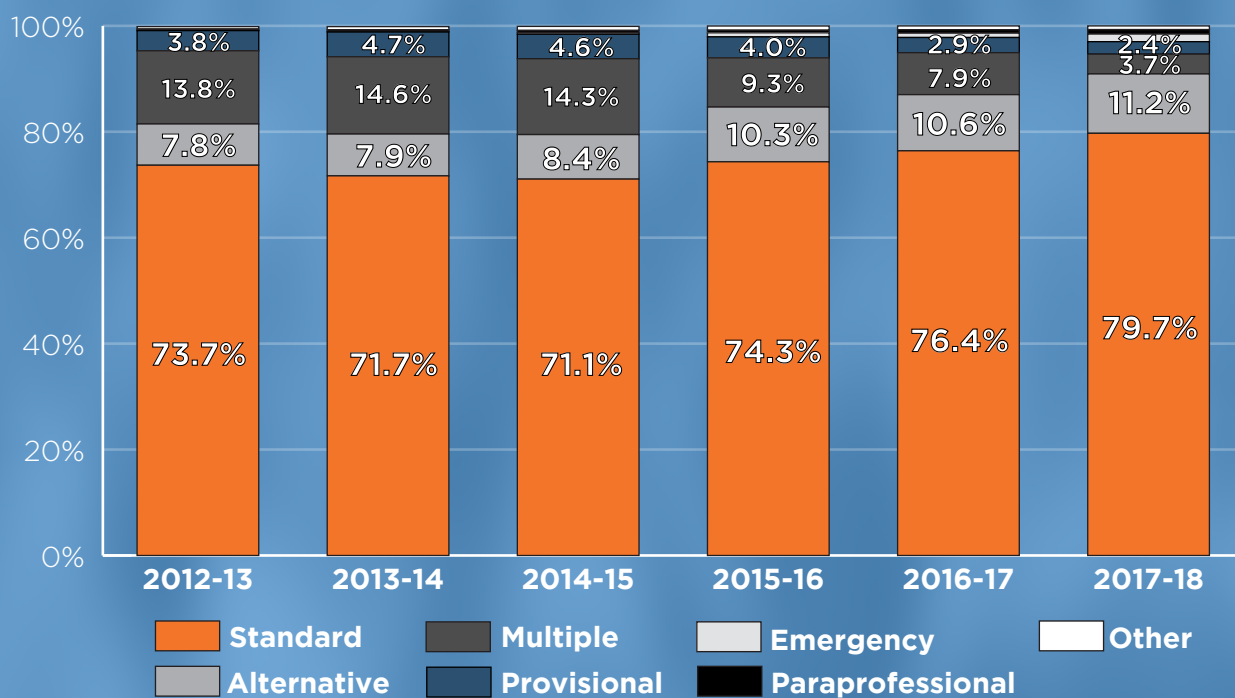
At the same time, the participation rate of educators with multiple certificates fell from 13.8 percent to 3.7 percent, the highest percentage point decrease across all types. Educators with multiple certificates usually represent less than five percent of certified educators in Oklahoma. For instance, their participation rate in 2017-18 was 3.7 percent, with a typical educator in this category holding two certificates. The

FIGURE 7

CERTIFIED VERSUS ACTIVE EDUCATOR IN PUBLIC SCHOOLS 2012-13 TO 2017-18

**FIGURE 8**

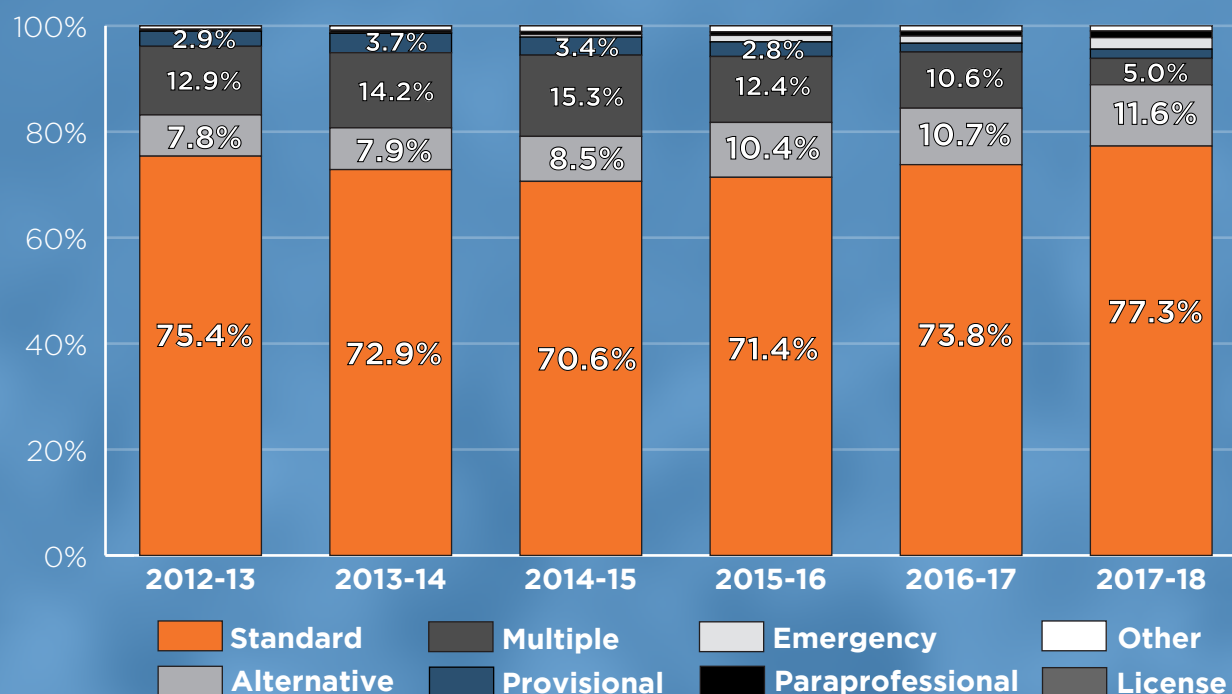
ALL CERTIFIED EDUCATORS BY CERTIFICATION TYPE 2012-13 TO 2017-18



Note: 2017-18 data as of January 24, 2018

FIGURE 9

ALL CERTIFIED AND ACTIVE EDUCATORS BY CERTIFICATION TYPE 2012-13 TO 2017-18



Note: 2017-18 data as of January 24, 2018

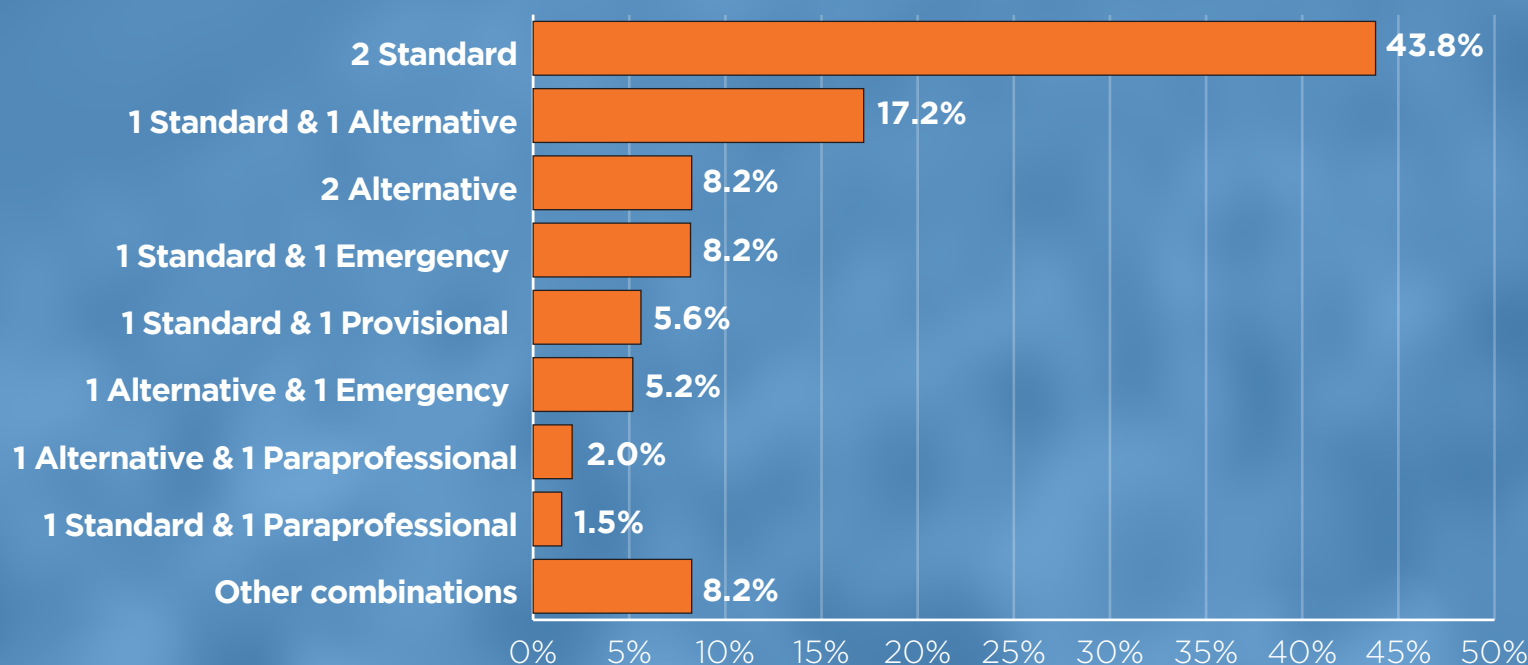
other category mainly includes individuals with an issued Non-Traditional Special Education Provisional Certificate, and those from the Teach for America program, whom are issued a credential valid for teaching two years in the state.

The percentage distribution of certificates for educators employed in Oklahoma's public schools between 2012-13 and 2017-18, by type, is highly similar to that of the reserve pool (Figure 9). Statewide, the *standard* category makes up the great majority of certificates—on average close to three out of four certificates annually fall under this category. The next highest frequencies include *alternative* (avg. 9.0 percent), *multiple* (avg. 12.0 percent)

and *provisional* (avg. 3.0 percent), with an aggregate yearly rate for all three of 23.9 percent. The remaining categories—*emergency*, *paraprofessional*, *other*, and *license*—represent together an average of 2.5 percent.

Trends in certificate types for educators who entered the state's public education system are also very similar to those in the reserve pool, i.e., an increase in the participation rate of certificates for the categories *standard* (after 2014-15), *alternative*, *emergency*, *paraprofessional*, and *other*, and an inverted U-shape trend for *multiple*, *provisional*, *other* (the decline begins in 2015-16), and *license*. *Alternative* certifications gained the most

EDUCATORS WITH TWO CERTIFICATES 2017-18



Note: 2017-18 data as of January 24, 2018

participation of all categories, increasing by 3.8 percentage points between 2012-13 and 2017-18. Once again, the category that lost the most in participation was *multiple*, dropping from 12.9 percent in 2012-13 to 5.0 percent in 2017-18.

The vast majority of educators employed in Oklahoma's public schools hold only one certificate. Among those that have more than one in 2017-18 (3.6 percent), the most frequent certificate combinations are two standard; one standard and one alternative; two alternative; and one standard and one emergency (Figure 10).

Oklahoma educators are often certified in multiple subject areas (Figure 11).

Although the percentage of such educators has dropped since 2012-13, the vast majority—more than 3 in 5—continued to hold certifications in two or more subject areas. The percentage of those with only one certified area has increased from 34.6 to 39.4 percent between 2012-13 and 2017-18.

Across years, the distribution of certificate areas among Oklahoma educators has remained similar with all 15 categories holding the same or similar rank. Figure 12 shows the percentage distribution of certificate areas for 2017-18, and reveals a pattern also observed in previous years, which is the relative concentration of certificates in the *elementary* subject area (21.7 percent). It is worth noting

that STEM subjects such as *science* and *mathematics* represent in 2017-18 6.0 and 5.9 percent, respectively, also consistent with previous years' findings. *Foreign language* and *ELL* are the area subjects with the lowest frequencies in 2017-18 as well as across years.

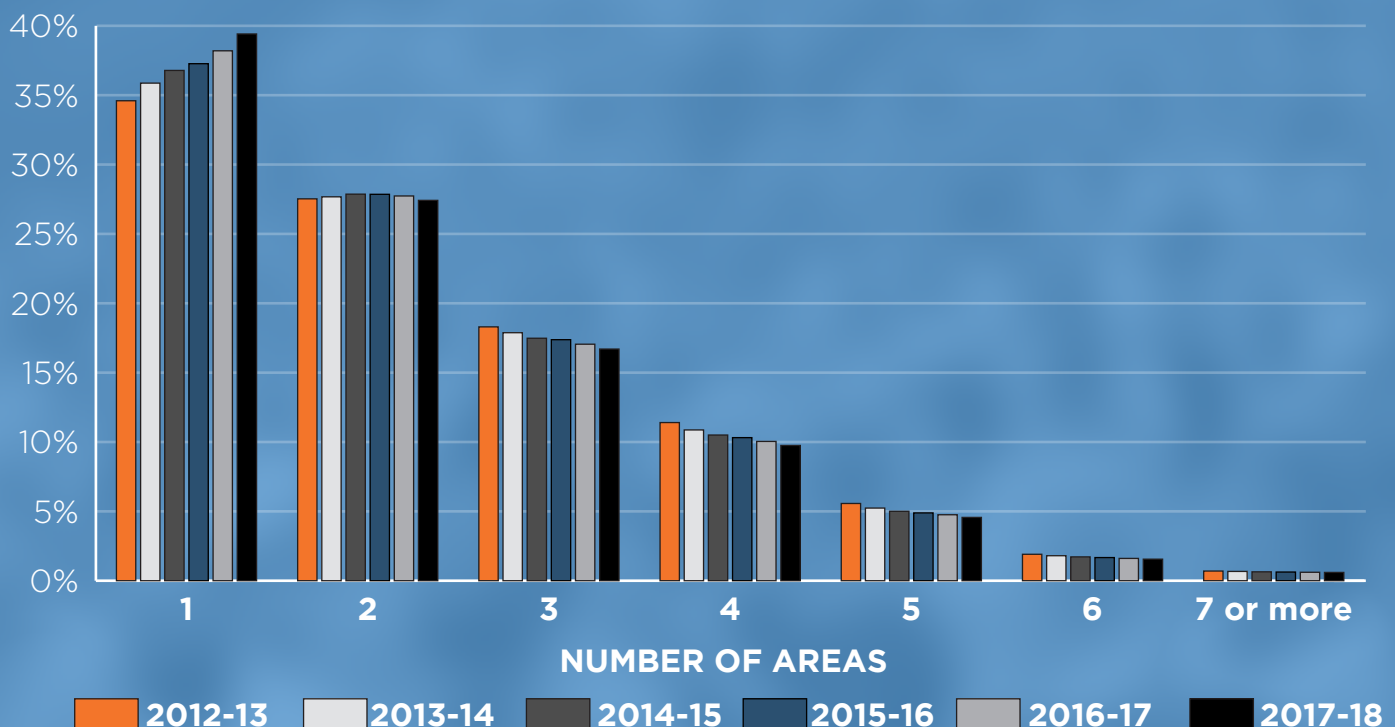
As far as trends are concerned, the overall number of certificate areas has persistently declined between 2012-13 and 2017-18— from 122,909 to 105,876—, reflecting the downward trend across all subjects except for *early childhood* and *foreign language* that have experienced a positive growth —4.0 percent and 31.1 percent, respectively.

The subjects that more drastically dropped include *social studies* (26.1 percent), *vocational education* (23.2 percent), *language arts* (22.5 percent), *science* (21.0 percent) and *instructional support* (21.0 percent). Appendix B contains a time series of the distribution of certificates, by subject area, and three measures of change between 2012-13 and 2017-18.

Although its participation rate remains low—2.2 percent in 2017-18—, *emergency* certificates has been the fastest-growing category from 34 in 2012-13 to 1073 in 2017-18 (**Shortage indicator 4: Proportion of public schools' educators holding an emergency certificate by subject area and**

FIGURE 11

EDUCATORS DISTRIBUTION PER NUMBER OF SUBJECT AREAS CERTIFIED 2012-13 TO 2017-18



Note: 2017-18 data as of January 24, 2018. Data includes all certified educators regardless of employment status.

geographical location). A comparison of the percentage distribution of subject areas for all certification types together versus *emergency*, between 2012-13 and 2017-18, suggests very few differences. For both, the top two subject areas have frequently been *elementary* and *early childhood*, especially after 2013-14. The next two categories, in order of frequency, for all certification types, are usually *social studies* and *language arts*, which frequently have a lower rank in the emergency group. The percentage distribution classification of core subject areas is often higher for the emergency certification option than for the rest.

Across years, some variation in the distribution of certificates was found. Appendix C provides a time series of the distribution of certificates, by type, in addition to three measures of change between 2012-13 and 2017-18. The average annual participation rate of the *standard* category varies from 71.0 percent in Region 1 (Central) to 76.2 percent in Region 4 (Southeast). Only Region 1 has a smaller percentage than the state average (73.6 percent). The next highest frequencies include certificate types *alternative*, *multiple* and *provisional*. Taken together, their annual participation rate fluctuates between 22.9 percent in Region 5, and 25.7 percent in Region 1—the only one with a larger percentage than the state average (23.9 percent). The annual participation rate for the last four categories (i.e., *emergency*, *paraprofessional*, *other*, and *license*) goes from 1.4 percent in Region 4 to 3.3 percent in Region 1. All, but Region 1, with a smaller percentage than the state benchmark (2.5 percent).

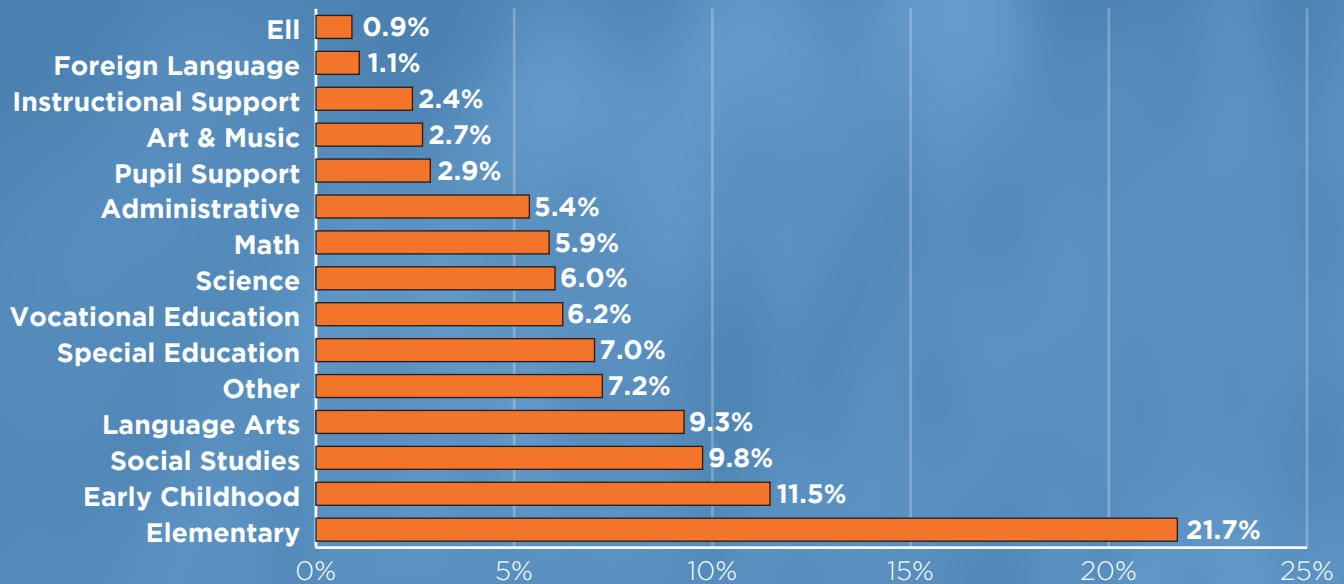
The regional growth of the number of valid certificates for educators employed in Oklahoma's public schools between 2012-13 and 2017-18 is also highly similar to those at the state level. For instance, while four types of certificates (i.e., *alternative*, *emergency*, *paraprofessional*, and *other*) had positive growth rate, two (*multiple* and *provisional*) followed a negative trend. Some divergence in trends are evident for the *standard* certificates—all regions show a positive grow except Region 5 (Southwest)—, and there is no conclusive evidence for the license category.

The regional percentage distribution of certificates for educators currently employed in Oklahoma's public schools, by type, closely resembles that at the state level over the last six years. Figure 13 shows the distribution by region and for the state for 2017-18. All but two regions (i.e., Region 1 and Region 5) have higher than the state participation rate for the *standard* category. The highest proportion of certificates in this category was in Region 4 while the lowest was in Region 1. By contrast, when the *alternative*, *multiple*, and *provisional* categories, taken together, are compared with that of the state, the findings show that Region 2 and Region 3 show a lower rate. For this group, Region 1 and Region 2 recorded the highest and lowest proportion, respectively.

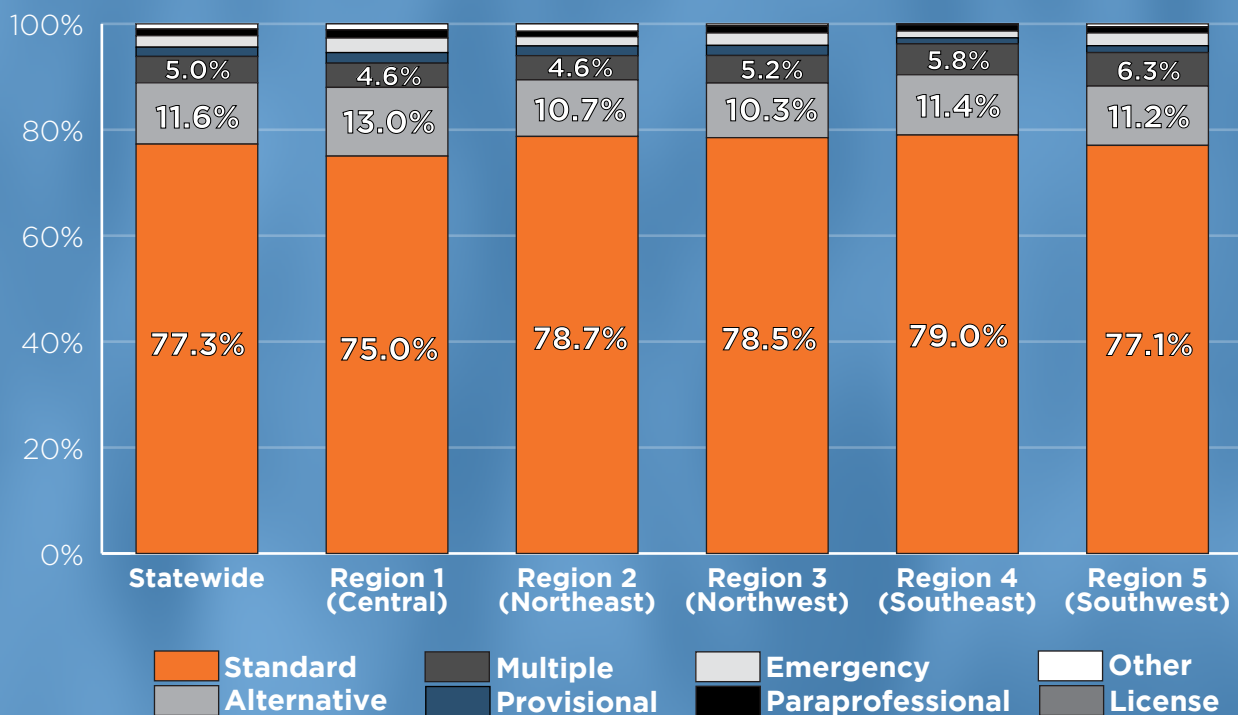
The group rate for the remaining categories—*emergency*, *paraprofessional*, *other*, and *license*—shows that all regions, except Region 1, have lower percentages when compared

FIGURE 12

SUBJECT AREAS DISTRIBUTION FOR ACTIVE EDUCATORS 2017-18

**FIGURE 13**

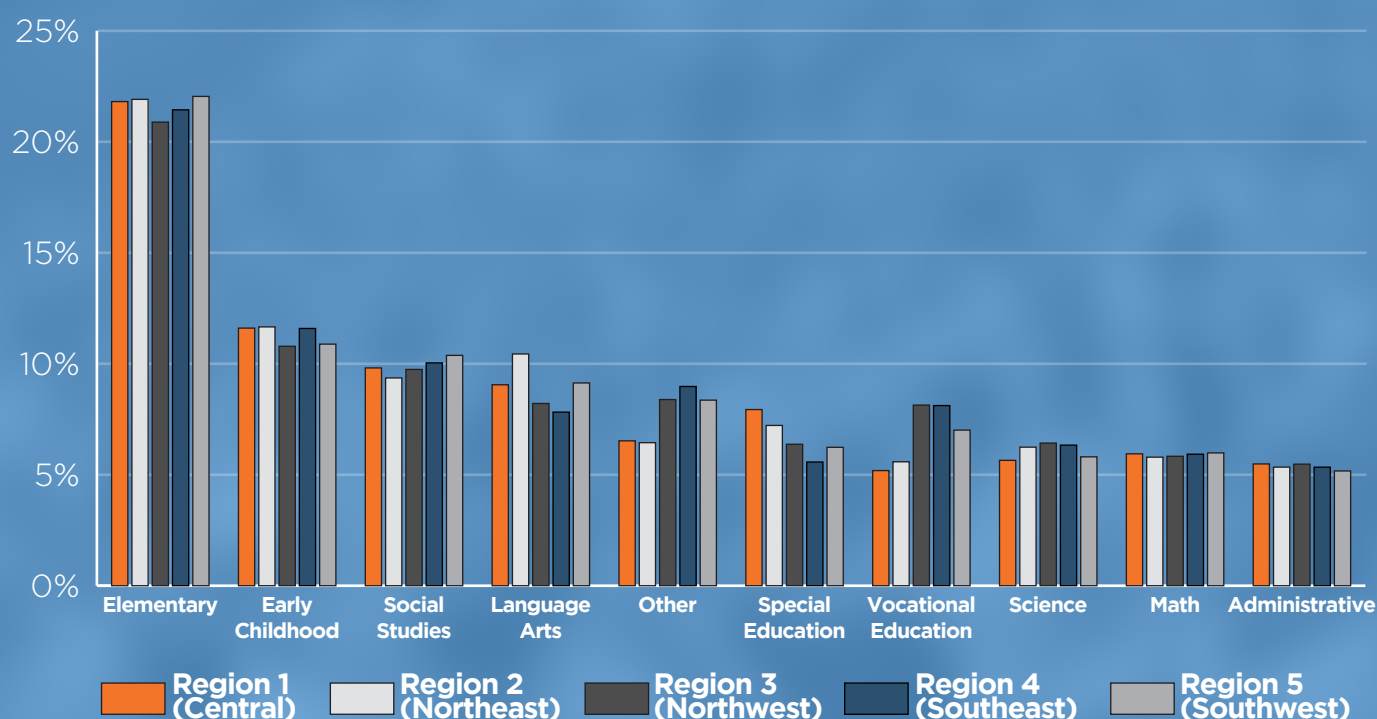
ALL CERTIFIED AND ACTIVE EDUCATORS BY CERTIFICATION TYPE AND REGION 2017-18



Note: 2017-18 data as of January 24, 2018

FIGURE 14

TOP 10 SUBJECT AREAS DISTRIBUTION ACROSS REGIONS 2017-18



Note: 2017-18 data as of January 24, 2018

with the state level. The highest proportion of certificates in these categories was in Region 1, while the lowest was in Region 4.

