Understanding Teacher Retention and Mobility in Washington State

Final Report

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Executive Summary

Introduction and Focus of the Study

Teacher retention and mobility are part of a larger state and national conversation about trends in the teacher workforce. This study aims to provide insight into the demographics of Washington teachers and their retention and mobility patterns, and to offer educators and policymakers in Washington state information to inform and enhance decision-making regarding teacher quality policies and practices.

Methodology and Data Sources

The primary data source for this study is the personnel data from the state's S-275 dataset. This dataset contains demographic and assignment information about all educators in Washington state. We linked the S-275 data to other state databases, including school demographic data across multiple years, enabling us to conduct longitudinal analyses that are comparable over time. Using state administrative datasets, we examined demographic information about teachers over the last 20 years from 1995-96 to 2015-16, focusing specifically on the last ten years. In examining retention and mobility trends over time, we look at nine five-year time periods since 1998. We also examined year-by-year changes in demographic characteristics and retention and mobility for each year for the period 2005-2015. We use four categories to analyze teacher retention and mobility: stayers in the same school, movers within district, movers out of district, and exiters from the Washington education system.

To help explain teacher retention and mobility patterns, we constructed multinomial logistic regression models using STATA 14 software, as this approach enables us to investigate the relationship between our dependent outcome variables of interest (retention and mobility status) and a number of continuous and categorical independent variables (e.g., district, school, and individual characteristics). The focal question for this work is "What variables consistently explain teachers' retention and mobility patterns in Washington state?" The two main populations investigated include all teachers statewide (across all years of experience), and beginning teachers (those with less than one year of experience).

Selected Findings

Demographic characteristics

- While the number of teachers in Washington state has increased by approximately 11,000 in the last twenty years, the racial and ethnic diversity of the teacher workforce made only minimal gains. In 1995-96, there were approximately 49,000 teachers, 94% of whom were White. In 2015-16, 90% of the state's 60,000 teachers were White. The increase in diversity of the workforce was concentrated among Hispanics, with the percent of Hispanic teachers increasing from 1.7% to 3.9%, and the percent of Asian/Pacific Islander/Native Hawaiian teachers rising from 2.0% to 2.8%. The proportion of Black/African American teachers has declined from 1.6% in 1995-96 to

1.2% in 2015-16. The proportion of Native American teachers also declined slightly from 0.8% to 0.7% in the last twenty years.

- The proportion of teachers over the age of 50 continued to rise from 20% in 1995, until it peaked at 36% in 2011. Since then, the proportion of older teachers has gradually declined to 32% in 2015.

- The number of teachers in their first and second year of experience has more than doubled in the last six years (2010-11 to 2015-16).

Statewide trends in retention and mobility across five-year time periods

- Nearly 60% of Washington teachers are located in the same school after five years, and this retention rate has changed little in nearly 15 years. Of the remaining teachers, 14% move to other schools within their district and 7% relocate to another district within the state. Approximately 20% of teachers exit the workforce after five years, and many of these teachers are of retirement age.

- While the statewide portrait reveals considerable stability, the rates of teacher retention and mobility for individual districts often vary considerably. In a sample of 10 districts with student enrollment above 10,000, the percent of teachers who stayed in their same schools after five years ranged from 45% to 62%.

- Across 4 five-year time periods examined, the retention rate of beginning teachers (those with less than one year of experience), in the same school ranged between 42% and 47%. A higher proportion of beginning teachers move within and out of their districts, as compared to all teachers statewide. However, the rate of beginning teachers exiting the Washington workforce has declined in the most recent five-year period to a low of 21%, similar to all teachers statewide.

- During the five-year period from 2010-11 to 2014-15, ESDs 112 and 123 had the highest rates of beginning teachers who stayed in their schools, while ESDs 171, 105, and 114 had the highest rates of beginning teachers who exited from the Washington education system.

- Novice teachers (0-4 years of experience) and veteran teachers (25 or more years of experience) stay in their schools at lower rates (47% and 48%, respectively), than mid-experience teachers (5-14 years, 60%, and 15-14 years, 64%). Veteran teachers have the highest rates of exiting (44%), compared with 20% of novices, and 13% and 19% of mid-experience teachers.

Year-by-year retention and mobility trends (10 years, 2005-06 to 2015-16)

- From one year to the next, on average 84% of all teachers statewide are retained in their same school, 7% move to another school within the district, and 2% change districts.

Trend data over the last ten years shows that less than 7% of the workforce leaves in any given year, though there is some variation.

- The majority of beginning teachers (on average 71%) stay in their school from one year to the next, 11% move within the district and 7% move out of district. On average, 12% exit the workforce in the following year.

- During the economic recession (2008-09 to 2011-12), proportionately fewer teachers moved out of district, and in the first two years, fewer exited the workforce. Additionally, a higher proportion of beginning teachers moved within their district and exited the workforce during this period.

- Over the last ten years, the percent of exiters age 55 or older has increased from 35% in 2005-06 to a high of 52% in 2012-13. By 2014-15, the percent of exiters age 55 or older dropped to 48%.

Statistical models of retention and mobility

- Using multinomial logistic regression models, we identified statistically significant variables associated with teacher retention and mobility.

- For all teachers statewide…
  o Full-time teachers are more likely to stay in the same school, less likely to move within district or out of district, and less likely to exit than part-time teachers.
  o High school teachers are more likely to exit or move out of district than elementary teachers.
  o Teachers outside ESD 121 are less likely to exit and to move out of district, and more likely to move in district than those in ESD 121.
- For beginning teachers…
  o Full-time beginning teachers are half as likely to exit as part-time beginning teachers.
  o High school beginning teachers are more likely to move out of district, and twice as likely to exit as elementary beginning teachers.
  o Beginning teachers in larger districts are slightly more likely to move within district and less likely to move out of district as beginning teachers in smaller districts.
  o As the percent of White students enrolled in the school increases, there is a slight decrease in the likelihood that a beginning teacher will move out of district.