Geographic variation in the distribution of certificates for some subject areas seems to exist. Across regions and years, there are two subjects that consistently rank among those with the highest percentage decrease: *social studies* and *language arts*. The highest drop for the former occurred in Region 2 (28.3 percent) while for the latter was in Region 3 (25.3 percent). The positive trend observed at the state level for the *early childhood* and *foreign language* areas is evident regionally. In examining *early childhood*, all except Region 3 have experienced a positive growth—the highest increase corresponds to Region 1

(9.4 percent). In examining *foreign language*, only Region 5 has shown a reversed pattern with all other regions experiencing a positive percentage increase—the highest increase corresponds to Region 2 (43.8 percent). Appendix B details the distribution of certificates, for each year between 2012-13 and 2017-18, by subject matter and region.

Figure 14 shows regional concentrations across the top 10 subject areas in 2017-18. The distribution observed for the most recent year across subjects and regions, closely resembles the pattern in previous years.

The participation rate of most subject areas is relatively similar across regions. This pattern should not disguise, however, the few areas

that consistently show a higher variability range³: *vocational education, language arts, other, and special education.*

Education

Between 2012-13 and 2017-18, educational attainment rates among public school educators have decreased. During this time period, the percentage who had received a master's degree or higher, dropped from 42.6 to 36.7 percent (figure 15). Evidence shows that higher levels of education of teachers are associated with higher salaries (McFarland, Hussar, Wang, Zhang, Wang, Rathbun, Barmer, Forrest, & Bullock, 2018), which has

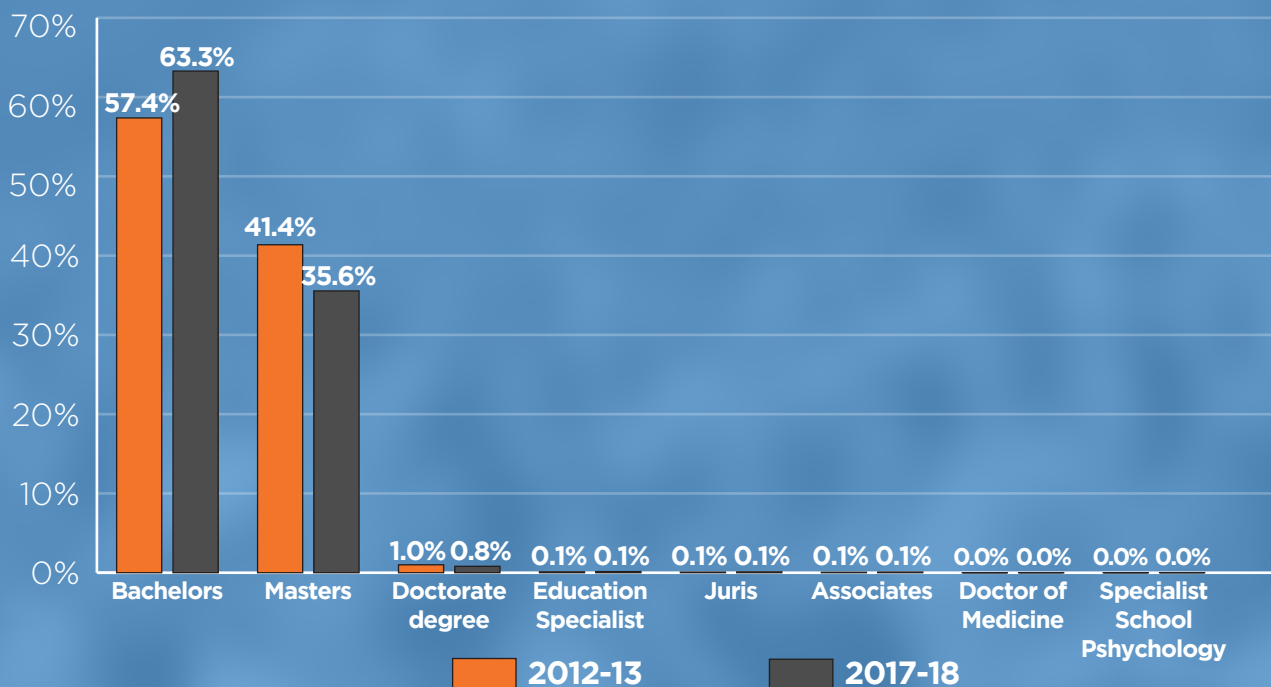
been shown to be an effective incentive for potential, current, and former educators to entering, staying, or returning to teaching (Santiago, 2002). In times of teacher shortage, a supply-side strategy to balance demand and supply is to fill teaching positions with individuals that have lower qualifications, including lower education.

National data reveal that the relative education of the workforce in the state is also deteriorating (U.S. Department of Education, National Center for Education Statistics, 2017a). The educational attainment of teachers in public schools nationwide has

3 The difference between the maximum and the minimum values.

FIGURE 15

EDUCATOR EDUCATION PERCENTAGE DISTRIBUTION 2012-13 AND 2017-18



Note: 2017-18 data as of January 24, 2018. Calculations include individuals who have both personnel and certifications records, and complete relevant information, e.g., county/region.

been increasing in the last decades and in more recent year as well, with the number who had received a master's degree or higher representing a 57.1 percent in 2015-16—the most recent year in which information is available from NCES: Digest of Education Statistics. That year, 39.3 percent of public school teachers in Oklahoma held a college diploma higher than bachelor's degree, about 12 percent lower than the national rate.

Salaries

Teacher compensation is a key factor in recruitment and retention (Sutcher, Darling-Hammond, & Carver-Thomas, 2016; Oklahoma State Department of Education, 2017; Santiago, 2002; Grissmer 2000) and certainly helps explain the shortage of teachers severely affecting the state in the recent past. The trends in teacher salaries discussed in this section use data from late 2010 through the most recent year in which information is available from the NCES: Digest of Education Statistics.

Average teacher salary, unadjusted for inflation, has consistently fallen in Oklahoma since 2009-10. In sharp contrast, the national average salary, and that of neighboring states, including the South-Central Region and Texas, have increased in the last six years. It is important to note, however, that salaries unadjusted for inflation do not account for the changes in prices and their effect on purchasing power. Table 2 shows the percent change in the average annual salary of teachers in public schools, for the United States, the South-Central Region, Texas, and Oklahoma, in real terms. Although a reduction in real salaries across the board has occurred, geographic differences exist. The data show that the average teacher salary in Oklahoma has seen the highest drop in real terms between 2009-10 and 2016-17, the highest annual percent decrease during the same period, and the highest change between the most recent two years.

TABLE 2

ESTIMATED CHANGE IN THE ANNUAL SALARY OF TEACHERS IN PUBLIC SCHOOLS¹

	Percent change ² 2009-10 to 2016-17	Annual Percent change 2009-10 to 2016-17	Percent change 2015-16 to 2016-17
United States	-0.05	-0.01	-0.01
South Central Region ³	-0.10	-0.01	-0.01
Texas	-0.03	0.00	-0.01
Oklahoma	-0.15	-0.02	-0.02

1 In constant 2016-17 dollars

2 Author's calculations

3 Arkansas, Louisiana, New Mexico and Oklahoma

Source: Table 211.60: Estimated average annual salary of teachers in public elementary and secondary schools, by state: Selected years, 1969-70 through 2016-17. In Digest of Education Statistics, 2017. Available at: https://nces.ed.gov/programs/digest/2017menu_tables.asp. Retrieved on 06/26/2018.

Teacher salary patterns in Oklahoma, directly affected by one of the largest cuts to education budgets nationally (Balingit, 2017), have moved in tandem with trends in the demand for new teachers. The average salary in real terms declined between 2009-10 and 2016-17, as hiring of new teachers dropped, both in number and participation rate, in most of the period between 2012-13 and 2017-18. In turn, lower salaries drive supply down, especially when the salaries and opportunities in competing occupations have been bigger than ever (Allegretto & Mishel, 2016).

Salaries, however, also represent teacher experience and education (Grissmer, 2000), and the drop in salaries could partially be explained by fewer years of experience and/or lower education attainment in the teaching force. As shown in previous sections, on average, public school educators in Oklahoma had about 12 years of experience in 2017-18, one year fewer than in 2012-13. During the same period, the participation rate of educators with a bachelor's degree has risen, while that of educators with a higher degree has declined.

Although salaries are an important indicator of teacher supply and demand factors, it is by no means the only one. Teacher working conditions, as well as relative wages and working conditions of teaching in comparison to other occupations, are additional factors that explain the teaching market conditions. These topics, however, are beyond the scope of the present report.

In the following section, trends in the educator supply from 2012-13 to 2017-18 are explored. In this report, teacher supply is operationalized by calculating the number of educators who stay in the public school system from the previous year (i.e., re-entrants), plus eligible individuals who apply for open positions and are newly hired (i.e., new hires).

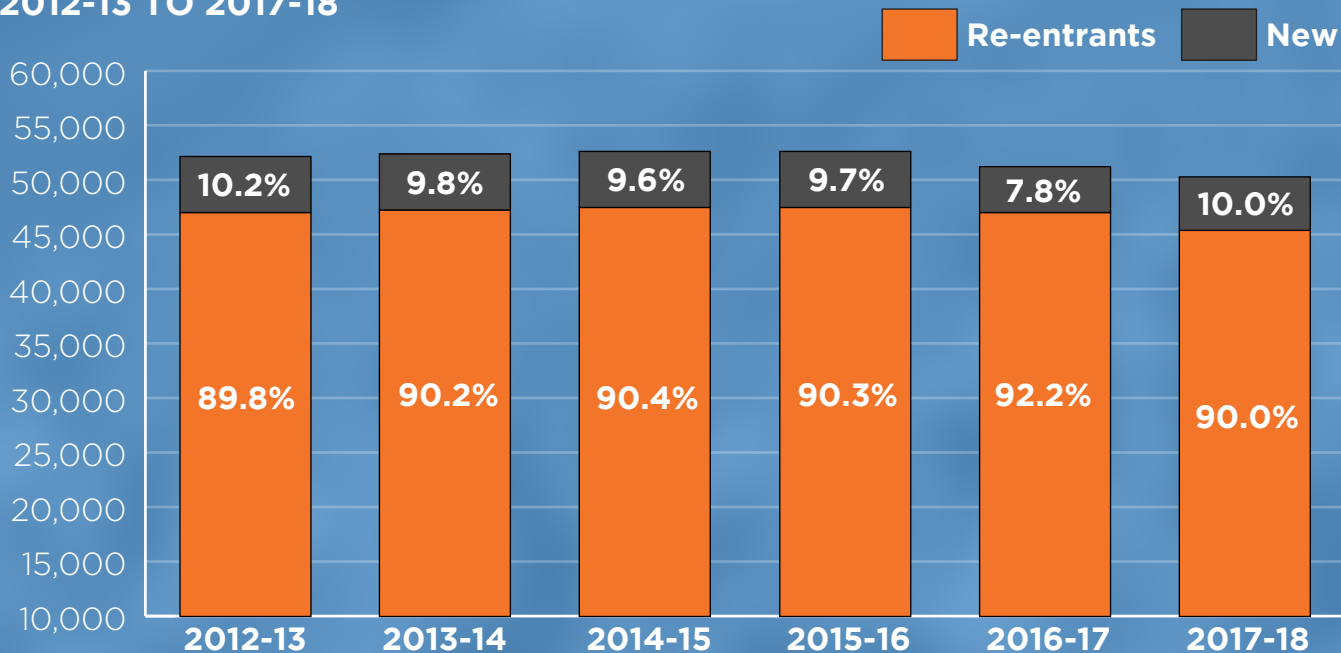
SUPPLY FACTORS

Re-entrants

Most of the educators supply every year comes from individuals staying in public school teaching from one year to the next. Continuing educators typically stay in the same position working for the same district. However, some change (voluntarily or involuntarily) position and/or school district. Although their transfer within the system creates openings, since they remain working as public educators, they are considered part of the teaching force in this report. Refer to *Section: Turnover* for a detailed analysis of educator turnover, including leavers and movers, and the trends in recent years.

Figure 16 shows the composition of the educator supply between 2013-14 and 2017-18. It highlights two main points. First, the number of re-entrants has increased at a decreasing rate during the first four years, and then drops very rapidly after 2015-16. Second, consistent with this trend, the participation of the re-entrants group on the overall supply reached a peak at 92.2 percent in 2016-17, after which it dropped to 90.0 percent at the end of the period. A similar trend is evident for regions 1 (Central), 3

SUPPLY FACTORS PARTICIPATION 2012-13 TO 2017-18



Note: 2017-18 data as of January 24, 2018. Calculations include individuals who have both personnel and certifications records, and complete relevant information, e.g. county/region.

(Northwest), and 4 (Southeast), albeit the change in the direction of the trend occurred at different points in time. Regions 2 (Northeast) and 5 (Southwest) experienced a consistent decline in the number of re-entrants between 2012-13 and 2017-18, with an accelerated drop in recent years.

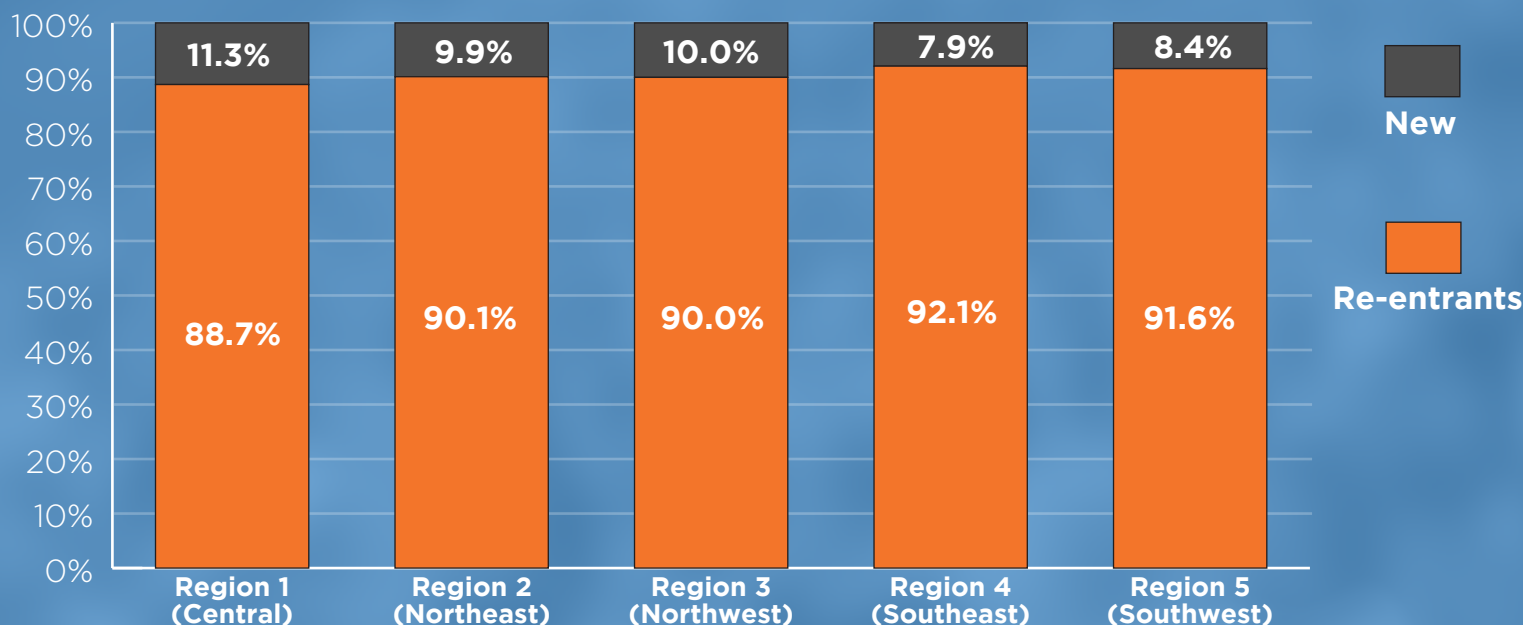
Figure 17 estimates the participation of educator re-entrants in the 2017-18 supply for all five regions. The proportion of educators returning the following year was higher than that of the state for regions 2 (Northeast), 4 (Southeast), and 5 (Southwest). The rate for Region 2 was the same as the state's rate, and the proportion for Region 1 (Central) was below the state benchmark.

New

New hires, defined here as those educators who were not teaching the previous year, represent, on average, 9.5 percent of the state supply. They come from several sources, including recent graduates from education preparation programs, former graduates with or without work experience, and those returning to teaching after at least one-year absence. Only some of these data (i.e., internal to the OSDE) were reasonably available during the preparation of this report, making most of the information necessary to make a more complete assessment of all sources of supply impractical to access at this point. However, the characteristics of this population, regardless of the source, are described below.

FIGURE 17

SUPPLY FACTORS BY REGION 2017-18



Note: 2017-18 data as of January 24, 2018. Calculations include individuals who have both personnel and certifications records, and complete relevant information, e.g. county/region.

New hires have shrunk in size throughout most of the period of analysis, reaching 5,049 in 2017-18—an estimate of 308 fewer than in 2012-13. In addition, the participation rate of new hires statewide changed from 10.2 percent in 2012-13 to 10.0 percent in 2017-18 (Figure 16).

Regionally, there was a consistent drop in the number of new hires since 2012-13, except in Region 2 (Northeast), where there were more individuals entering public school teaching in 2017-18 than in 2012-13. The most recent new hires' participation rates rank regions 2 (Northeast), 5 (Southwest), and 4 (Southeast) with the lowest percentages

across regions and Region 1 (Central) with the highest rate. Region 3 (Northwest) has the same rate as the state (Figure 17).

When the new hires subgroup was compared to all individuals in the supply pool, the finding was as expected—they are much younger, have fewer years of experience, and less likely to hold a standard certificate as opposed to *provisional* or *emergency*.⁴ It is worth mentioning, however, that the data trends suggest the experience gap between new hires and all individuals in the supply has been decreasing, mainly due to an overall increase in new hires' experience, especially after 2015-16.

4 Based on the chi-squared statistic and $P < .01$

In terms of trends, comparison analyses were conducted for several characteristics of the new hires subgroup. The results of the significant outcomes are presented below.

The participation rate of most certificate types dropped during the last 6 years, except for the *emergency* and *other combined* categories (Figure 18). The percentage of new educators with an emergency certificate was found significantly higher in 2017-18 than in 2012-13 –a 17.5 percentage point’s increase.⁵

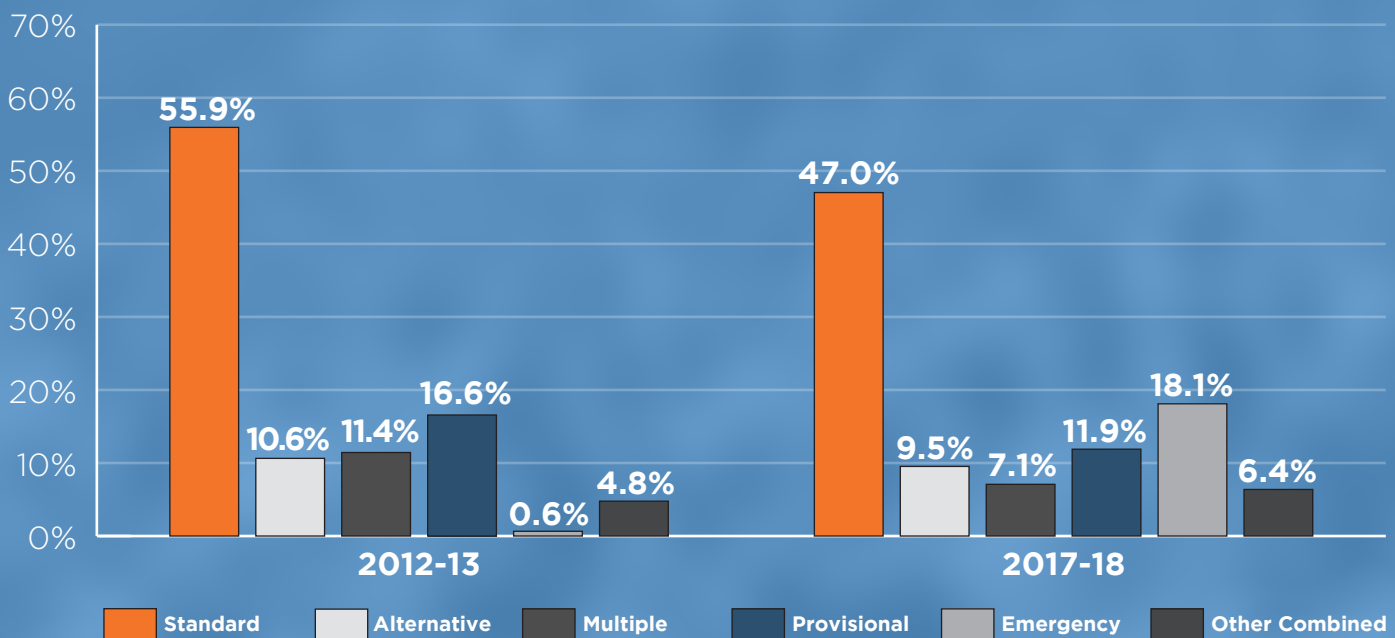
The new hires group in 2017-18 had significantly more years of experience than the group in 2012-13 (Figure 19).⁶ The percentage of new educators who had no previous experience teaching has sharply dropped from 60.8 percent in 2012-13 to 36.3 percent in 2017-18. The experience composition of new hires began to change during the 2016-17 school year. Among experienced new hires in 2012-13, only 11.1 percent had between 1 and 3 years of experience, and 7.1 percent 15 years or more. Six years later, the rates increased to 32.7 and 17.8 percent, respectively.

5 Based on the chi-squared statistic and $P < .01$

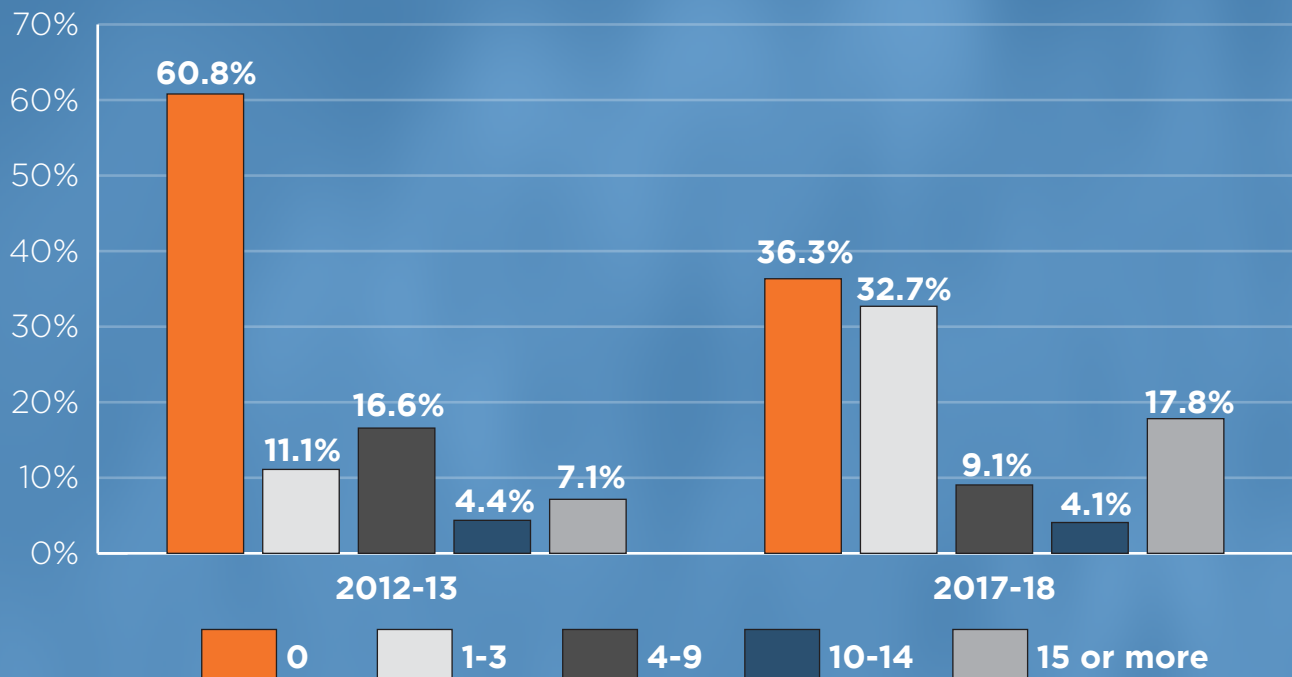
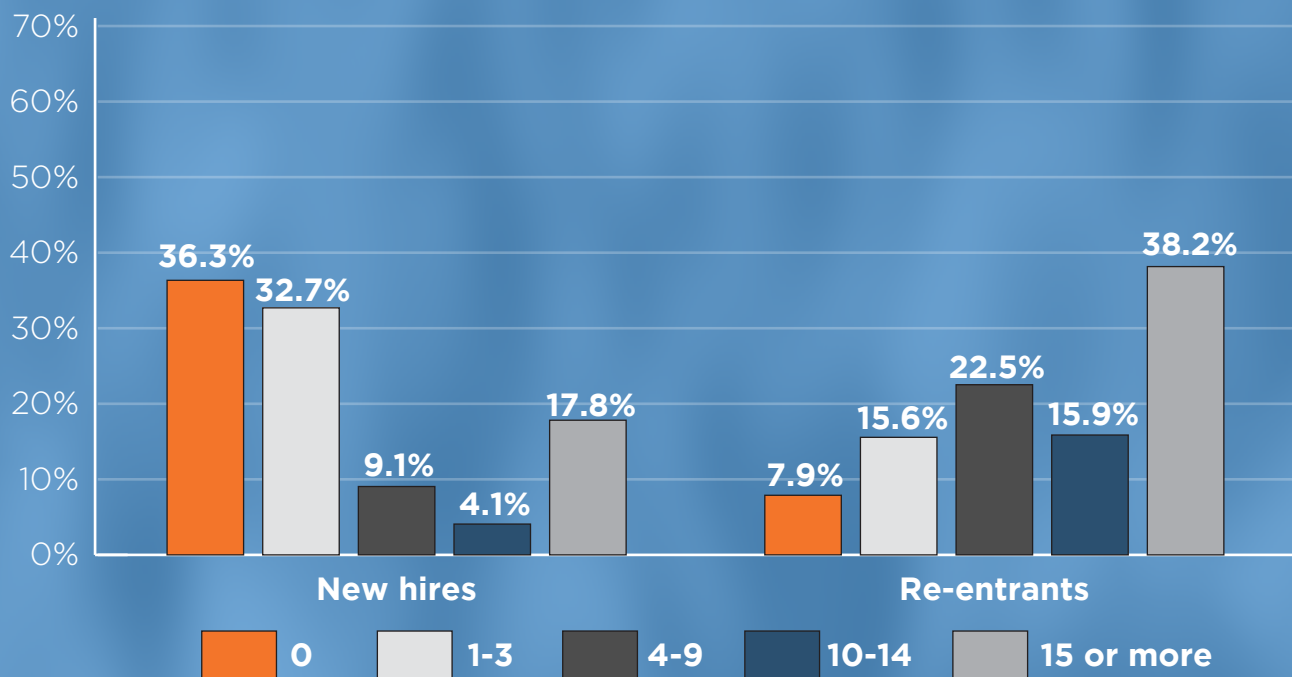
6 Based on the chi-squared statistic and $P < .01$

FIGURE 18

PERCENTAGE DISTRIBUTION OF NEW HIRES BY TYPE OF CERTIFICATE 2012-13 AND 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region. "Other Combined" include other, paraprofessional, and license.

FIGURE 19**PERCENTAGE DISTRIBUTION OF NEW HIRES BY YEARS OF EXPERIENCE
2012-13 AND 2017-18****FIGURE 20****PERCENTAGE DISTRIBUTION OF YEARS OF EXPERIENCE BY SUPPLY FACTOR
2017-18**

Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

New hires and re-entrants are statistically different in many aspects. Evidence shows that there are more new hires who have little (between one and three years) or no experience, and more re-entrants that are experienced (four years or more) (Figure 20). With only one experience-group exception (four to nine), the participation rate of new hires drops as we move to higher experience groups. The opposite is true for re-entrants with the exception of the experience group 10 to 14 that has a lower rate than expected. Appendix D details the certificate type percentage distributions for both new hires and re-entrants from 2012-13 to 2017-18.

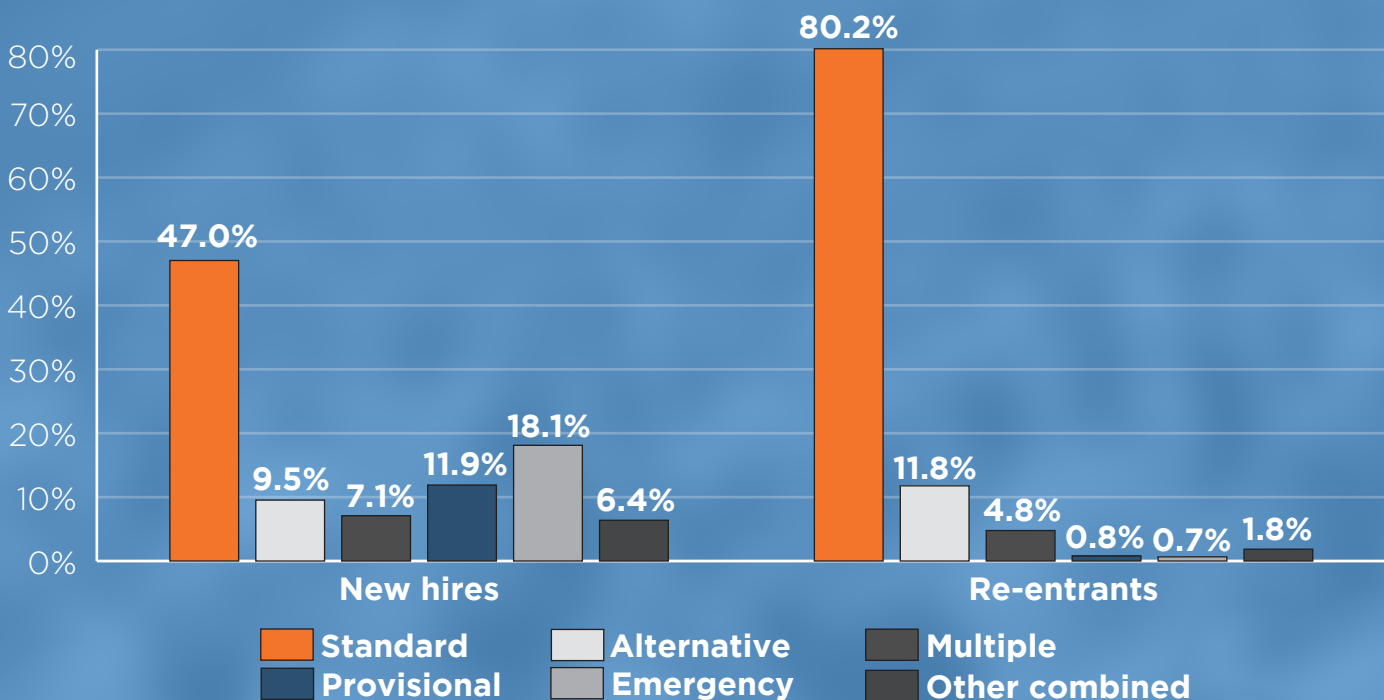
There is also strong evidence of more frequent occurrence of certificates types *provisional* and *emergency*, and less

so *standard*, for new hires than for re-entrants (Figure 21). Specifically, the participation rate of educators with a standard certificate was higher among re-entrants than among new hires, and the participation rate of educators with a *provisional* and/or an *emergency* certificate was lower among re-entrants than among new hires. Although the percentage gap between new educators and re-entrants with a *provisional* certificate has notably decreased during this period, it still shows a discrepancy of 11.1 percent in 2017-18. The *provisional* certificate has consistently ranked second or third for new teachers every year since 2012-13.

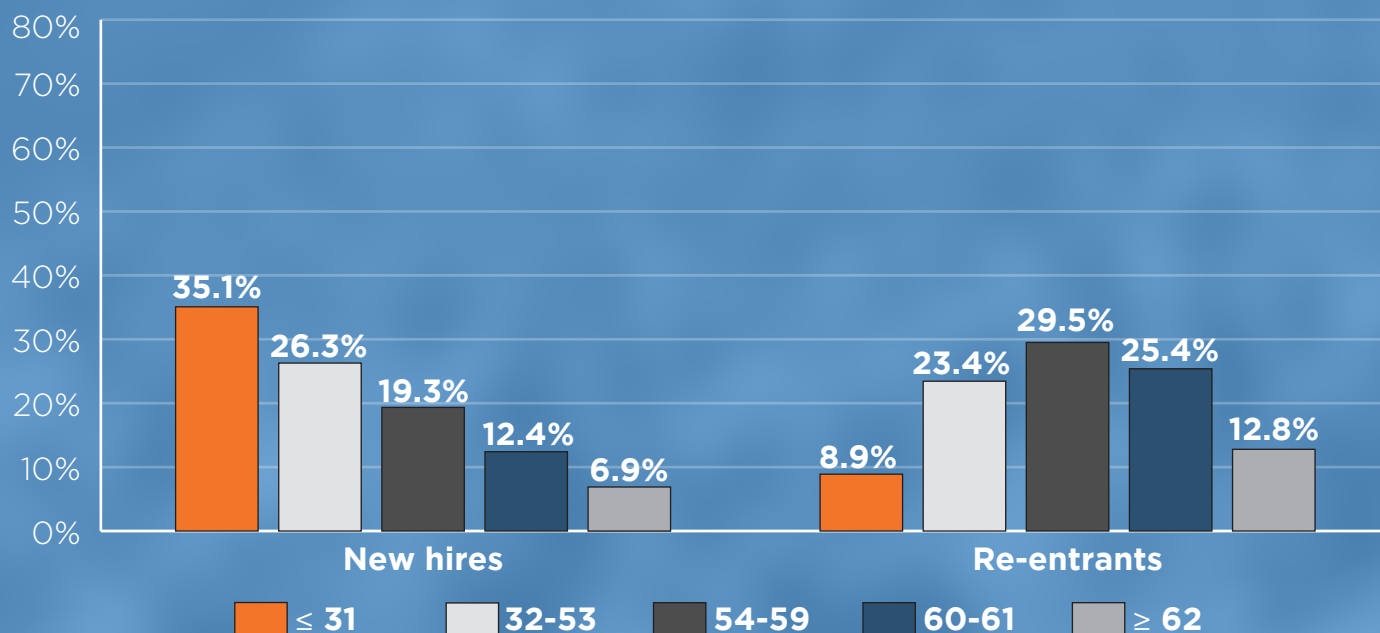
Finally, data show there is a significant difference in the age distribution of new

FIGURE 21

PERCENTAGE DISTRIBUTION OF CERTIFICATE TYPE BY SUPPLY FACTOR 2017-18



Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

FIGURE 22**AGE DISTRIBUTION BY SUPPLY FACTOR
2017-18**

Note: 2017-18 personnel data as of January 24, 2018. Calculations include individuals who have both personnel and certification records, and complete relevant information, e.g. country/region.

hires and re-entrants. New hires in 2017-18 were more likely to be 31 years old or younger, but less likely to be 60-61 years of age. The opposite is true for re-entrants in each of these age groups (Figure 22).

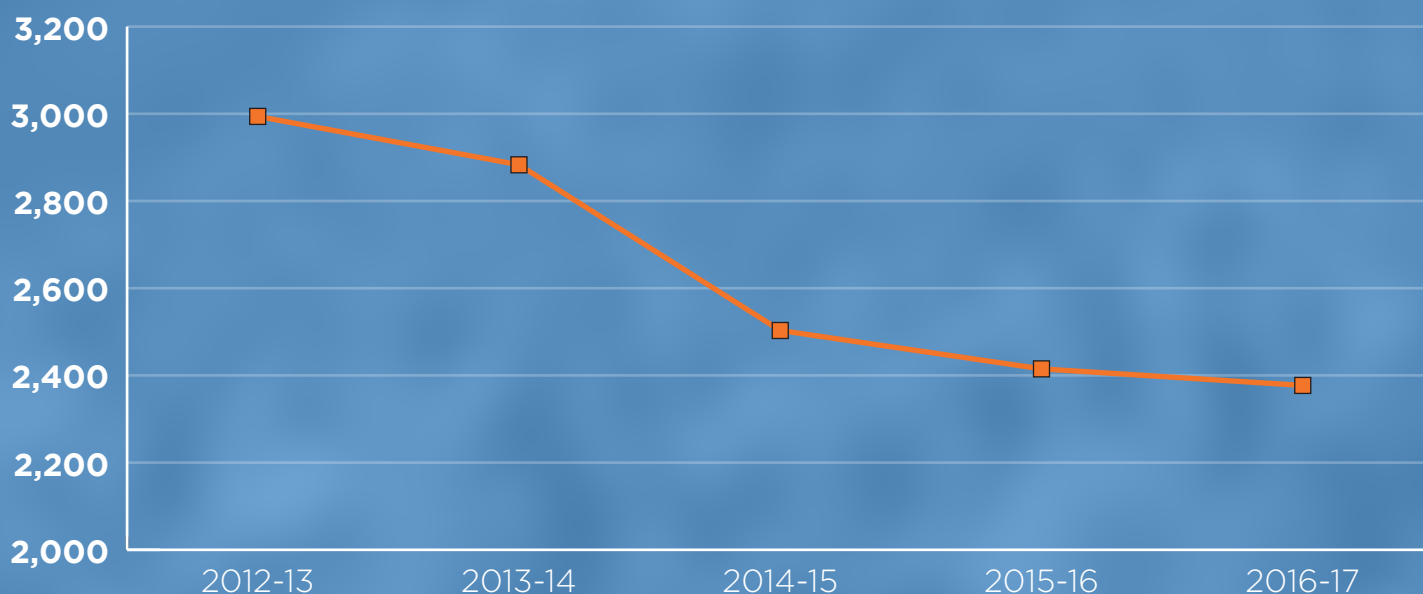
TEACHER PREPARATION PROGRAMS

As we have seen, new hires is one of the large groups composing the teaching force. A fundamental source of educators for this group are recent graduates of teacher preparation programs, or graduates from prior years, some of whom could have

some teaching experience. The changes we have seen in the demand for teachers in recent years can have an effect on education preparation programs enrollment, completion rates, and the proportion of college graduates entering the teaching profession. In this section, data from the Oklahoma State Regents of Higher Education⁷ (OSRHE) is used to explore trends in the number of graduates with an education degree and their distribution among IHEs, major fields, and academic degree from 2013-14 through 2016-17, the most recent year in which data are available.

⁷ The Oklahoma State Regents of Higher Education is the coordinating board for all institutions in the State System of Higher Education. Each semester, the board collects, from all public and some private institutions of higher education (IHE), information about enrollment, degrees and certificates conferred, tuition and fee rates, and faculty and staff activity.

OSRHE GRADUATES WITH AN EDUCATION DEGREE TRENDS 2012-13 TO 2016-17



Source: Author's calculations based on data provided by the Oklahoma State Regents for Higher Education

Figure 23 displays the trends in the number of college graduates with an education degree and shows that every year between 2012-13 and 2016-17 fewer graduates earned such degree (*Shortage indicator 5: Number of college graduates with an education degree by Institution of Higher Education, program and academic degree*).

The drop has been a general pattern regardless of the graduating institution. Empirical evidence suggests that during economic downturns, such as the Great Recession between 2007 and 2009, graduation rates drop on majors that result in lower wages –such as in fields leading to public school positions– (Blom, Cadena,

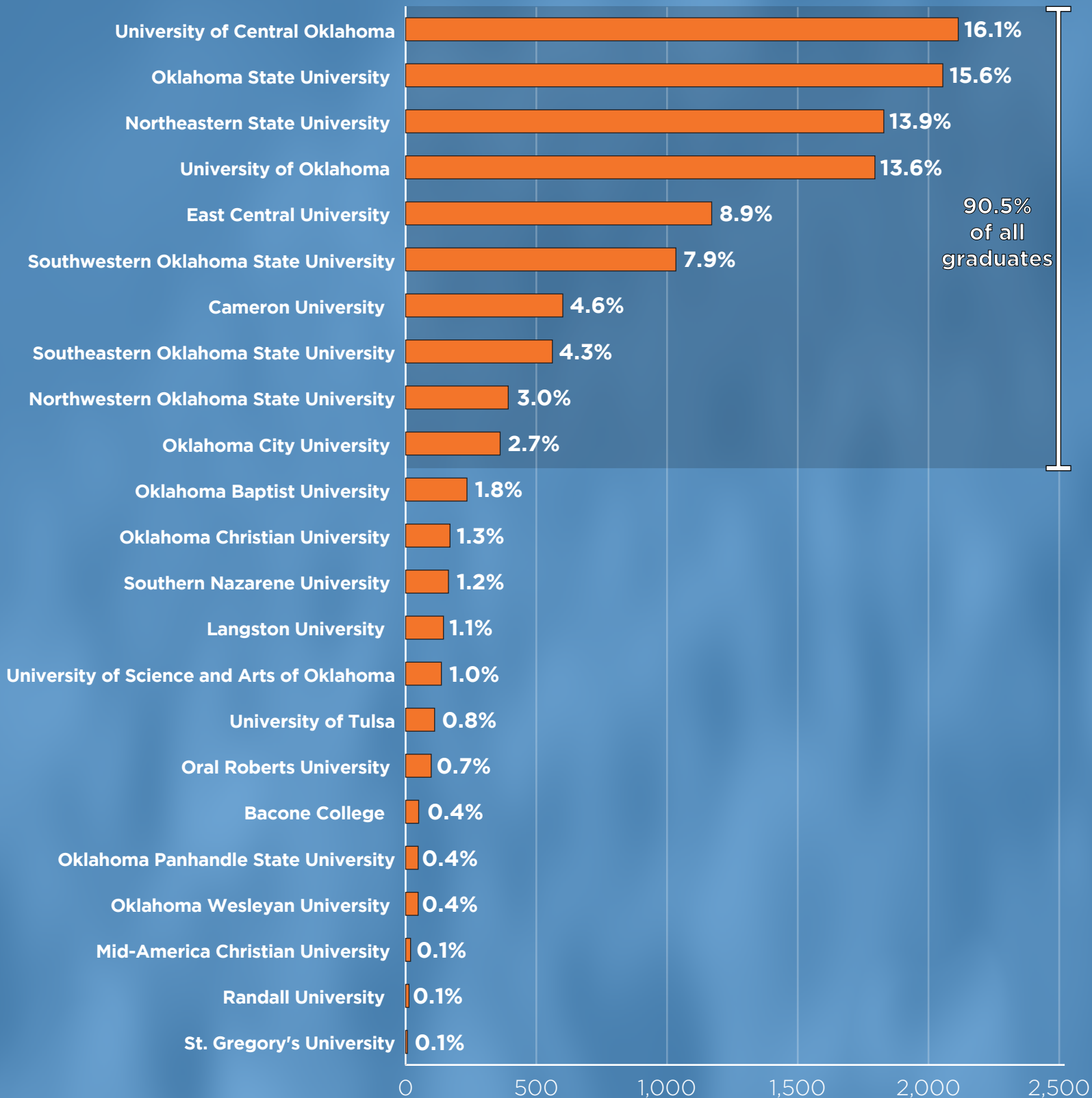
& Keys, 2015). In addition, it can also be affected by the lower demand for new teachers that occurred in Oklahoma during most of the period of analysis.

Figure 24 reports the share of each IHE among all graduates for 2012-13 through 2016-17 combined. More than nine in ten graduates (i.e., 90.5 percent) with an education degree come from programs in 10 IHE.

The participation rates of the different major fields of study among education degrees are shown in Figure 25. The top four majors account for more than half of the graduates (51.6 percent). Two of them–

FIGURE 24

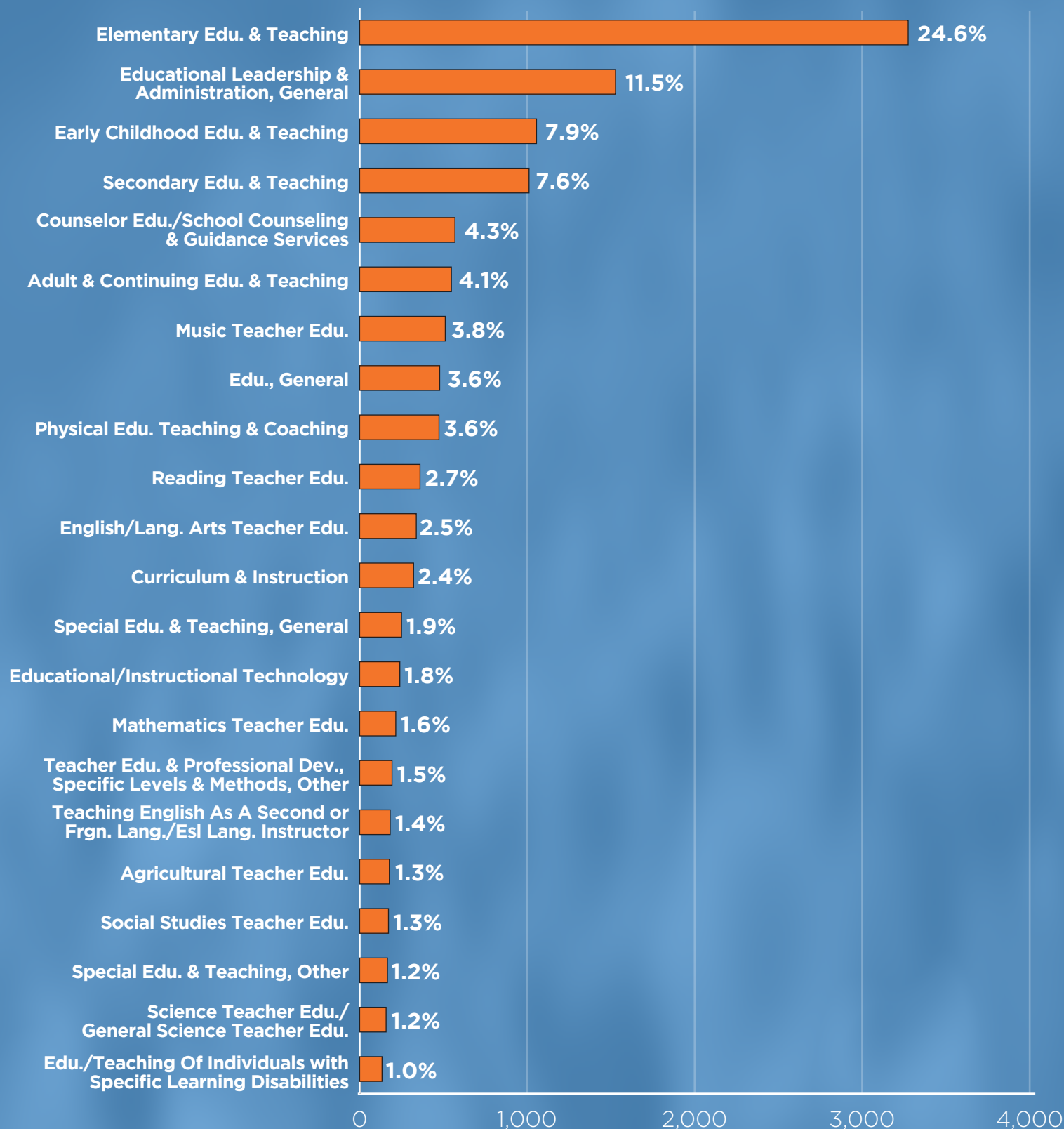
OSRHE GRADUATES WITH AN EDUCATION DEGREE BY INSTITUTION OF HIGHER EDUCATION 2012-13 TO 2017-18



Source: Author's calculations based on data provided by the Oklahoma State Regents for Higher Education

FIGURE 25

OSRHE GRADUATES WITH AN EDUCATION DEGREE BY PROGRAM 2012-13 TO 2016-17

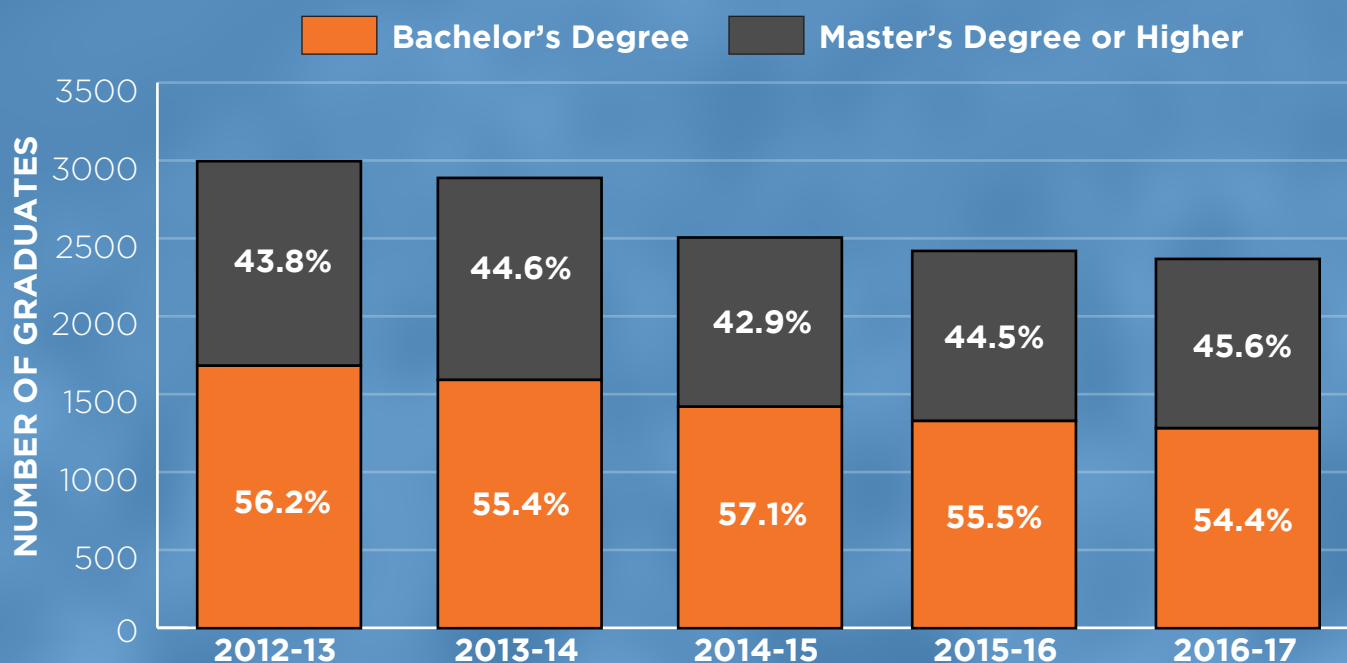


Note: Only programs that represent one percent or more of total graduates are displayed.

Source: Author's calculations based on data provided by the Oklahoma State Regents for Higher Education

FIGURE 26

OSRHE GRADUATES WITH AN EDUCATION DEGREE BY ACADEMIC DEGREE 2012-13 TO 2017-18



Source: Author's calculations based on data provided by the Oklahoma State Regents for Higher Education

Elementary Education and Teaching and Early Childhood and Teaching— were at the top of the rank in previous years as well (Berg-Jacobson & Levin, 2015.)

In the last few years, the United States has seen a steady decrease in the number of degrees conferred by IHE in the field of education, in sharp contrast to the overall increasing trend across all other college degrees (U.S. Department of Education, National Center for Education Statistics, 2017b). In addition, during the same period (i.e. since the early 2010s), both bachelor's and master's degrees conferred in education have dropped notoriously, from 104,008 and 185,127 in 2010-11 to 87,217 and 145,781 in 2015-16, respectively.

As Figure 26 illustrates, similar trends are experienced in Oklahoma, with an overall drop in the number of graduates with an education degree from 2012-13 to 2016-17, and a drop separately for each academic degree as well. The net effect has been a slight increase in the participation rate for master's degrees or higher, and a similar change in the opposite direction for bachelor's degrees.

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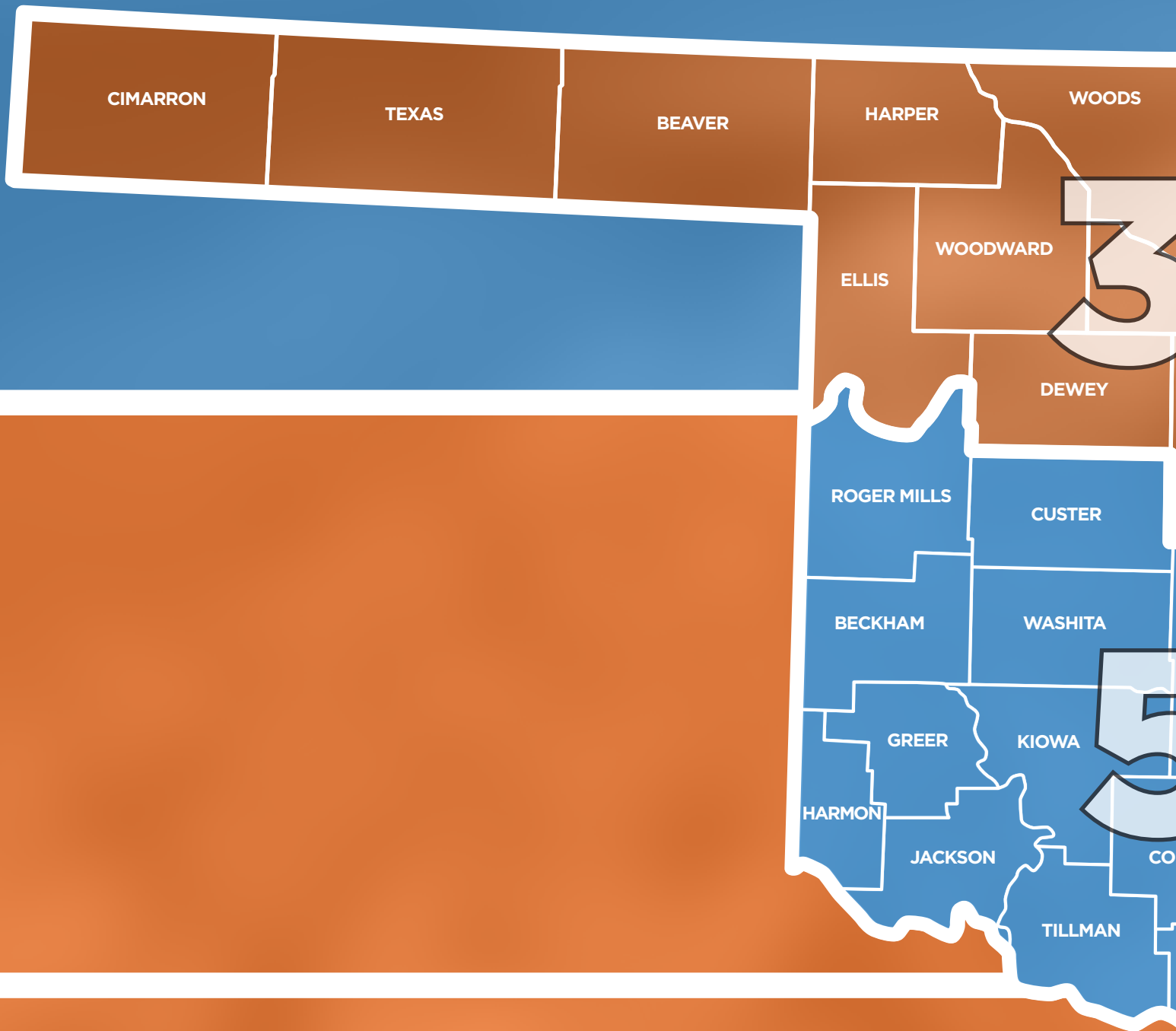
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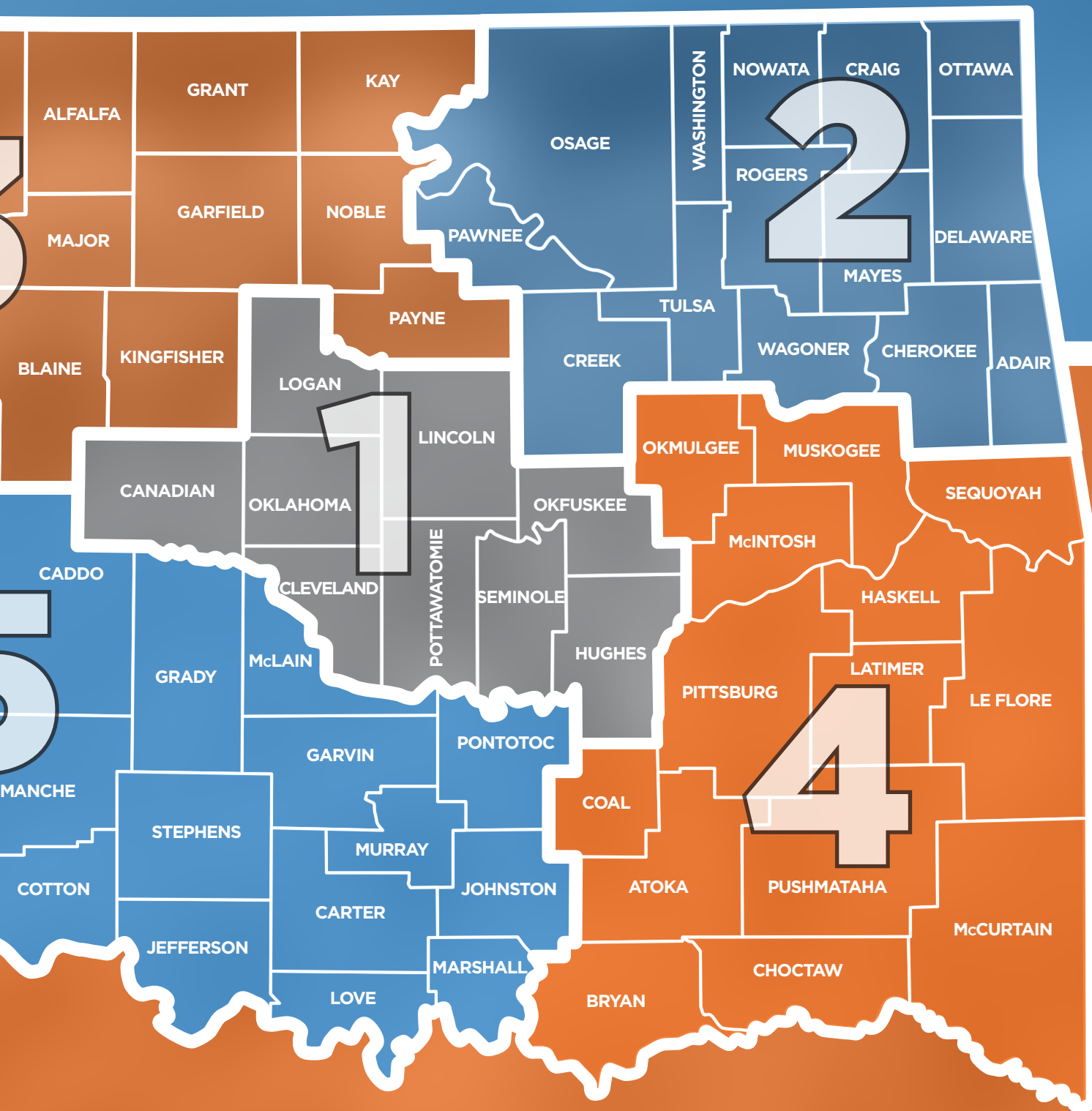
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Trend



S

SUPPLY AND DEMAND: TRENDS AHEAD

DEMAND PROJECTIONS

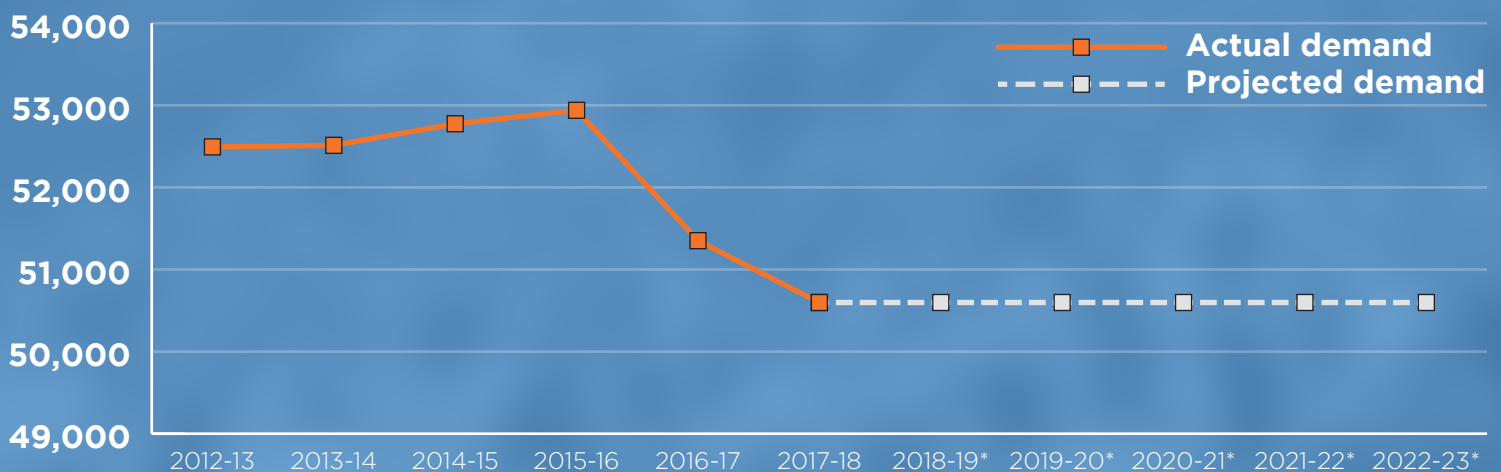
Future educator demand is the product of a complex system where factors such as population, enrollment, economic trends, number of educators employed in public teaching, and the policies and practices governing pupil-educator ratios, interact dynamically. The method for projecting educator demand followed in this report is the mechanical method, which estimates future levels of demand if certain established trends continue. This method yields demand projections that capture a simplified version of those interactions, and as with any projection, it involves speculation about the future and anticipation of key variables.

The projections presented in this section represent one of the two elements of potential teacher shortages and will be compared and contrasted with the supply-side projections at the end of the section. Given the persistence and even deterioration of the educator shortages in the state, understanding the possible scenarios of future educator demand can better inform efforts to balance supply and demand, and hopefully, improve the quality of the teaching effectiveness.

Two alternative scenarios of future demand conditions are presented below, and they provide the basis for two sets of projections. The first one considers changes in recent public school enrollment and pupil-educator trends, and the second focuses on continued decreases in the demand for public school educators. The projected demand is described and analyzed at the regional level under both scenarios.

FIGURE 1

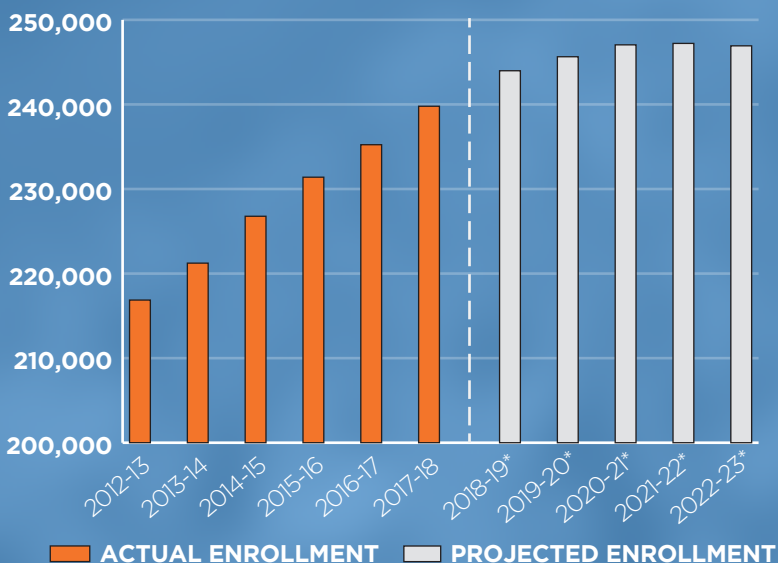
PROJECTED EDUCATOR DEMAND: SCENARIO 1 2018-19 TO 2022-23



Note: 2017-18 data as of January 24, 2018

FIGURE 2

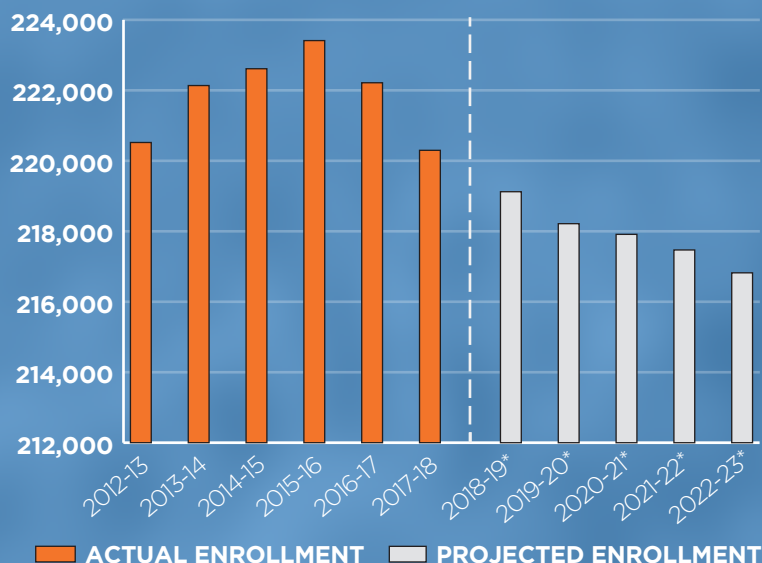
STUDENT ENROLLMENT: REGION 1 2012-13 TO 2022-23



Note: 2017-18 data as of January 24, 2018

FIGURE 3

STUDENT ENROLLMENT: REGION 2 2012-13 TO 2022-23



Demand: Scenario 1

Figure 1, Scenario 1 shows how demand might evolve between the present and 2022-23. It describes a future state in which the past public school enrollment increasing trend will likely reverse after 2018-19; the teacher workforce is assumed to remain at the 2017-18 level –the lowest statewide level since 2012-13–; and the resulting pupil-educator ratio decreases from 12.88 to 12.83, which represents an average annual decline of 0.01. The key assumption in this scenario is that educator demand remains constant or relatively steady after 2017-18.

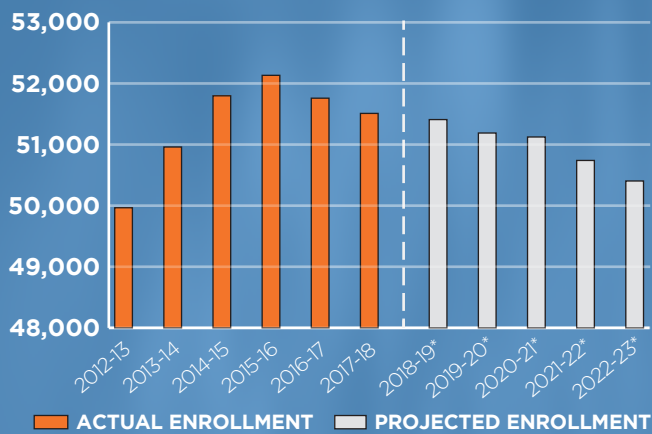
Over the period 2018-19 to 2022-23, the projections in Scenario 1 suggest some geographical variations in both student enrollment and pupil-educator ratios, and the following paragraphs explore those differences in detail.

Figures 2-6 display the historical and projected enrollment for each of the five regions in the state. In all regions, except Region 1 (Central), the decline in enrollment is projected to continue after 2017-18 and persist over the following five years.

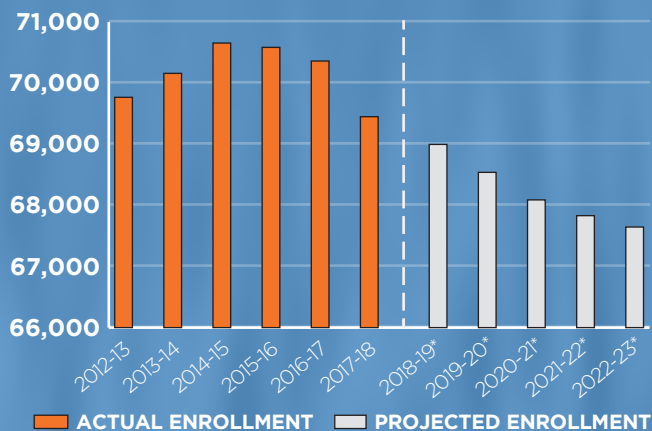
The upward trend in public school enrollment displayed by Region 1 (Central) during 2012-13 through 2017-18, is expected to continue in the next few years, but likely at a decreasing rate. The average annual growth of public enrollment in Region 1 (Central) during the last five years was 2.1 percent, and the projected rate would drop to 0.6 percent per year. Among the rest of the regions, the annual decline in enrollment is projected to be highest in Region 2 (Northeast), and lowest in Region 3 (Northwest).

FIGURE 4

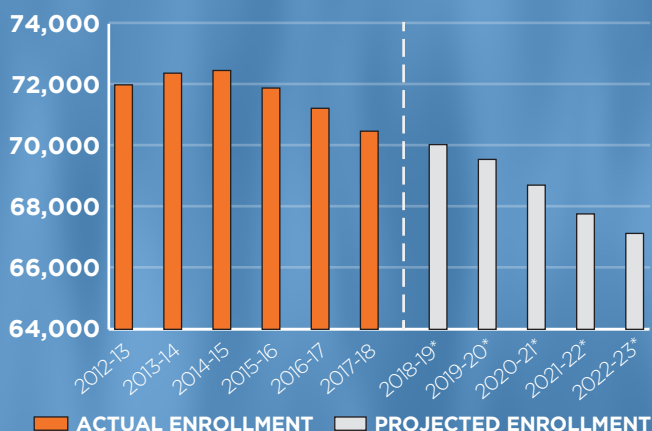
STUDENT ENROLLMENT: REGION 3 2012-13 TO 2022-23

**FIGURE 5**

STUDENT ENROLLMENT: REGION 4 2012-13 TO 2022-23

**FIGURE 6**

STUDENT ENROLLMENT: REGION 5 2012-13 TO 2022-23



Note: 2017-18 data as of January 24, 2018.

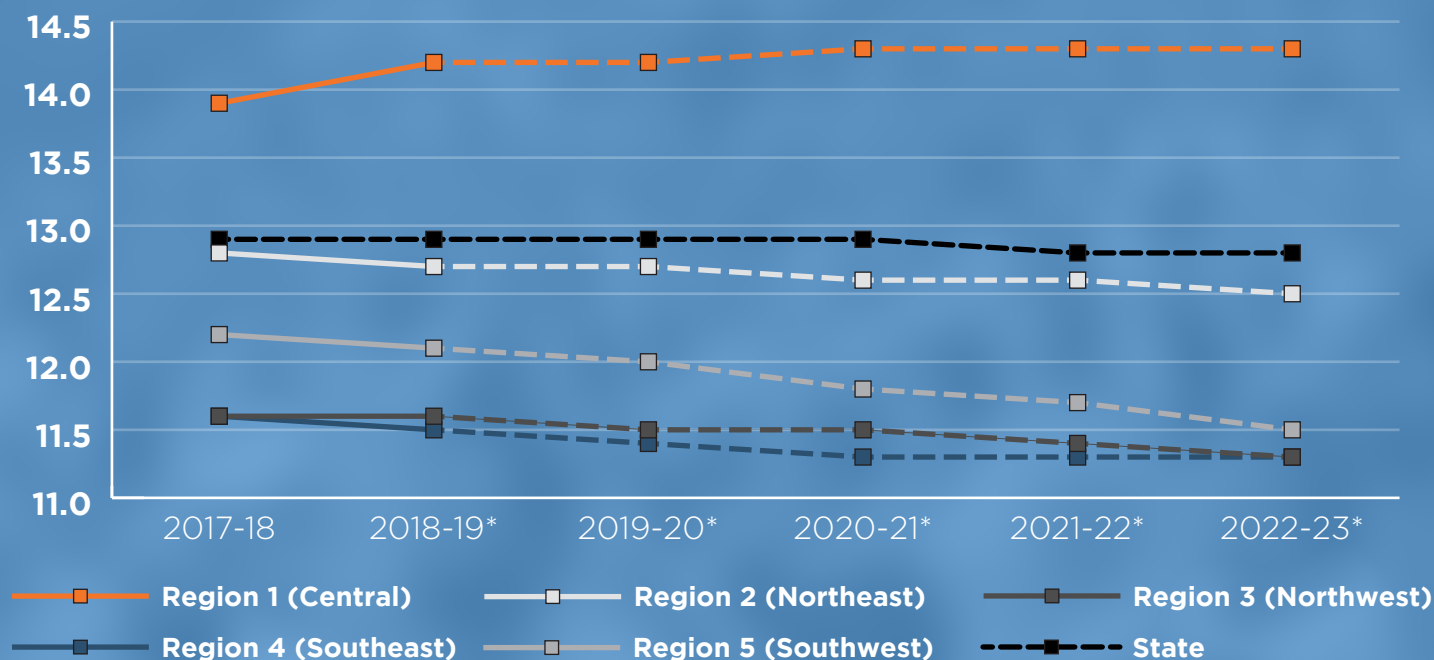
The enrollment projections also suggest two different patterns of trends in the average annual decline in regional enrollment. In two regions, (i.e., Region 3-Northwest and Region 4-Southeast), the drop in the number of students enrolled in public schools is smaller than in the previous three years—0.4 percent and 0.5 percent as opposed to 0.6 and 1.7 percent, respectively. The other two regions (i.e., Region 2-Northeast and Region 5-Southwest) are expected to face an accelerated decline in the annual student enrollment –1.6 percent and 0.95 percent as opposed to 0.3 and 0.91 percent, respectively.

Although the enrollment projections are the same in the two demand scenarios presented in this report, those for pupil-educator ratios are different as a result of the underlying assumptions.

The projected overall decline in the pupil-educator ratio between 2018-19 and 2022-23 in Scenario 1 would materialize at different points in time across grades depending on their specific trends in enrollment projections. While most grades (e.g., kindergarten, first, second, seventh, eighth, ninth, and twelfth) would experience a delayed decline in their pupil-educator ratios –enrollment first increases and then begins to decrease–, a couple of grades (i.e., grades fifth and sixth) could experience reduced ratios throughout the projection period due to a sustained decline in enrollment. Appendix A lists all enrollment projections for all grades and regions between 2018-19 and 2022-23.

FIGURE 7

PUBLIC SCHOOLS' PUPIL-EDUCATOR RATIOS BY REGION: SCENARIO 1 2018-19 TO 2022-23



Note: 2017-18 personnel data as of January 24, 2018. Enrollment headcount includes kindergarten and grades 1 thru 12. Ungraded students such as out-of-home placements are not included.

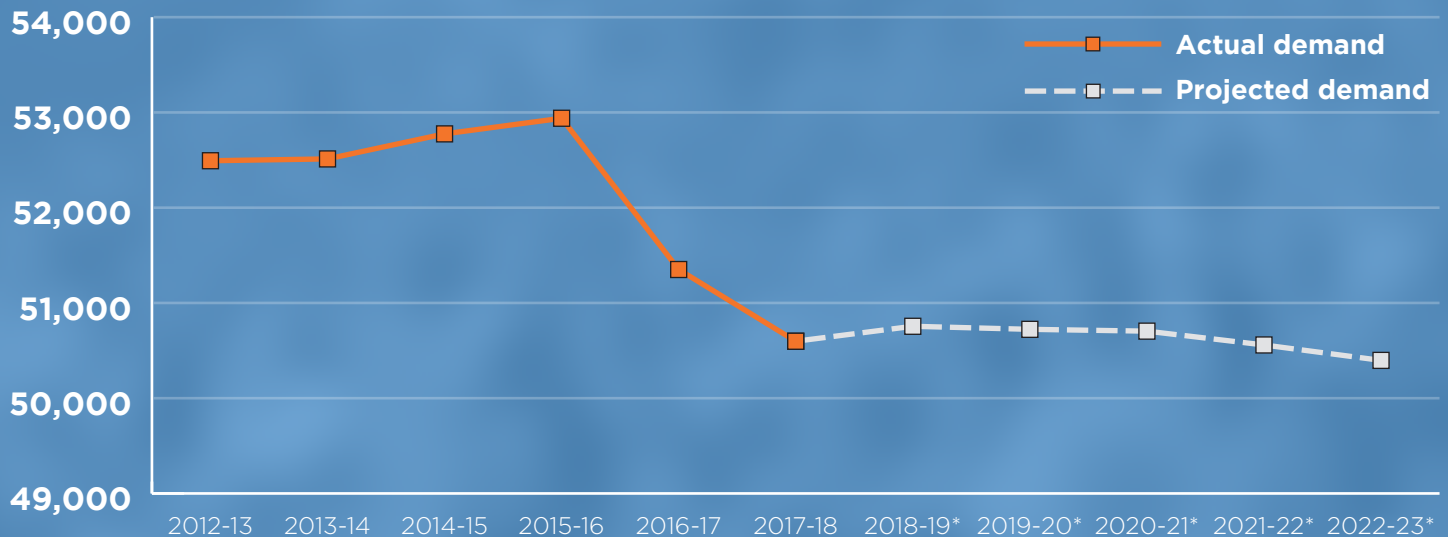
Because pupil-educator ratios vary widely across primary positions –some of the trends for teacher vs. other educators, and core vs. elective subjects were found to be statistically different (See *Section: Demand*)–, selective declines in those ratios could occur. For instance, pupil-educator ratios for core academic subjects in high school and middle school that have shown an above average growth in recent years could begin to decline if the expected lower student enrollment occurs.

Under Scenario 1, the projections for pupil-educator ratios reveal interesting regional patterns hidden in the aggregate data. While the ratios for 2018-19 through 2022-23 in Region 1 are expected to

continue to rise, at least until 2020-21, those for the rest of the regions will have a somewhat different trajectory (Figure 7). For example, the 2017-18 pupil-educator ratio in Region 5 (Southwest) was 12.17; if the assumptions in Scenario 1 are met, the ratio in 2022-23 for this region would drop to 11.54, the steepest decline among all regions. A similar comparison for Region 3 (Northwest) –the region with the slowest decline– reveals that the pupil-educator ratio would drop from 11.62 in 2017-18 to 11.33 in 2022-23. All regional data series, except for Region 1, are expected to remain below that of the statewide numbers throughout the projected period. Appendix B details the demand factor's projections by region and year in Scenario 1.

FIGURE 8

PROJECTED EDUCATOR DEMAND: SCENARIO 2 2018-19 TO 2022-23



Note: 2017-18 personnel data as of January 24, 2018.

Demand: Scenario 2

Scenario 2 explains how the educator demand would look if the pupil-educator ratios remain at the 2017-18 levels –the highest ratios statewide since 2012-13. As previously explained, the annual average growth rate of the number of pupils per educator statewide, between 2012-13 and 2017-18, was 1.5 percent. In addition, most of the 24 subject areas or primary positions created for the analysis showed a growth rate above that of the state during that period.

Figure 8 shows that under the assumption of steady pupil-educator ratios after 2017-18, the demand for educators will likely

decrease from nearly 50,600 in 2017-18 to around 50,400 in 2022-23. Student enrollment under this scenario is expected, as before, to decrease after 2018-19.

Relatively stable pupil-educator ratios appear likely, at least in the near future, primarily due to the state-mandated pay raises that went into effect August 1, 2018. However, if the trend in enrollment projections is realized, which also seems likely considering the recent pattern observed in the data series, the distribution of the expected reduction in demand among grades and positions, will ultimately depend on district and school level priorities.

Finally, the likelihood of the decreased educator demand after 2018-19 being met depends on several factors, including the yearly turnover rate, the willingness of certified educators to return to public school teaching, and the availability and inclination of college graduates to seek teaching positions. The scenarios proposed in the *Sections: Supply Projections* and *Projected Gaps*, describe some of these factors, their possible effects and the assumptions behind them.

Some similarities and differences across regions in terms of educator demand are evident when the overall projections shown in Figure 8 are disaggregated by geographic regions. Figures 9 through 13 display actual values of educator demand before 2018-19 and the five-years-ahead projections for all five regions. Three distinct patterns of projected demand can be identified under the assumptions included in Scenario 2. First, the demand for educators in regions 2 (Northeast), 3 (Northwest), and 4 (Southeast) will continue to decline in the coming five years, albeit generally at a slower pace. Second, Region 5 (Southwest) is the only one that would be expected to continue the persistent and almost linear declining trend of educator demand observed since 2012-13. Third, Region 1 (Central) is anticipated to face a quite different pattern ahead. The combination of a projected increase in student enrollment and a steady pupil-educator ratio would result, for most of the projection period, in the increasing demand shown in Figure 9. Data on the demand factors' projections under Scenario 2, by region and year, are included in Appendix C.

FIGURE 9

PROJECTED EDUCATOR DEMAND SCENARIO 2: REGION 1 (CENTRAL)

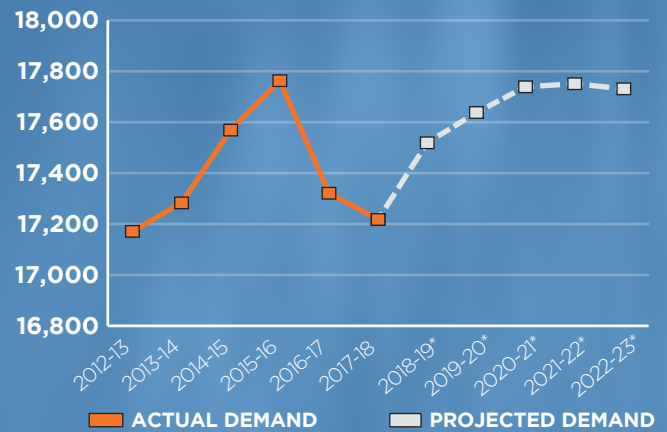


FIGURE 10

PROJECTED EDUCATOR DEMAND SCENARIO 2: REGION 2 (NORTHEAST)

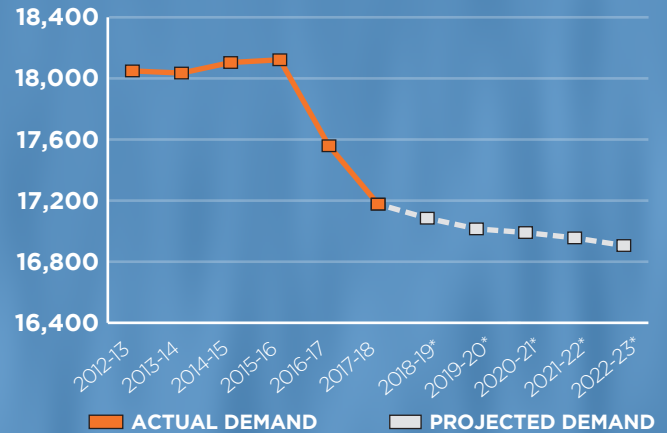
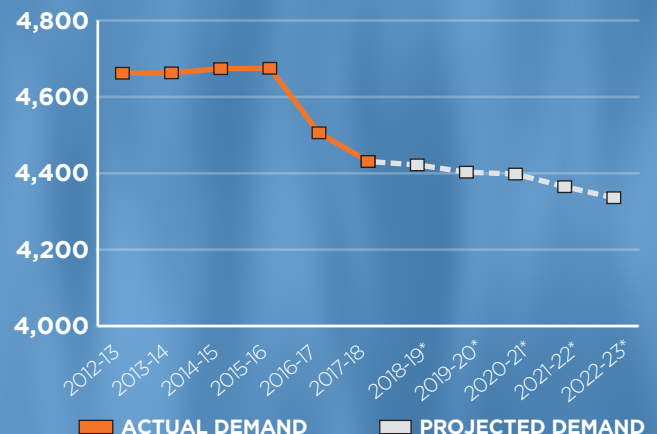


FIGURE 11

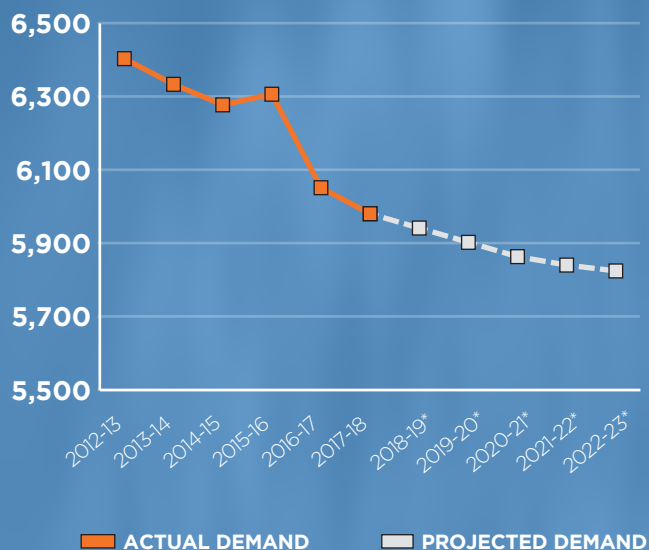
PROJECTED EDUCATOR DEMAND SCENARIO 2: REGION 3 (NORTHWEST)



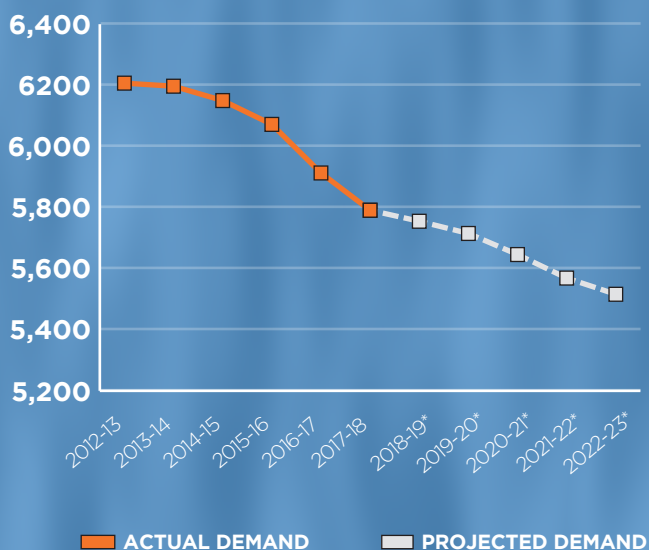
Note: 2017-18 data as of January 24, 2018.

FIGURE 12

PROJECTED EDUCATOR DEMAND SCENARIO 2: REGION 4 (SOUTHEAST)

**FIGURE 13**

PROJECTED EDUCATOR DEMAND SCENARIO 2: REGION 5 (SOUTHWEST)



SUPPLY PROJECTIONS

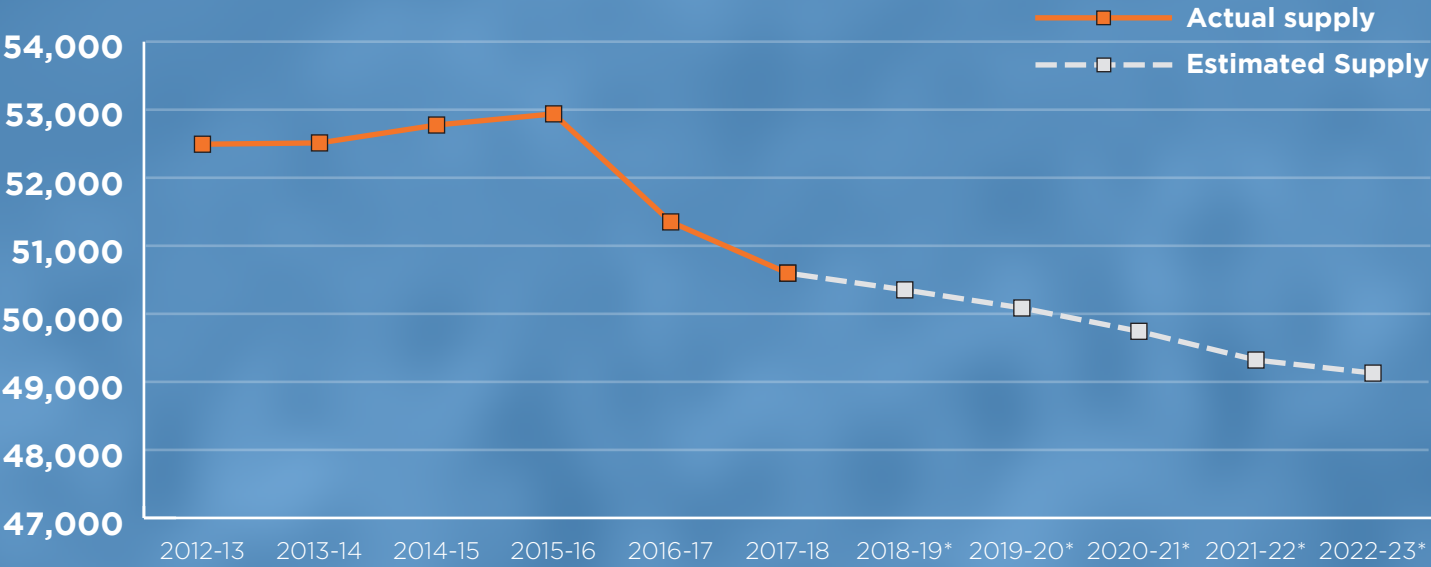
Traditionally, key components of the educator supply, including returning educators from the previous year and new hires –which encompasses certified educators willing to return to teaching and college graduates willing to work in the public school system– are more difficult to predict than those in the demand side. An important reason behind this assertion is that the decision-making process used by individuals who make up the supply relies heavily on the perception of working conditions and future wages of teaching, and their comparison to other occupations (Allen, 2010; Grissmer, 2000). This report uses the historical supply broken down by position, region and year to predict two alternative scenarios of future teacher supply in the state, where established trends are combined in alternative ways. Data from a survey of certified educators not teaching in Oklahoma in 2017 will help illustrate the relevance of those perceptions and also describe some of the assumptions behind the projections.

The supply projections are developed for two plausible pathways that capture alternative assumptions: one scenario that is consistent with continued decline in supply, and the other representing an expansion of supply similar to that observed in early 2010.

The projections presented below represent the second element of potential teacher shortages/surpluses that are highlighted in the next section.

FIGURE 14

PROJECTED EDUCATOR SUPPLY: SCENARIO 1
2018-19 TO 2022-23



Note: 2017-18 personnel data as of January 24, 2018.

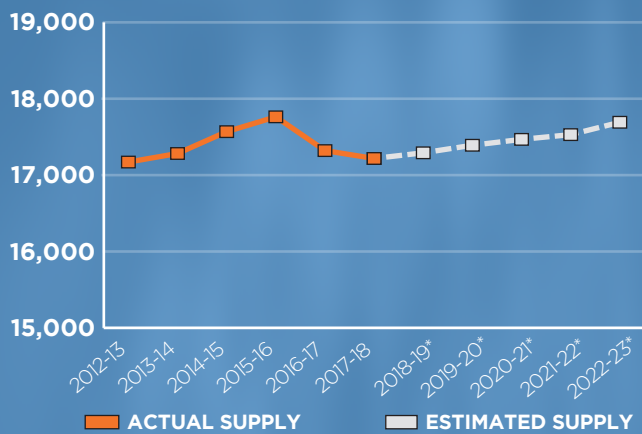
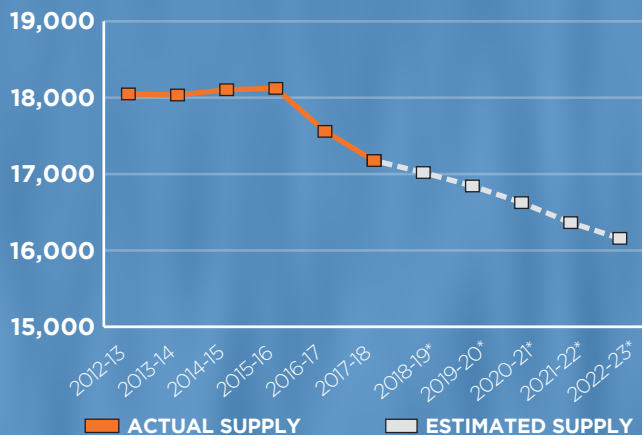
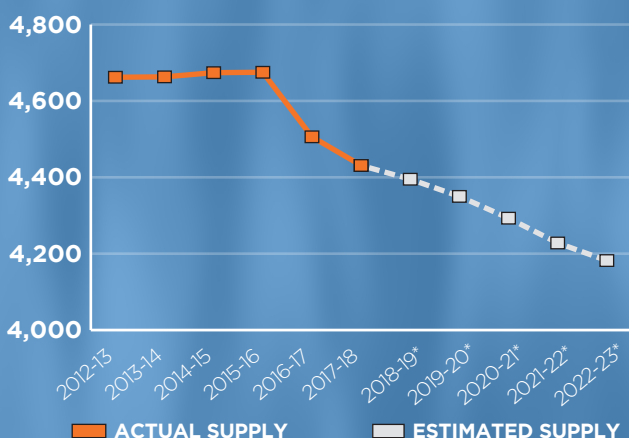
Supply: Scenario 1

The overall downward trend observed in educator supply during the recent past, especially after school year 2015-16, is expected to continue in the next five years (Figure 14).

The supply of educators for the years between 2012-13 and 2017-18 decreased by an average of 3.6 percent per year. From 2018-19 to 2022-23, the statewide supply is projected to decrease by 2.9 percent per year, reaching some 49,100 educators in 2022-23. This scenario assumes the trends seen during the past years for both the rate of individuals who stay in public school teaching from one year to the next and for those who were not teaching the previous year, remain stable. Recall that with the

exception of 2016-17, the participation rate of re-entrants from 2012-13 to 2017-18 has been close to 90 percent, which leaves the average rate of new hires around 10 percent for the same period.

A key presumption behind the projections in Scenario 1 is that the supply of educators from all different sources, at least in the near future, will respond weakly to the increase in the salary levels that were set to occur for most school districts at the beginning of the school year 2018-19. Additionally, if the economy of Oklahoma continues to grow in the coming years—with persistent better salaries and opportunities in competing occupations – and the working environment in the public

FIGURE 15**PROJECTED EDUCATOR SUPPLY
SCENARIO 1: REGION 1 (CENTRAL)****FIGURE 16****PROJECTED EDUCATOR SUPPLY
SCENARIO 1: REGION 2 (NORTHEAST)****FIGURE 17****PROJECTED EDUCATOR SUPPLY
SCENARIO 1: REGION 3 (NORTHWEST)**

Note: 2017-18 data as of January 24, 2018.

teaching profession is still perceived as not improving (Box 1), further decrease in educator supply appears likely.

Finally, because the number of years of experience for the new hires group has been gradually increasing in the last few years, and the contemporary number of college graduates with an education degree has consistently dropped, it seems conceivable to expect that an increasing number of individuals in the reserve pool will be a source of future teachers.

The downward trend in the supply projected in Scenario 1 is not evenly distributed across regions with one region facing a very different path. Over the past few years, the educator supply in Region 1 (Central) has mostly shown an upward trend, reaching in 2017-18 a slightly larger workforce than in the previous five years. This increasing trend is expected to continue between 2018-19 and 2022-23, expanding the central region supply of educators by 0.6 percent annually (Figure 15).

The projections of the number of educators in the teaching force for the rest of the regions (i.e. northeast, northwest, southeast, and southwest) closely resemble the trends expected at the state level (Figures 16 through 19). The regional supply will persistently fall until 2022-23 at annual rates that are similar to those observed between 2012-13 and 2017-18 (i.e., 1.2, 1.1, 1.1, and 1.2 percent, respectively). Appendix D contains the supply projections by region and year.

FIGURE 18

**PROJECTED EDUCATOR SUPPLY
SCENARIO 1: REGION 4 (SOUTHEAST)**

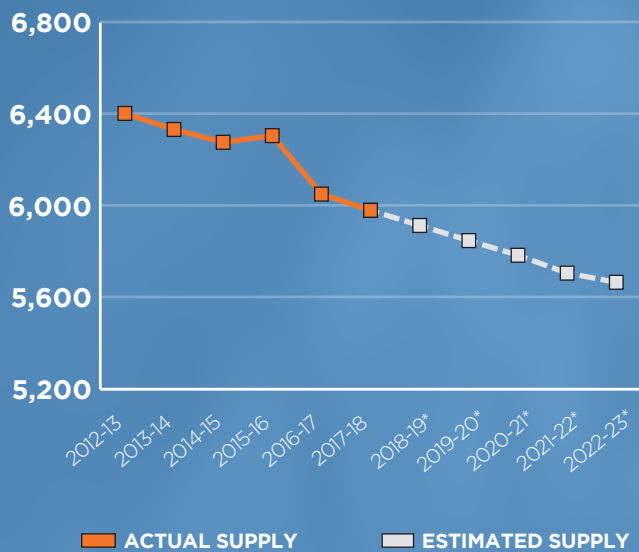


FIGURE 19

**PROJECTED EDUCATOR SUPPLY
SCENARIO 1: REGION 5 (SOUTHWEST)**

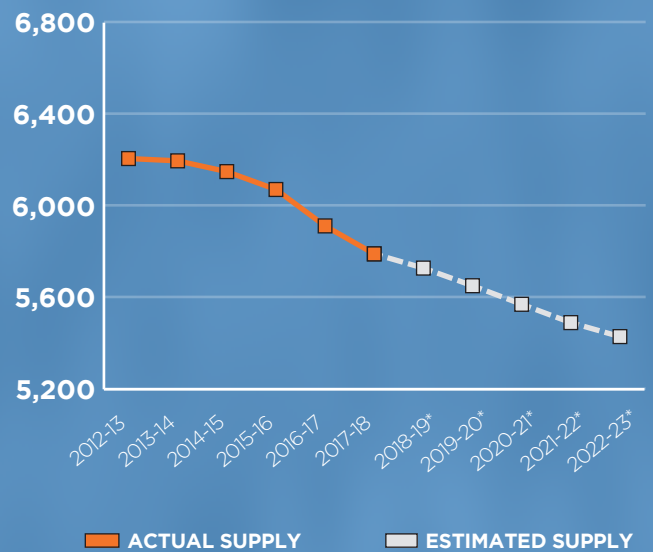
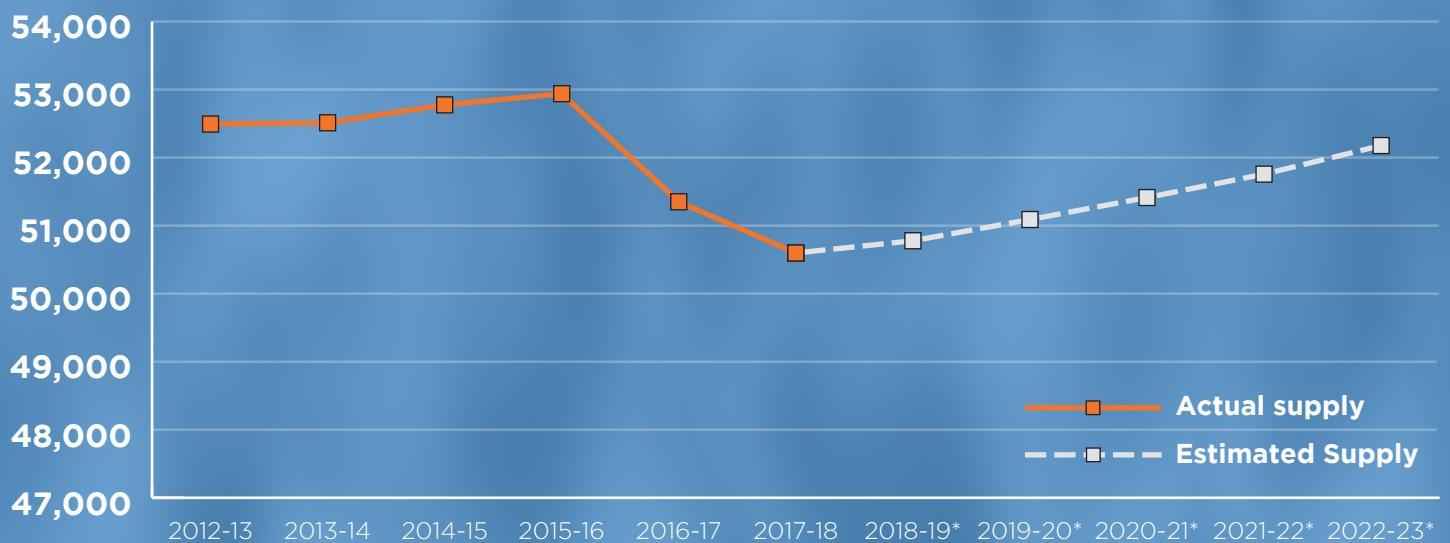


FIGURE 20

**PROJECTED EDUCATOR SUPPLY: SCENARIO 2
2018-19 TO 2022-23**



Note: 2017-18 personnel data as of January 24, 2018.

BOX 1: UNDERSTANDING THE RESERVE POOL

SURVEY BACKGROUND

The survey was conducted by Cole Hargrave Snodgrass and Associates online from September 27 through October 16, 2017. This analysis focuses on the 5,487 respondents that reported being under the age of 65. The survey firm reported that the respondents were largely representative of the state as a whole. The intent of the survey is to represent the reserve pool made up of approximately 30,000 people who are under 65 years old, qualified to teach, and are not teaching in public schools. Less than 10% of the respondents had never taught in Oklahoma schools while just over half (52%) had taught six or more years in Oklahoma and 19% reported teaching in another state prior to teaching in Oklahoma. Most (45%) hold secondary education certifications and about a third (31%) hold elementary education certification.

CAUSES OF TEACHER DEMAND

When a teacher leaves or quits teaching, an opening or demand for a new teacher is created. The survey directly addressed the causes of demand by asking respondents why they had quit teaching. Table 1, below, shows the reasons people gave for leaving (responses may not sum to 100% due to rounding).

TABLE 1 REASONS FOR QUITTING PROVIDED BY TEACHERS

	REASON	PROPORTION
POLICY & PRACTICE RELATED	PAY AND FUNDING	22%
	BETTER OPPORTUNITY	14%
	LEADERSHIP/REGULATION	6%
	NOT VALUED	6%
	HIRING DIFFICULTIES	7%
NOT POLICY & PRACTICE RELATED	MOVED STATES	19%
	PERSONAL REASONS	16%
	RETIRE	8%
	MISCELLANEOUS	3%

The key takeaway from this data is about half of teacher attrition could be addressed through policy and practice changes. To illustrate this, the responses have been organized into three groups. In yellow at the top of the table are the responses from about 48% teachers that provided reasons for quitting that generally could be addressed through policy and practice. The 46% of responses shown in green at the bottom of the table are generally not amenable to policy changes. The reason shown in the middle, “Hiring difficulties” is mostly made up of people who never quit: this 7% of respondents completed teacher preparation but did not actually work as teachers. Hiring difficulties may represent bureaucratic red tape, but could also represent districts appropriately deciding the respondents were not good fits for the district needs.

The largest single group of respondents (22%) cite pay and funding as a reason for quitting, a reason that can and has been addressed in Oklahoma since this survey was taken. The survey also provides information about which groups of people are more focused on pay issues. Pay is more important to secondary and special education teachers, Hispanic and Native American teachers, and younger teachers. Men are slightly more focused on pay, while women are slightly more focused on the time required to be a teacher.

OF PUBLIC SCHOOL EDUCATORS IN OKLAHOMA

All in all, many reasons people provide for quitting are not directly related to policy, such as moving and retirement. The group that cited “Personal reasons” is more likely to be between 25 and 45, suggesting for many of these respondents their personal reason is child rearing.

SOURCES OF SUPPLY

A key issue is how many of the people in the reserve pool are interested in returning to teaching. The survey asked respondents to describe themselves and allowed people to select multiple descriptions. Two questions asked about interest in returning to teaching: 25% of respondents said they “expect to return” and 6% said they “would like to return.” This suggests that 25% to 30% of the reserve pool is interested in returning to teaching.

This group that is interested in returning was more likely to cite personal reasons for quitting. They are slightly more concentrated in suburban and smaller districts and more likely to be in their 20s or 30s. This response suggests that many of those who would like to return to teaching are raising families. If this is true, their return could be hastened by making schools more family friendly. These family friendly policies could include more part-time or job-sharing opportunities as well as easy access to child care at schools.

Changes to policy and practice could make teaching more attractive to some groups within the reserve pool. Teachers who work in urban and suburban schools are a little more interested in improvements to the work environment and student discipline practices. Experienced teachers are more interested in control over instructional decisions and issues around district standards and curriculum. Younger teachers care more about higher pay and access to supplies. They are also more likely to teach in other states.

As with demand, pay is an important issue. About a third of survey respondents said increased pay was the change needed to return to teaching, while about two-thirds of teachers would require something other than a pay increase.

Many of those who are not interested in returning to teaching are either already working in education or consider themselves retired. About 25% of the respondents are working in private or parochial schools, working as administrators, or some other role in education. Moving this group of people into teaching would create other openings within the education system that would need to be filled. Another 13% of the respondents described themselves as retired.

CONCLUSIONS

The reserve pool consists of teachers who are certified to teach, below the retirement age, and who are not working as teachers. These teachers describe why they left their jobs which resulted in open positions: about half cited reasons that can be addressed through policy and practice with pay as the largest singly reason that people left teaching. Pay is also an important factor in recruiting these teachers back into the classroom. Those who are most interested in working in teachers are in the age group that is focused on raising children. Strategies to make being both a teacher and a parent may help increase people’s willingness to return to teaching.

FIGURE 21

PROJECTED EDUCATOR SUPPLY SCENDARIO 2: REGION 1 (CENTRAL)

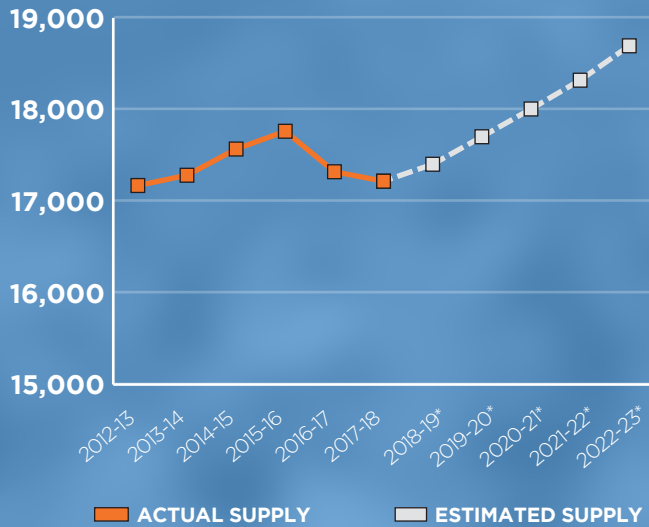
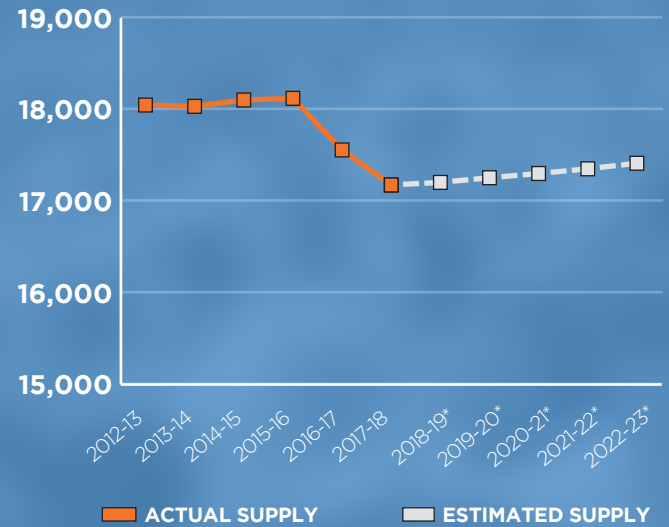


FIGURE 22

PROJECTED EDUCATOR SUPPLY SCENDARIO 2: REGION 2 (NORTHEAST)



Note: 2017-18 data as of January 24, 2018.

Supply: Scenario 2

In the second scenario developed for the supply side of the teaching market, the increasing year-over-year trends observed from 2012-13 through 2014-15 are expected to resume after the academic year 2017-18, adding some 1,500 educators to the teaching workforce by the end of 2022-23. Figure 20 displays the educator supply under the assumptions for Scenario 2, showing both the actual and estimated supply. The annual supply growth rate during the projection period (i.e. between 2018-19 and 2022-23) is 0.6 percent, which is twice the rate of growth from 2012-13 to 2015-16. This growth rate difference means that more than 300 educators would be added to the workforce each year after 2017-18. But even under this more optimistic scenario, the educator supply in 2022-23 would fall short of the levels shown at the beginning of the period of analysis, and far lower than the highest peak of the series in 2015-16.

The projections in Scenario 2 imply that the supply factors are monetarily-responsive with the pay raise approved earlier this year for Oklahoma educators for the first time in more than two decades playing a key role in the supply expansion. A moderate elasticity of supply –changes in response to a change in price– seems reasonable based on the results obtained from a survey conducted in 2017. A sample of educators under age 65 who are certified, but not employed by the public school system, were surveyed by Cole Hargrave Snodgrass and Associates, commissioned by the Teacher Shortage Task Force of the Oklahoma State Department of Education, and found that about 1 in every 3 respondents reported increased pay as the condition to return to teaching (Box 1).

In the simple, standard model of the teaching job market, the difference between the total educator demand and retained educators (i.e. re-entrants)

constitutes the number of new hires needed to satisfy the demand. How much would each source of supply respond to the monetary incentive (i.e., pay increase), however, is unknown. At the very least, a key assumption behind this scenario is that the drop in the retention rates of public school educators observed in recent years would reverse during the projection period. For instance, if the two-year mark retention rate for the 2015-16 cohort (i.e., 62.8 percent) is the same for the 2016-17 cohort, close to 2,400 educators with two years of experience would be retained in 2018-19. If the higher two-year mark retention rate for the 2014-15 cohort (i.e., 68.3 percent) is assumed instead, some 2,600 educators would be retained in 2018-19. The additional number of educators retained would represent more than two-thirds of the educators that would be added in Scenario 2 each year after 2017-18.

Figures 21 through 25 depict the actual and estimated supply series under Scenario 2 for the five regions of the state, showing broad differences in the projected trends. The Central and Northeast regions follow the same upside projected supply move, given their upward trends between 2012-13 and 2017-18. The steepest increase, by far, would occur in Region 1 (Central) where the educator supply could surpass its highest level in 2015-16 before 2020-21. The supply growth in Region 2 (Northeast) is estimated to be more modest, reaching in 2022-23 a supply level lower than the one in 2016-17, the second lowest during the period of analysis.

FIGURE 23

**PROJECTED EDUCATOR SUPPLY
SCENARIO 2: REGION 3 (NORTHWEST)**

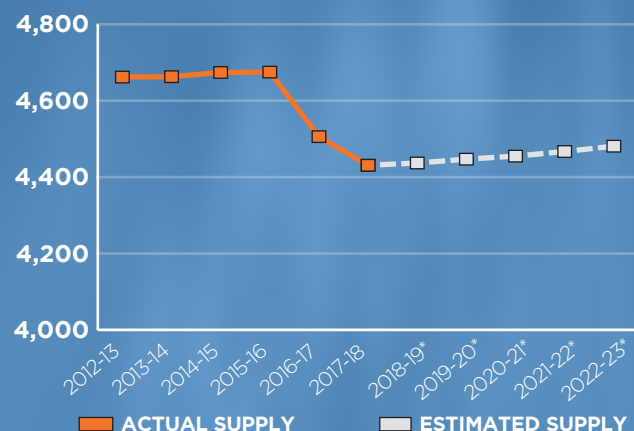


FIGURE 24

**PROJECTED EDUCATOR SUPPLY
SCENARIO 2: REGION 4 (SOUTHEAST)**

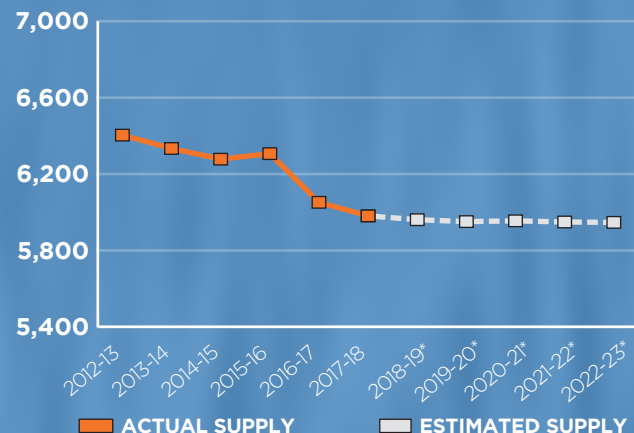
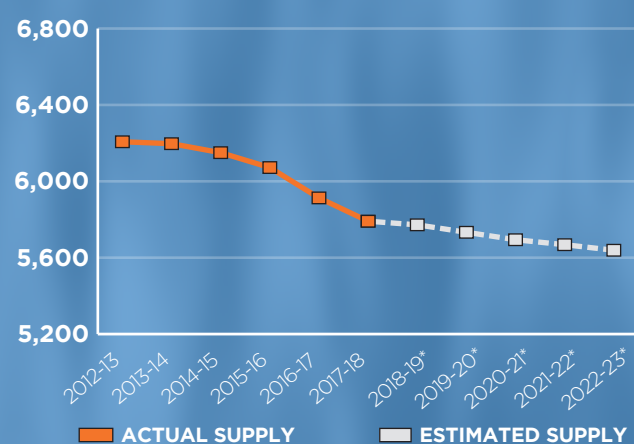


FIGURE 25

**PROJECTED EDUCATOR SUPPLY
SCENARIO 2: REGION 5 (SOUTHWEST)**



Note: 2017-18 data as of January 24, 2018.

In stark contrast, Region 5 (Southwest) is expected to face a decreasing supply of educators following the trend observed in this region since 2012-13. Regions 3 (Northwest) and 4 (Southeast) would fundamentally remain between 2018-19 and 2022-23 at about the same supply level shown in 2017-18. Appendix D contains the supply projections by region and year.

PROJECTED GAPS

The previous sections provided demand and supply projections for public school educators during 2018-19 and 2022-23. Following is an examination of projected future gaps (shortages or surpluses) between supply and demand under the two scenarios developed for each of them. The resulting four gap-analysis options are presented at the state level and also projected for all five geographic regions. It is important to remember that the demand-supply scenarios proposed in this report provide simulations of some possible educator shortages in the future given that certain conditions take place as described in each case. As such, the scenarios offer valuable insights about general future trends and context.

Demand and Supply: Scenario 1.1

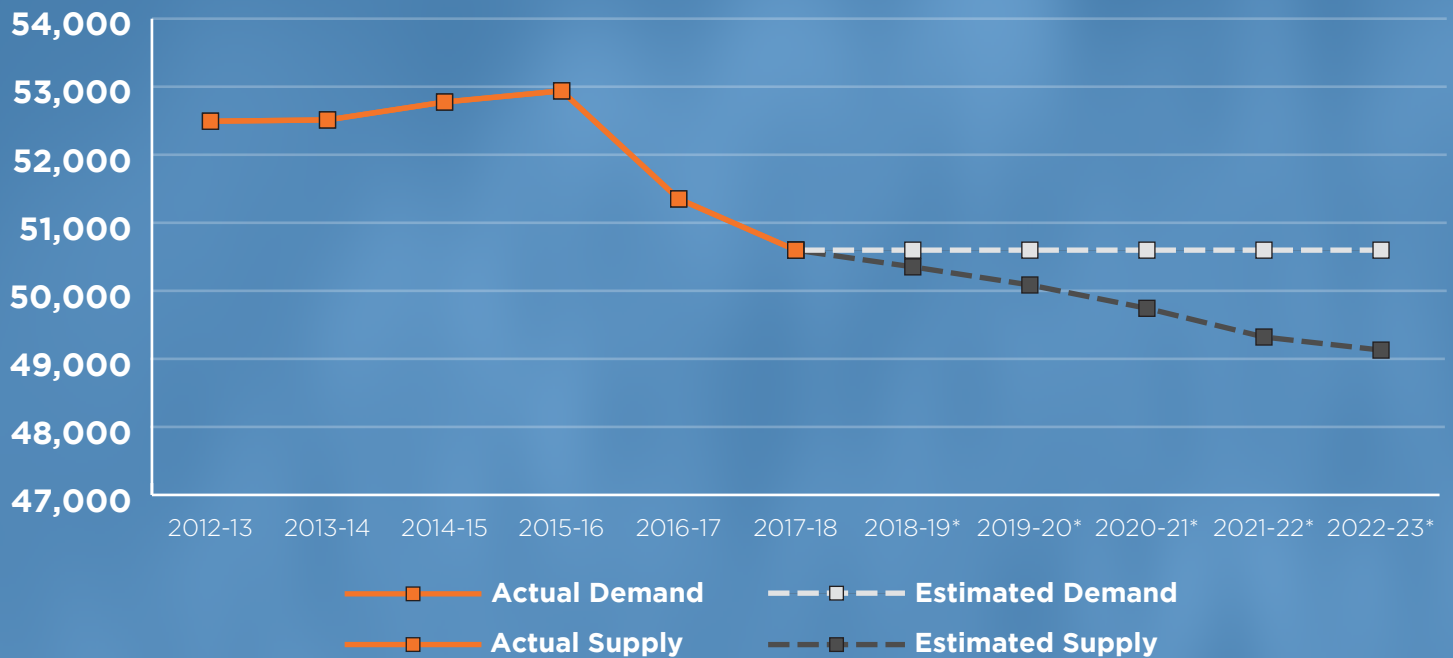
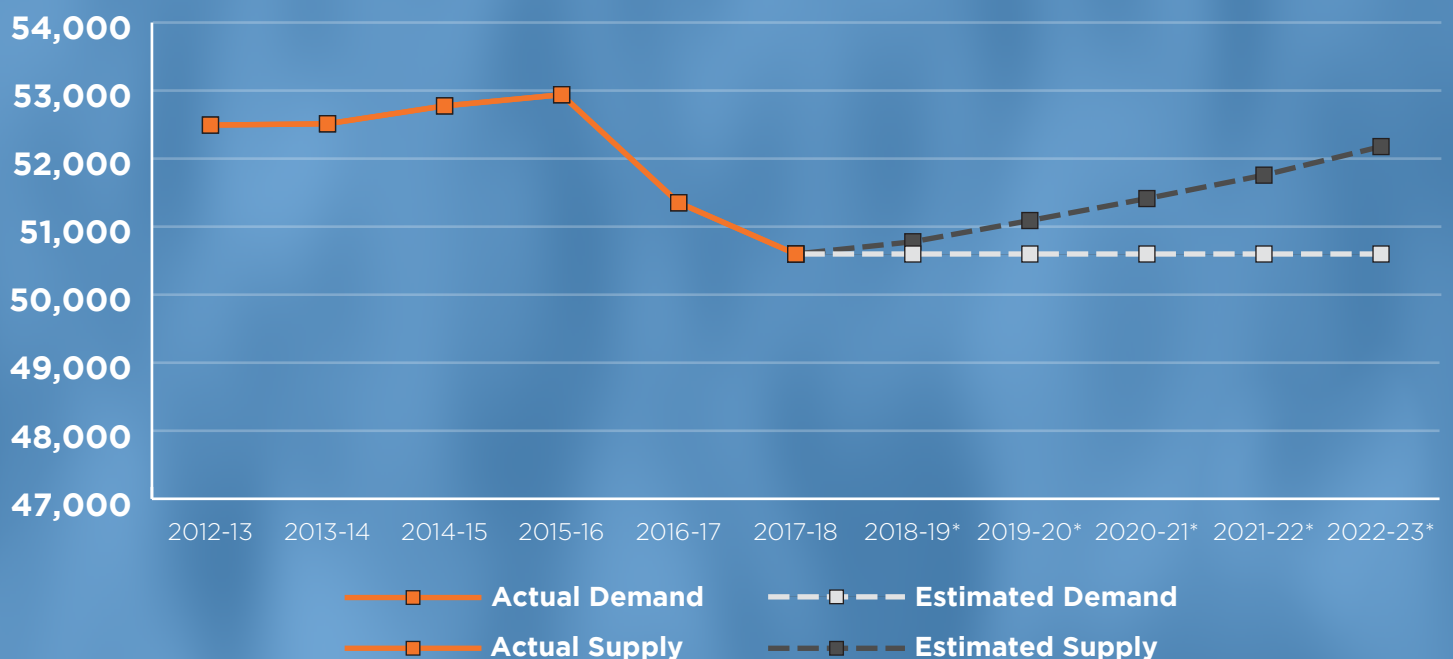
The potential effects of a projected demand that remains stable at the 2017-18 level and a projected supply that continues to decline until 2022-23 are depicted in Figure 26. The resulting estimates suggest an increasing shortage of public school educators during the entire 5-year period resulting in a gap of about 240 educators in 2018-19 growing to more than 1,400 in 2022-23.

Figure 26 also depicts the actual educator demand and supply between 2012-13 and 2017-18. The absence of any demand-supply gaps on or before 2017-18, however, does not account for the mechanisms that may have been applied by school districts to stabilize the market. For example, in times of critical shortages of qualified educators, teaching positions are unlikely to remain unfilled and strategies such as relaxing qualification requirements during hiring and adjusting pupil-educator ratios can become common practice. The previously provided interpretation about the market equilibrium between 2012-13 and 2017-18 applies to all demand-supply scenarios discussed in this section.

Projected supply and demand inadequacies under Scenario 1.1 differ by region. The excess demand, or shortage of educators, expected statewide is also anticipated for all regions except Region 1 (Central), where a surplus of educators for the period 2018-19 and 2022-23 is foreseen. The largest educator shortages among the remaining four regions are expected to occur throughout the period in Region 5 (Southwest), where the gap would reach some 6.2 percent of the expected demand by 2022-23. Appendix E includes all regional graphs.

Demand and Supply: Scenario 1.2

Under the second combined scenario, the demand is projected to remain stable (i.e., it stays constant after 2017-18 resulting in decreasing pupil-educator ratios) while the supply is expected to begin to grow again (Figure 27).

FIGURE 26**PROJECTED EDUCATOR JOB MARKET TRENDS: SCENARIO 1.1**
2018-19 TO 2022-23**FIGURE 27****PROJECTED EDUCATOR JOB MARKET TRENDS: SCENARIO 1.2**
2018-19 TO 2022-23

Note: 2017-18 personnel data as of January 24, 2018.

FIGURE 28

PROJECTED EDUCATOR JOB MARKET TRENDS: SCENARIO 2.1
2018-19 TO 2022-23

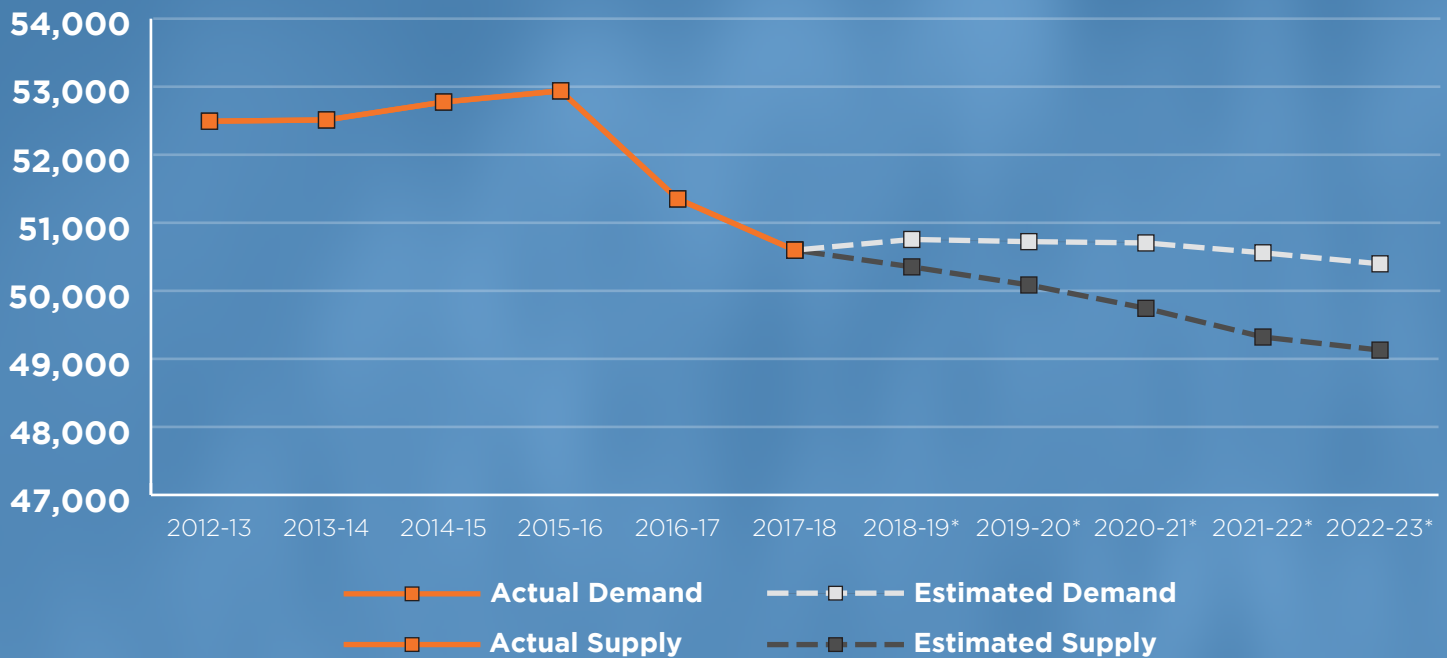
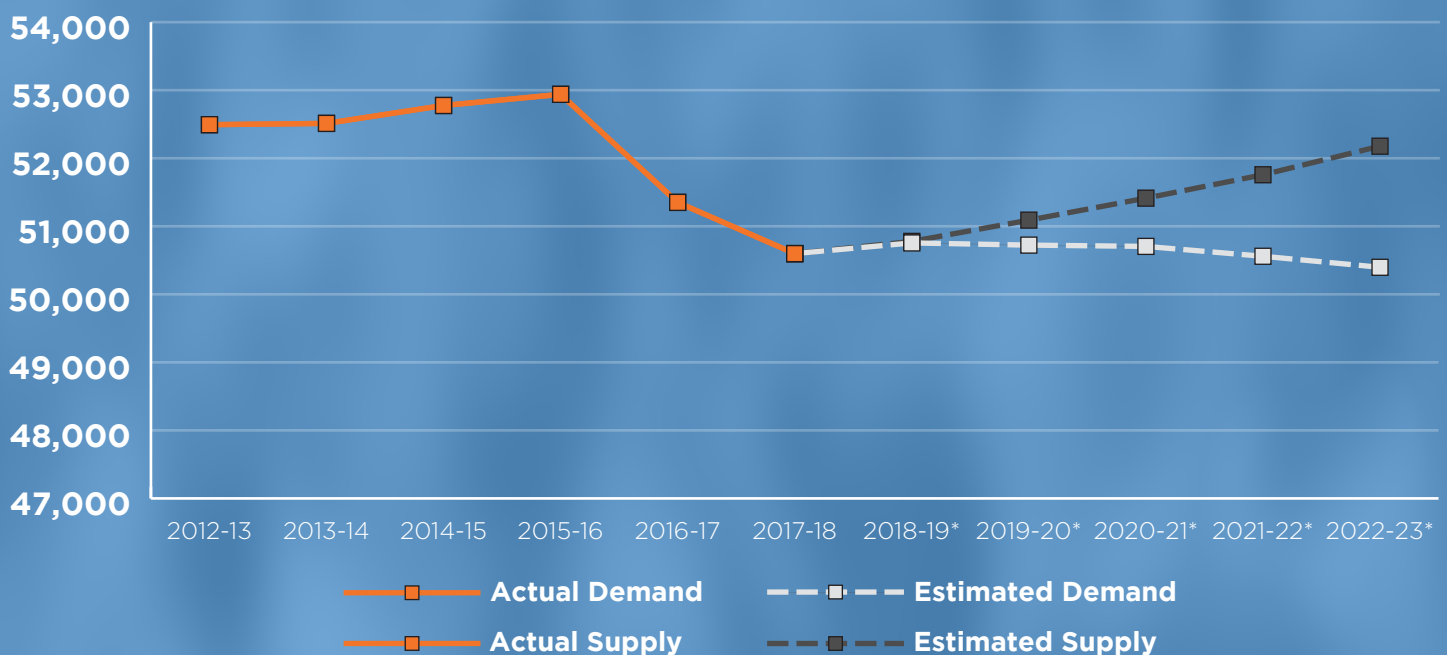


FIGURE 29

PROJECTED EDUCATOR JOB MARKET TRENDS: SCENARIO 2.2
2018-19 TO 2022-23



Note: 2017-18 personnel data as of January 24, 2018.

The projections in Scenario 1.2 show a widening gap (i.e., surplus) between supply and demand that is due entirely to a constantly increasing supply of educators after school year 2017-18. The expectation of a surplus in the market for public school educators is an optimistic and desired scenario where the demand ceases the decreasing trend shown in recent years, allowing an improvement in the pupil-educator ratios, and the supply is responsive (i.e. elastic) to improving salaries.

The estimates in Scenario 1.2 show wide differences between regions. While regions 1 (Central) and 2 (Northeast) would also display an increasing excess of supply between 2018-19 and 2022-23, Region 5 (Southwest) is the only region that is expected to face an increasing shortage of educators. The size of the gap in Region 5 would fluctuate between 0.3 percent and 2.6 percent of the annual demand. The market of educators employed in the public education system in regions 3 (Northwest) and 4 (Southeast) is foreseen to experience small discrepancies between demand and supply. All regional graphs with the projected gaps per year are included in Appendix F.

Demand and supply: Scenario 2.1

An alternative scenario to the two described previously was developed assuming a continued downward trend in both supply and demand after school year 2017-18. The overall pattern of projected gaps of public school educators under such scenario is shown in Figure 28.

This scenario projects that, even when the educator demand steadily falls after 2018-19 mainly in response to a declining enrollment, the number of eligible and available educators is expected to be increasingly scarce reaching a 2.5 percent gap by 2022-23. Evidence over the last several years has shown that the implementation of strategies prompted to equilibrate the market under situations of critical educator shortages are likely to hinder instruction. If, under scenario 2.1, the expected widening shortages push districts and schools to continue relaxing qualification requirements during hiring and/or increasing the workload of educators, they will be completely counterproductive and keep eroding any efforts by educators, administrators and policy makers in the state to improve the quality of teaching practice, and ultimately student academic achievement.

Some similarities and differences are, once again, evident when the overall shortages data are disaggregated across regions. All but one region (i.e., Region 1) are expected to display an expanding gap between demand and supply, albeit some variation in the size of the impact. While the educator shortage, by the end of the projection period, may reach 4.4 percent of the demand for Region 2 (i.e., Northeast), it could represent 3.6 percent, 2.7 percent, and 1.6 percent for regions 3, 4, and 5, respectively. By contrast, Region 1 shows a shrinking shortage that reverses by 2022-23, mainly due to a decreasing demand after 2020-21. Appendix G provides the regional graphs depicting these shortages.

Demand and supply: Scenario 2.2

The last scenario developed for the public school educator job market is depicted in Figure 29. It depicts what the demand and supply would look like between 2018-19 and 2022-23 if the path of a declining educator demand continued and a shift towards an increasing educator supply is realized.

Under scenario 2.2, the total number of positions school districts have available will decrease by 0.4 percent, which represents about 200 fewer positions statewide.

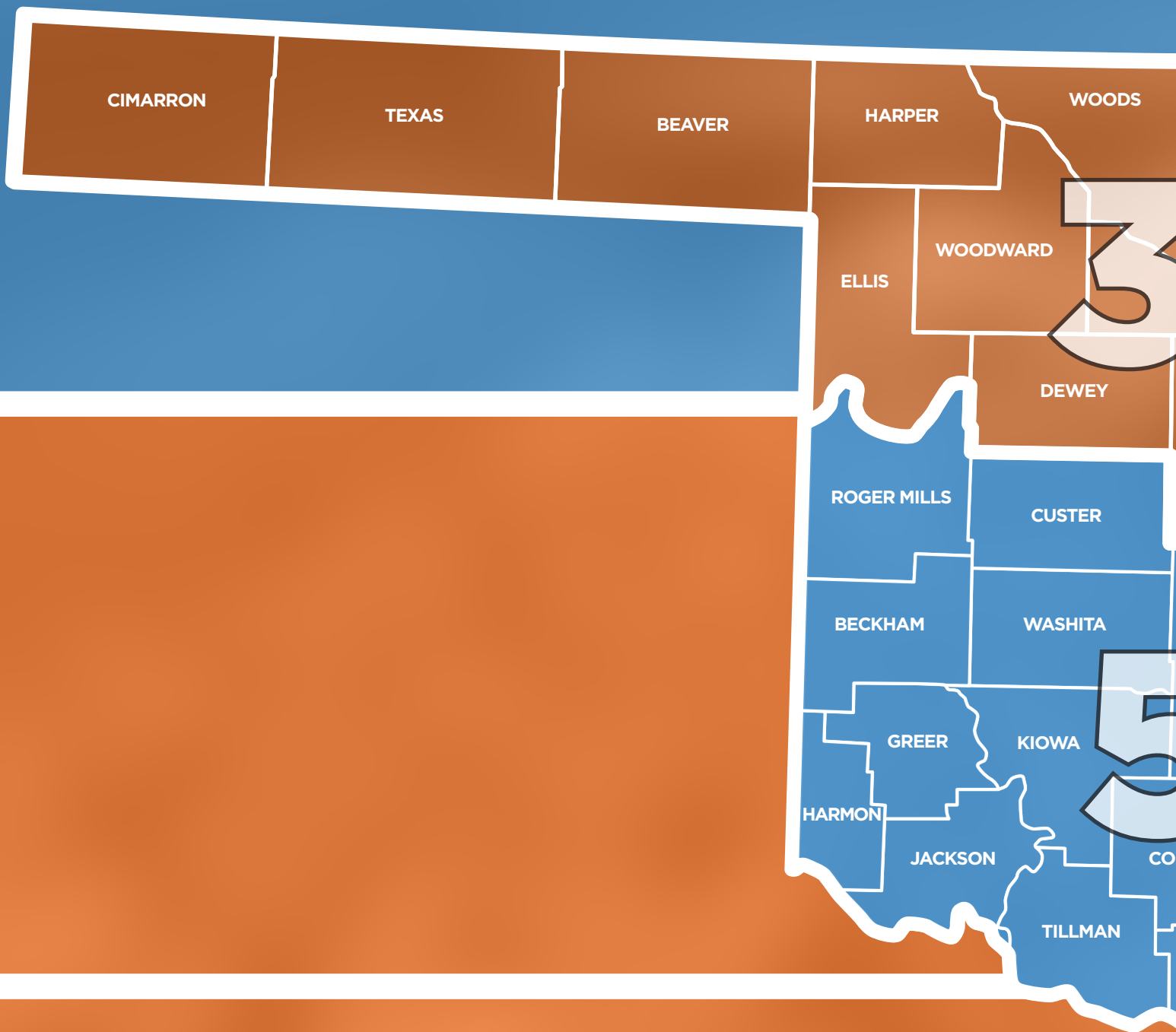
In contrast, the number of eligible and available individuals who are willing to work for the public school system would expand by 3.1 percent, reaching some 52,170 educators in five school years. The outlined pathway is a more optimistic scenario of the future job market that results in a surplus or excess supply of educators. It is a plausible option, however, if the projected trends of a dropping student enrollment after 2018-19 occur and the factors or supply determinants respond to the price incentive (i.e., pay raise) approved earlier this year for Oklahoma educators. The projections of a widening excess supply in this scenario are more pronounced than those expected in scenario 1.2 where the demand is expected to remain stable after school year 2017-18.

A summary of the results by region for 2018-19 through 2022-23 is given in Appendix H. The Central, Northeast and Northwest regions show the same growing gap between supply and demand, albeit

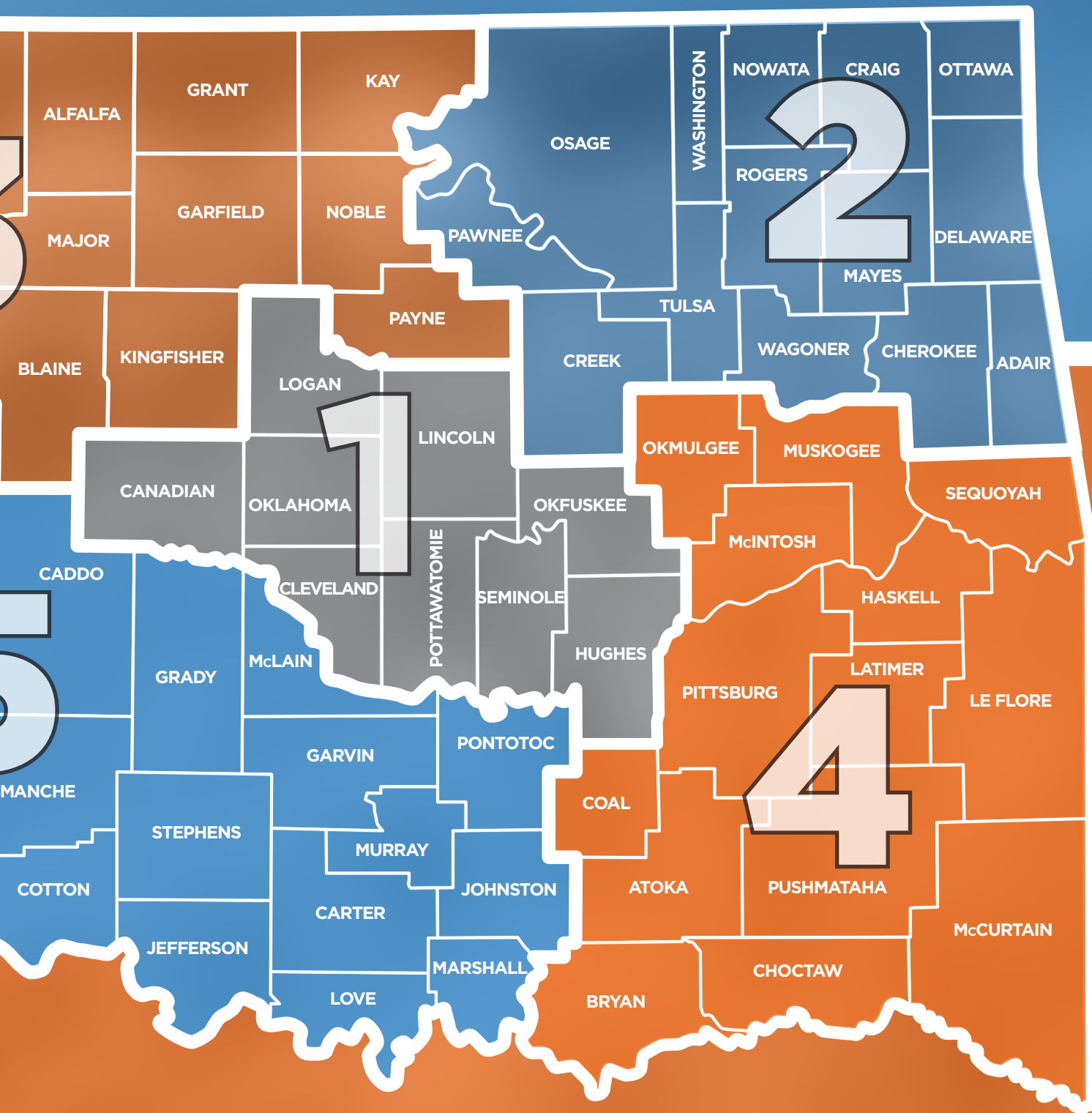
involving different patterns. For example, while in Region 1 (Central) demand increases at a decreasing rate and supply increases almost linearly, regions 2 (Northeast) and 3 (Northwest) show a persistent, albeit modest, deterioration in demand and steady increases in supply. In regions 4 (Southeast) and 5 (Southwest) both demand and supply are expected to decline at different paces producing a similar growing gap as those seen in other regions.

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Looking Forward



TEACHER SUPPLY, DEMAND, AND QUALITY: LOOKING FORWARD

This report focuses on different aspects of educator demand and supply, including data trends for several key variables and five indicators of shortage, that help explain the depth of the excess demand for educators in the state in the past several years. The shortage indicators address demand-side factors (indicators 1-3), supply-side factors (indicators 4 and 5) and are disaggregated by the following subpopulation groups: educator's role, position, type of certificate, subject area, degree, number of years of experience and geographical location. The data and analysis proposed in the previous sections provide an integrated approach to understand past, current and expected challenges balancing supply and demand of public school educators.

In the context of the four projected gap-analysis options presented in the *Section: Trends ahead*, and building on its analysis and findings on key factors determining educator supply, demand and shortage, the report delineates a six-point action agenda that will support a more adequate supply of educators while promoting statewide efforts focused on teacher quality improvement. The agenda covers policy and practice issues that require commitments at all levels of the public school system. It

addresses critical steps toward a deeper understanding of the dynamics of the sources of supply – including career paths, preferences, attitudes and perceptions related to public teaching– each intended to strengthen and adapt strategies to improve retention and recruitment efforts.

ACTION ITEM 1: UNDERSTAND THE CAREER PATHWAYS OF TEACHER PREPARATION PROGRAM GRADUATES

In the last few years, there has been a growing concern about two major policy issues: educator shortages and educator quality. A critical element in addressing both issues is understanding the dynamics and sources of educator supply including the new hires group that mainly consists of experienced former teachers and graduates of teacher preparation programs. The individual analysis presented in this report regarding enrollment and graduation data from teacher preparation programs, on the one hand, and the characteristics of the workforce, on the other hand, must be linked to the creation of integrated datasets that contain longitudinal information about college graduates with certification and public schools' personnel records.

Following teacher preparation program completers after graduation will provide otherwise inexistent information about key aspects of their professional careers –e.g., factors that made teaching the occupation of choice; the proportion of those who choose teaching that seek traditional teacher

certification, and that of those who choose alternative routes; the number of certified educators who are hired annually into public education and their characteristics, including demographics, tenure, retention and turnover rates. This information will help build a more complete picture of the reserve pool of qualified individuals –including their career pathways into the public education system– as well as help address recruitment and retention issues in advance.

Linking the teaching certification and personnel records data –administered by the Oklahoma State Department of Education– and the teacher preparation programs data –gathered and maintained by the Oklahoma State Regents for Higher Education and coordinated by the Office of Educational Quality and Accountability – must be done through a collaborative understanding that will then be documented in a data-sharing agreement that protects privacy and confidentiality of the subjects and their data.

ACTION ITEM 2: MEASURE AND MONITOR EDUCATOR QUALITY SHORTAGE

Currently the predominant educator supply and demand policy issue is how to fill open teaching positions while a major concern remains related to the shortage of qualified individuals who are willing to enter, or stay, in the teaching force.

Improving education quality, however, requires much more than balancing supply and demand to have enough teachers in the

classrooms. It demands individuals who are adequately trained and supported, that are motivated and willing to a continual teaching effectiveness process (Unesco, 2016).

While balancing educator supply and demand is still an urgent priority, efforts to improve the quality of teaching practice and hence its effectiveness cannot continue to be compromised. The composition of the teaching workforce –e.g., subject matter knowledge, instructional skills, fluency in multiple languages and demographic characteristics–, its adequacy and distribution across schools, subjects and grade levels, must be the way shortages are defined, measured, monitored and addressed.

In light of these aspirations, and building on the report’s analysis and findings, data on the following dimensions of quality (Gibbs, 2010; Boe & Gilford, 1992) should also be closely monitored and reported regularly as summary indicators of the adequacy of the teaching workforce: a) the match between the characteristics of educators and that of the student population across subgroups and geographies (e.g., high-poverty and/or high-minority schools); and b) the authority and responsibility educators are given over their work (i.e., autonomy for the purpose of this report). Several studies have shown that the lack of teacher autonomy is a significant determinant of turnover (Warner-Griffin, Cunningham & Noel, 2018; Berry & Farris-Berg, 2016; Ingersoll & May, 2012). Measuring and

monitoring teachers' perception about their autonomy will provide factual basis for policy and administrative decisions related to retention. In addition, statewide and sub-state level information on quality are extremely helpful instruments for identifying shortages of qualified teachers among schools of different characteristics.

Addressing shortages using the proposed holistic approach will also fulfill the goals of the Oklahoma ESSA Consolidated State Plan (Oklahoma State Department of Education, 2017a), an 8-year strategic plan that, in Section D, describes initiatives aimed at supporting effective instruction and improving equitable access to effective teachers for all students.

ACTION ITEM 3: UNDERSTAND SCHOOL DISTRICTS' SHORTAGE DIFFICULTIES

Timely identification of the specific difficulties school districts face in filling open teaching positions, the most frequent strategies they use to overcome them and the anticipation of their effects on schools' recruitment practices, are critical in the design of effective policies and practices that aim at balancing supply and demand. Current analysis and indicators of shortages must be complemented and supplemented with data from school districts about priorities, strategies, perceptions and concerns on how to better address the shortages. Effective information gathering mechanisms –

including the use of a short convenient format, the outreach of a sample of districts that accurately represent their distribution across the state, and permanent communication and feedback-seeking from participating school districts throughout the planning and implementation phases–, and sharing strategies that ensure coherence, opportunity and efficiency, can be a successful strategy to support school districts, while they still remain in full ownership of the hiring process.

ACTION ITEM 4: EXAMINE TEACHER WORKING CONDITIONS

Evidence shows that working conditions of teachers have a significant influence on key factors in education, including educator effectiveness and student achievement (Ye, 2016; Johnson, Kraft & Papay, 2012;), as well as educator turnover intention (Boyd, Grossman, Ing, Lankford, Loeb & Wyckoff, 2009; Ladd, 2011). Learning about teachers' working conditions will foster an understanding of pressing issues and promising strategies that can more effectively and efficiently improve, thus positively impacting retention.

The results from the Survey of 7546 Holding Oklahoma Teaching Certifications but Not Currently Teaching in Oklahoma Public Schools suggests the large extent in which working conditions are related to educator decisions to leave the profession and return to teaching. On average, 78.0 percent of survey respondents reported

the working environment prevailing in the schools where they taught deteriorated from when they started until their last year. Also, when asked about why they quit teaching in Oklahoma public schools, 12.0 percent selected “leadership/regulations” or “not valued/respected” –both reasons related to key aspects of teacher working conditions. In addition, 66.0 percent of survey respondents believe “it would take more than just an increase in pay” for them to go back to teaching.

Implementing a school-level survey about the working environment for educators would 1) provide a snapshot of the teachers’ views of working conditions, as well as what is working well and where the gaps are; 2) allow detection of priorities among various aspects of teachers’ working conditions, especially those that have been shown to enhance teacher effectiveness, including school leadership, instructional practice and support, teaching workload, instruction resources, and class autonomy; and 3) supply with relevant information to draft most critical recommendations aimed at improving and strengthening current teacher working conditions. Several states have implemented similar data collection strategies, including North Carolina, Arizona, Kansas, Kentucky, Nevada and Ohio, and the information obtained from their implementation has been critical to support school improvement efforts (New Teacher Center, 2016).

ACTION ITEM 5: EXPAND RECRUITMENT OF QUALIFIED EDUCATORS

In response to teacher shortages, a few states have implemented an effective strategy to attract back into public teaching qualified individuals from the reserve pool, including retired teachers (Espinoza, Saunders, Kini & Darling-Hammons, 2018). In 2017, Oklahoma signed into law a measure that became effective on July 1, to allow certain retired teachers to return to the classroom (Oklahoma State Department of Education, 2017b) with no limitation on earnings if they meet certain conditions. Data from a sample of educators surveyed in 2017 who are certified, but not employed by the public school system, provided an estimate that 24.0% of this subgroup of the reserve pool are retired educators who are not currently working.

As previously described, new hires, defined as those educators who were not teaching the previous year, represent, on average, 9.5 percent of the state supply –approximately 5,000 educators. The average annual percent of new hires who were retired and came back to teaching between 2012-13 and 2016-17 was 3.8 percent. This percentage increased to 9.1 percent in 2017-18 (as of December 6, 2017).

In order to enhance the number of entering educators from the reserve pool who can help meet immediate shortage needs in a cost-effective way, specific efforts must be identified to reach out to a larger number of qualified candidates and persuade them to return to teaching providing tailored information to individual characteristics and circumstances.

ACTION ITEM 6: ENHANCE THE MENTORING AND INDUCTION PROGRAM FOR NEW TEACHERS

Evidence shows that new teachers who are not well prepared are more likely to leave the profession within the first years (Ingersoll, 2003; Smith & Ingersoll, 2004). One of the six evidence-based strategies recently cited as promising policies to address teacher shortages, and hence improve retention, is mentoring and induction for new teachers (Espinoza et al., 2018). Since 2015, Oklahoma has a Teacher Residency Program that requires all new teachers to participate in the program under the guidance of a mentor teacher or residency committee (Oklahoma State Department of Education, 2017c). Effective November 1, 2018, some changes were introduced to the program, including a change in its name to Teacher Induction Program (TIP); the deletion of language related to the residency committee requirement; the deletion of language that limited the definition to only those who have graduated from an education program at a college or university; and that of language that limited the selection of mentor teachers (Oklahoma State Department of Education, 2018).

In 2018, a survey of teachers who were in their first year of teaching was administered, and the results reveal that the majority of respondents at the least received sufficient guidance and support while participating in the program (88.0 percent); had the opportunity to participate in professional development activities (89.0 percent) and to observe colleagues in the classroom (78.0 percent); rated the support received from

the mentor as “good” or “very good” (75.0 percent); and believe the program provided them the opportunity for ownership and contribution, hence helping them become more effective educators (57.0 percent). The survey results, however, also show that 36.0 percent of the participants reported working in a public school where a TRP was not available, and that 13.0 percent of respondents were not assigned a mentor even when a program was available at the site.

In addition, research shows that having a mentor from the same field is strongly associated with reduced turnover (Ingersoll & Strong, 2011). According to the TRP survey, 28.0% of survey respondents reported their mentor did not have a similar certification as theirs or were unaware of their mentors’ certification type.

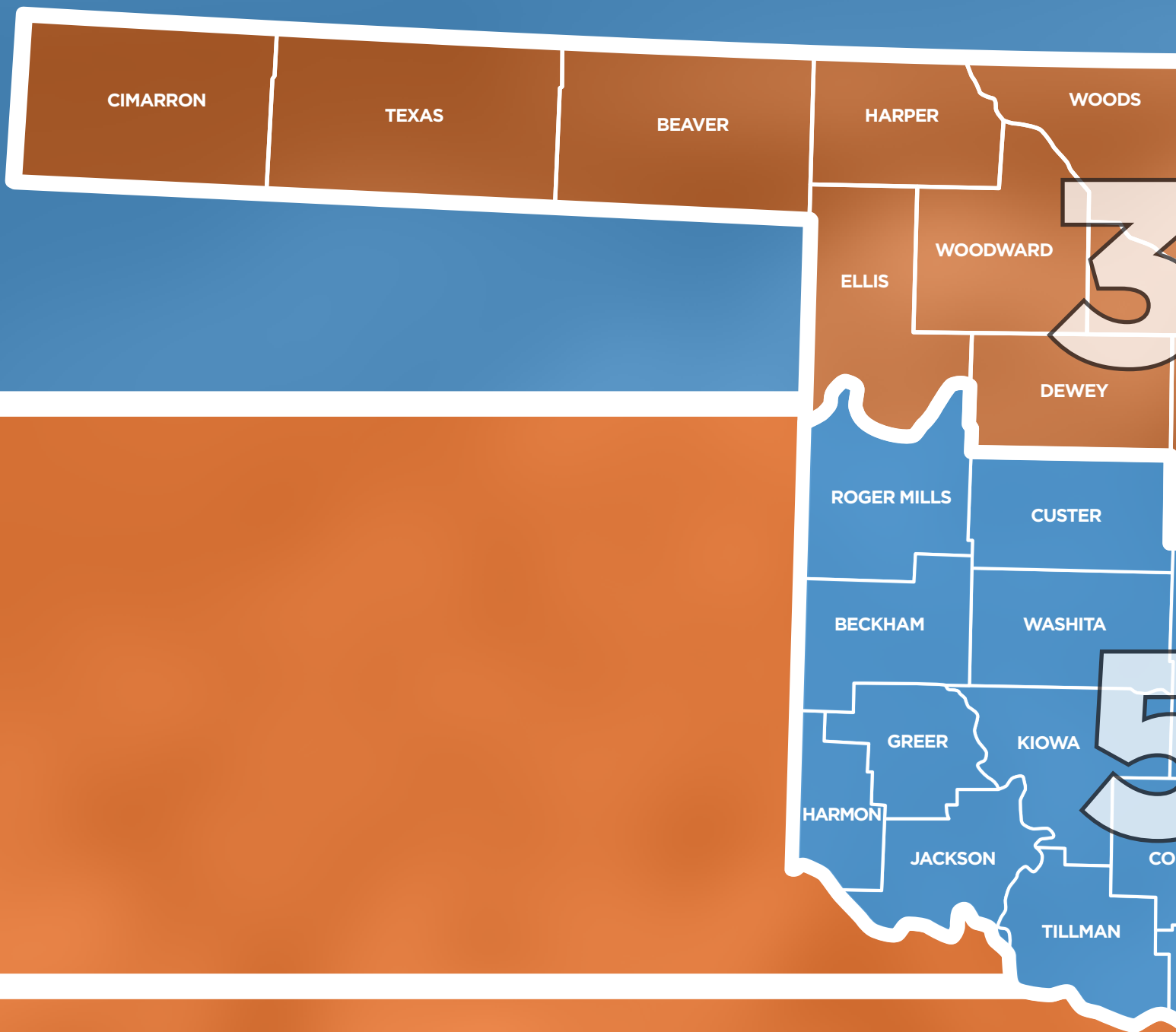
For new teachers to acclimate and remain in the profession, the support systems they need must be available for all of them. It is crucial to explore ways to provide more effective guidance and information to schools about the legislative requirement that all new teachers, and those who transition to new roles within a school or district, must participate in an induction program; about the benefits of a well-structured and evidenced-based program; and the most helpful aspects of the program according to the mentees themselves. Also, feedback from school districts and mentors about their experiences with the implementation of the program at their sites, including successes and barriers, would be highly beneficial in statewide efforts to better support local initiatives.

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Method

METHODOLOGY

The preparation of this report involved four different processes: a) data compilation about key factors of educator supply and demand from multiple databases and sources; b) data preparation for analysis, including data re-formatting, cleaning, matching and transformation, as needed; c) calculating summary statistics and testing hypotheses concerning relationships among relevant variables; and d) formulating assumptions and producing projections about the future paths of critical determinants of supply and demand, including student enrollment, pupil-educator ratios, educator turnover and new entrants. In order to ensure consistency and comparability across years (i.e., between 2012-13 and 2017-18), all data available were assessed, updated and revised during the analysis of the teaching workforce past dynamics, trends over time and preparations of future estimates. This section describes these processes for the demand-side factors, the supply-side factors, and the demand-supply projections.

DEMAND DATA Enrollment

Two sets of data were used in the calculations involving student enrollment: educational and population data. Data on K-12 historical enrollment (i.e., 2012-13 through 2017-18) came from the Oklahoma State Department of Education's annual reports, known as the October 1st enrollment dataset. Based on the previous

six years of data, enrollment projections were produced for 2018-19 through 2022-23. The information for population statistics, which serves as the basic material for school enrollment projections, came from the Oklahoma State Department of Health (OK2SHARE). Vital statistics of births, including aggregate numbers and the breakdown of the population by age and county, were accessed for dates and years that coincide with those of the educational data. Livebirth data for 2017 were still preliminary when the data preparation process for analysis started (i.e., January, 02, 2018).

During the analysis process, enrollment numbers were summarized in ratios by grade and region, forming the time series that allowed the detection of data trends. In addition, the proportion of students who progress from one grade to the next was also determined following the cohort-survival rate method (i.e., Grade Progression Ratio). The annual enrollment ratio for students in kindergarten was estimated using the number of children enrolled in kindergarten as a proportion of total children born five years earlier. Prekindergarten enrollment was not included in the trend analysis and projections due its specific characteristics and requirements, including its voluntary (i.e., non-mandatory) attendance status (HB 1657, 70 O.S. §1-114), different attendance rates compared to grades 1 through 12, class size and available resources limitations to accommodate eligible 3- and 4-year-olds

(OAC 210:35-5-41), and the different arrangements (i.e., in collaboration with other providers) school districts can implement to provide pre-k services (70 O.S. §1-114).

Workforce

Demographic data, teaching assignment(s), and information about the district and school where public school educators are employed, were obtained from the annual reports of the Oklahoma Cost Accounting System (OCAS). These reports are known as the “school personnel data” and the entries in the original files relate to a particular record describing an assignment or position, the site level and associated full-time equivalent (FTE) information; multiple rows per educator account for multiple positions. Personnel data were accessed for the school years 2012-13 through 2017-18. Please note that data for 2017-18 are preliminary (i.e., as of December 06, 2017) since the file with the complete data for that year was not released until July 1st, 2018.

Based on the school personnel raw data for each year, new variables were created and others recoded. The unique identifier included in the original files –which is automatically allocated to each educator who is granted a teaching certificate by the Oklahoma State Department of Education, Teacher Certification office– was used to create one row per record (i.e., educator). The new and recoded variables include subject code, site-level, primary position, age and region.

Primary position

For the sake of comparability and ease of interpretation, information in the school personnel data files about the educator’s job, subject and site-level were reviewed and recoded into a smaller and more meaningful number of categories that comprise the new primary position variable. The creation of this new variable followed the same collapsing rules used in previous similar studies (Berg-Jacobson, A., & Levin, J., 2015). The 24 options (i.e., primary positions) configured include: *district-wide staff; administrative; guidance counselor; librarian; other professional staff; elementary; middle school (MS) language arts; MS arts & music; MS social studies; MS foreign language; MS mathematics; MS science; MS vocational education; MS other; high school (HS) language arts; HS arts & music; HS social studies; HS foreign language; HS mathematics; HS science; HS vocational education; HS other; charter; and other* positions. A detailed list of the subject, job, and site-level codes grouped under each position can be found in Appendix A.

Using the maximum full-time equivalent value(s) as the reference variable, each year’s data were aggregated to the individual-level and the primary position of each educator was identified. The teacher number, or *TNO* column, included in the original data tables was used as the unique identifier for each educator. Two rules were applied in defining the primary position for those educators with an overall FTE value distributed across

multiple assignments: 1) keep the highest FTE, when one exists; or 2) keep the first row of information for those individuals with a similar FTE value.

Also, data cleaning was undertaken to ensure accuracy and consistency across years; however, no filtering was performed in any of the teacher data tables. Due to changes in district names occurring over the years, data were normalized by using the information from the most recent year. Changes in school district names do not affect/modify any of the results obtained as none of the calculations or analyses conducted involve the name of the district. The mapping of school districts per year is listed in Appendix B.

Age

Consistent with similar reports published in the past (Berg-Jacobson & Levin, 2015; Data and Decision Analysis, Inc., 2002), the age of educators was computed based on the birthday information provided in the school personnel data files. The variable's values were grouped into the following five categories: *age 31 or younger*, *32-53*, *54-59*, *60-61*, and *age 62 or older*.

Region

The 77 counties in the state were organized into five regions: Region 1 (Central), Region 2 (Northeast), Region 3 (Northwest), Region 4 (Southeast), and Region 5 (Southwest). Appendix C provides a list of counties by region.

Pupil-educator ratios

A secondary analysis of combined data on school personnel and enrollment, stored in different datasets, was involved in the computation of pupil-educator ratios. To ensure the correctness of the matching process when merging tables across datasets, identifier variables (e.g., *TNO*; *county code* and *district code*) common across them were used. In addition, several rounds of data cleaning and quality checks were performed to maximize accuracy on all the data available for analysis. For example, when inconsistencies in school/district coding across datasets were found, the codes in the personnel file prevailed. When the inconsistencies were across years, the codes from the most recent year were applied.

Pupil-educator ratios were produced by primary position, region and year. The annual numerator/denominator comparison used enrollment headcount data for kindergarten and grades 1 through 12 –excluding non-graded students and out-of-home placements–, and the total number of educators included in the personnel file; the ratios were organized into the 24 primary positions listed previously.

The position associated with the educator's maximum FTE and its area, job and site level information were used during the matching and merging process.

SUPPLY DATA

Experience

Two OSDE administrative datasets were used to obtain a snapshot of the extent in which experienced educators teach Oklahoma public school students: Personnel and Certification. For most years, experience information was provided in the form of five variables for all educators hired annually by school districts, except charter school teachers and adjunct teachers for whom such information is not tracked: *experience in district*, *experience in Oklahoma*, *experience in other state*, *military experience*, and *total experience*. The last variable in the list of the five previously detailed was used in the configuration of the experience metric, and only in a few cases adjustments were necessary to the total experience value. Such adjustments occurred when discrepancies between the total experience value, and the sum of all values across the remaining columns with experience data, were found.

In addition, for payment and service record purposes in the state (i.e. Oklahoma Teachers Retirement System), the total years of approved out-of-state and military experience are each capped at 5 years (Oklahoma State Department of Education, 2018). Most of the experience records in the original files were already adjusted to fulfil this requirement.

Experience data were analyzed for the period between 2012-13 and 2017-18, on the overall, by region, and for the subgroup of new hires to provide additional insights on educator turnover and its trends. Data for the academic

year 2017-18, which was preliminary, included an additional column to account for eligible out-of-country experience for all educators as required by law. Due to a small number of educators with such experience in 2017-18 (i.e., 28), and considerations of comparability across years, the computation of the total educator experience for 2017-18 did not include teaching experience from out-of-country schools.

During data cleaning and preparation for analysis, missing records for any of the experience variables were completed with information from previous years, as appropriate.

The breakdown of the length of educator experience follows the National Center for Education Statistics' disaggregation, adjusted to the Oklahoma definition of career teacher: *no experience*, *1–3 years*, *4–9 years*, *10–14 years*, and *15 or more years*.

Qualifications

To work as a professional educator in Oklahoma, aspiring individuals must obtain a certification from the Oklahoma State Department of Education, Teaching Certification office. Several pathways exist to obtain a certificate in the state, and all require specific prerequisites listed in the OSDE website (<https://sde.ok.gov/teacher-certification-paths>).

The files received with raw data included historical, individual-level certification information, dating back to 1995. Since this report covers the period between 2012–13

and 2017–18, the analysis of certification data involved each year during the six-year period only.

In light of previous, similar reports (Berg-Jacobson & Levin, 2015), the certificate type variable was organized into a smaller number of categories: *standard*, *alternative*, *emergency*, *provisional*, *license*, *paraprofessional*, *multiple certificates*, and *other*. Further, in order to get a better understanding of the relevant characteristics of educators in relation to their qualifications, certification data were matched and merged with personnel data, both at the state and regional levels. Appendix D has the complete list of old and new certification codes.

According to the competency-based licensure and certification system (Oklahoma State Department of Education, 2015), educators can be approved for multiple subject areas by passing the appropriate test(s) and/or fulfilling specific requirements, which may include evidence of completing the appropriate program. During the application/renewal process for a teaching certificate, individuals can request the addition of one or more areas to the certificate. The subject areas included in the raw data were recoded and organized into 15 categories: *administrative*, *pupil support*, *instructional support*, *early childhood*, *elementary*, *language arts*, *art & music*, *social studies*, *foreign language*, *mathematics*, *science*, *special education*, *English language learners*, *vocational education*, and *other*. Appendix E lists all area codes grouped by category.

Finally, educators with at least one valid certificate in any given year were further classified into two categories: active educators (i.e., currently employed in Oklahoma’s public schools), and reserve pool of qualified educators. Similarities and differences were statistically tested between the two groups; see *Section: Statistical Significance* for details.

Re-entrants

In order to analyze the individual components of educator supply, each year between 2012-13 and 2017-18 educators in the workforce were identified as either *new hires* or *re-entrants*. The latter (i.e., continuing educators) were defined as those individuals who stayed in the public-school system from one year to the next. When data for academic years 2012-13 and 2017-18 years were analyzed, 1.1 percent of the educators who were re-entrants in 2012-13 and 7.9 percent who were re-entrants in 2017-18 had no experience recorded. This apparent contradiction could be due to data entry/system migration errors. For the purpose of the re-entrants vs. new hires analysis, all records included in the annual file were included. When the data were broken down by years of experience, only those individuals with a complete experience record were included in the calculations.

New hires

The second component in educator supply is comprised of certified educators who were not teaching the previous year. Year-over-year comparisons were implemented

for the same 6-year period as other analyses in the report, and as previously explained, data for 2017-18 were not final until July, 1st 2018. Data preparation for analysis started in December 2017. When the new hires data were broken down by age groups, 12.1 percent of educators in 2017-18 were missing birthdate information, and hence, were excluded from the analysis related to age.

Turnover

Turnover is defined in this report as the number of educators who leave the public schools' system between two consecutive years plus those educators who move between school districts and/or change position during the same timeframe. Six categories were used to explain and classify the educator workforce, including turnover:

1) *stayers* includes individuals working in the same position and public school district in two consecutive years; 2) *leavers* comprises educators who were employed in the first year, but not in the second; 3) *movers-1* consists of all individuals working the following year in different position and district; 4) *movers-2* encompasses educators working in a different position, but same district; 5) *movers-3* includes individuals working in the same position, but different district; and 6) *new hires* comprises public school educators working in the second year, but not the first). The position and district data in the first year were used as the reference information for the leavers and movers categories.

Adhering to Carver-Thomas & Darling-Hammond (2017) and the NCES: National Teacher and Principal Survey (NTPS), turnover is further disaggregated into five components: *retirement*, *voluntary preretirement*, *involuntary preretirement*, *voluntary movers*, and *involuntary movers*.

Retention

Retention rates were calculated as the cumulative percentage of beginning educators teaching in consecutive years. Individual-level historical certification information for the period between 2012-13 and 2017-18 was used for the retention analysis. All educators with at least one valid certificate in any given year, and employed in the Oklahoma's public schools, were included in the computations.

STATISTICAL SIGNIFICANCE

Statements in the text describing differences across groups indicate that statistical testing was performed. Differences across geographic areas (i.e., statewide vs. each region) and across years (i.e., 2012-13 vs. 2017-18) were tested using cross-sectional and/or time-series data. Only those differences that were determined to be statistically significant at the 0.05 level, using two-sided significance tests (z-tests), are reported. The distribution of several characteristics of the teaching workforce was compared across subgroups, including turnover, retention, pupil-educator ratios, educator certificate type and areas, educator experience,

educator highest degree obtained, new hires vs. re-entrants, active vs. reserve pool of qualified educators, and all certificates vs. emergency certificates.

PROJECTIONS DATA

Demand projections

Grade progression and enrollment rates for kindergarten through grade 12 for each year between 2012-13 and 2017-18 were used as the basis for the enrollment projections developed in this report. Specifically, two sets of calculations were obtained: 1) *three-year averages* of most recent data, and 2) a *single-year value* from the last year for which data were available. In order to increase precision, the median point between the 3-year averages and the single-year values was used to calculate expected enrollment for 2018-19 to 2022-23.

As 2017 birth data from the Oklahoma State Department of Health Service databases (OK2SHARE) were not final at the time of data gathering and preparation for analysis, the enrollment rate in kindergarten for the academic year 2022-23 was obtained by applying interpolation to the most recent enrollment estimates published by the NCES: Digest of Educational Statistics, Common Core of Data, in November 2016.

The methods used to calculate expected enrollment imply certain assumptions about the future of key factors that explain school population changes. For the purpose of this report, it is assumed that the recent behavior of population variables such as fertility, mortality, migration, and educational indicators such as

student dropout and transfer, will continue over the projection period.

Two educator demand scenarios were developed to provide insights about the future based on the combination of previous/new trends for key demand driving forces. The projected demand under both scenarios is described and analyzed at state and regional levels.

Scenario 1

It describes a future state in which public school enrollment is expected to decrease after 2018-19; the teacher workforce is assumed to remain at the 2017-18 level –the lowest statewide level since 2012-13–; and the pupil-educator ratios decrease from 12.88 to 12.80. The educator demand in Scenario 1 remains constant after 2017-18.

Scenario 2

It explains how the educator demand might look if the pupil-educator ratios remain at the 2017-18 levels –the highest level statewide since 2012-13–; and the demand for educators decreases for most of the projection period from 50,598 in 2017-18 to 50,298 in 2022-23. Enrollment under this scenario is once again expected to decrease after 2018-19.

Supply projections

The educator supply estimates for 2018-19 through 2022-23 were obtained by assuming that past trends of key elements of supply would recur and, in combination, produce two possible outcomes. Historical supply data were broken down by position, region and year to produce the predictions.

Scenario 1

The overall downward trend observed in educator supply during the recent past is expected to continue in the next five years. The process to obtain the projections involved the following four steps: 1) calculate the year-over-year change in the workforce between 2012-13 and 2017-18 by primary position and region; 2) obtain 5-year averages of those changes by position and region; 3) use the 2017-18 supply numbers and the 5-year averages to estimate the 2018-19 supply for all 24 positions at the regional level; and 4) repeat steps 1-3 for 2019-20, 2020-21, 2021-22 and 2022-23.

Scenario 2

The increasing year-over-year trends observed from 2012-13 through 2014-15 are expected to resume after the academic year 2017-18. The trends in the data series between 2012-13 and 2015-16 were replicated, and the following calculations applied to obtain the educator supply estimates for 2018-19 through 2022-23: 1) compute the year-over-year change rate in the workforce between 2012-13 and 2015-16 by primary position and region; 2) generate 3-year averages of those rates by primary position and region; 3) apply the average rates to the most recent workforce numbers for all 24 positions at the regional level; and 4) repeat steps 1-3, using 2012-13 through 2015-16 and 2018-19 thorough 2021-22 data only, for the following years in the projection period.

Projected gaps

The demand and supply projections were combined into four-gap analyses options presented at the state and regional levels, where a direct comparison of the actual and estimated number of educators was conducted. The assumptions made about key determinants of educator demand and supply and their implications are included under each scenario described in the *Section: Projections*. A summary of the results by scenario and region is included in appendices E, F, G and H.

Projections accuracy

Accuracy in the projections is crucial. In order to provide empirical evidence for the methodology used in this report to forecast student enrollment for the next five years, the predictions for 2012-13 through 2017-18 were produced and evaluated against the actual enrollment levels in those years. A frequently used measure of accuracy in projections, especially when using cross-sectional data, is the Mean Absolute Percent Error (MAPE) (Swanson, Tayman, & Bryan, 2011; Wilson, 2007; Hyndman & Koehler, 2006). The annual MAPE across grades, including kindergarten, were obtained; the values fluctuated between 0.42 percent in 2012-13 to 1.78 percent in 2017-18. A transformed Average Percent Error (APE) distribution was used for 2014-15 and 2015-16, which passed the test of symmetry using values within ± 2 (George & Mallery, 2010). All adjusted and unadjusted APE distributions are available upon request.

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