- The poverty level of the school was not a consistent statistical predictor of teacher turnover or attrition for all teachers or for beginning teachers, a finding that differs from some other research in other locations

Conclusions and discussion

- The longitudinal analysis suggests that any perceived statewide shortage of teachers in

recent years is not due to recent changes in the statewide retention or attrition of teachers.

- There is no evidence to support the "myth" that "half of all beginning teachers leave the profession within five years" in Washington state. In Washington state, on average over the past 20 years, one quarter of beginning teachers exit the state system, either permanently or temporarily after five years. In fact, the rate of beginning teachers exiting the Washington workforce has declined in the most recent five-year period to a point where it is similar to all teachers statewide.

- Very little progress has been made in the past 20 years in improving the diversity of the teacher workforce. Of particular concern is the decrease in the proportion of Black/African-American teachers statewide. State policies aimed at improving teacher diversity certainly seem indicated.

- Given the substantial increase in the proportion of new teachers in recent years, the need for efficient and effective teacher mentoring and support programs is more pronounced than it has been in the past.

- Further investigation is needed to understand why full-time teachers and high school teachers have statistically significant differences in retention and mobility rates, as compared to all teachers and all beginning teachers.

- State strategies need to be differentiated and targeted in ways that recognize the variation that exists in teacher retention and mobility rates.

Study Limitations and Unaddressed Questions

While this study provides a comprehensive and longitudinal analysis of teacher retention and mobility, including factors that may impact turnover rates, we do not examine some other related issues. First, we do not address the reasons why teachers choose to move to other schools or districts, or why they decide to leave the profession, either temporarily or permanently. Issues such as increased workload, quality of school and district leadership, support from parents and community, and personal and family factors are all known to influence teacher's views about their careers. We also do not distinguish between teachers who have been involuntarily transferred. Additionally, we make no claims about the quality of the performance of teachers who stay in their schools, move to another school or district, or leave the profession.

This report also does not examine the extent to which the current supply of teachers is adequate to meet future staffing needs. Inquiry about the adequacy of the teacher "pipeline," including the number, endorsements, and quality of prospective teachers is another important aspect of understanding workforce dynamics. Based on the findings in this study, inquiry into these questions is likely to yield further insight into policies that may enhance the retention and support of teachers.

I. Background on Teacher Retention and Mobility

The purpose of this report is to provide educators and policy makers in Washington state with accurate information about statewide teacher retention and mobility and to inform and enhance decision making regarding teacher quality policies and practices. This analysis offers a systematic longitudinal approach for examining trends in teacher retention, mobility and attrition. In this report, we examine the characteristics of teachers and look at factors associated with their retention and mobility, including teachers' background characteristics, district and student demographics and regional location. We pay particular attention to the retention and mobility of teachers new to the profession.

A. Study Context

Teacher retention, mobility and attrition are part of larger state and national conversations about perceived changes in the teacher workforce. Concerns have been raised about a potential shortage of teachers due to a possible decrease in the supply of new teachers entering the profession, changes in education policy that require additional staff, and rumors of more teachers leaving the profession, among other factors. While there have been perennial shortages of teachers in schools serving disadvantaged students, and areas such as special education, math, science, bilingual and English language education, the extent to which new fluctuations in the teacher workforce are local, regional or national remains unclear. There are also concerns about the potential impact of teacher mobility on the equitable distribution of teachers across schools. This study is an attempt to address some aspects of these questions surrounding the nature of the Washington teacher workforce.

B. Relevant Literature

National studies of the teacher workforce have concluded that while the number of teachers has grown with increases in the student population, overall teacher retention and mobility rates have remained relatively stable over time (Goldring, Taie, & Riddles, 2014; Luekens, Lyter, & Fox, 2004; Marvel, et. al., 2006; NCES, 2005). The earliest Schools and Staffing Survey (SASS) was administered by the National Center for Education Statistics in 1987-88, and the most recent Teacher Follow-up Survey (TFS) in 2012-13. Of public school teachers who were teaching in the 2011-12 school year, 84% remained in the same school, 8% moved to a different school, and 8% left the profession during the following year (Goldring, Taie, & Riddles, 2014).

Few studies point to widespread national teacher shortages. However, studies have found issues of particular concern related to staffing in schools. For example, the rate of attrition from the teaching profession varies by teacher's age, with youngest

and oldest teachers leaving at higher rates. The main reasons cited by public school teachers for leaving the workforce included retirement and pregnancy/child rearing (Whitener, et al., 1997). Another NCES study, *America's Teachers: Profile of the Profession*, report that the vast majority of the nation's teachers are experienced teachers who continue to teach from year to year (Henke, et al, 1997). However, it has been more difficult for schools to find fully qualified teachers in some fields than in others, such as mathematics, science and special education (Cowan, Goldhaber, Hayes & Theobald, 2016; Henke, et al., 1997; Podgursky, Ehlert, Lindsay, & Wan, 2016). Researchers have also noted difficulty in finding fully qualified teachers in schools serving larger proportions of students in poverty (Engel, Jacob & Curran, 2014; Henke, et al., 1997). The Learning Policy Institute recently released a report in which they suggest that too many teachers are leaving the workforce, and this could result in a future shortage (Sutcher, Darling-Hammond, & Carver-Thomas, 2016).

Using SASS and TFS data, Ingersoll has examined teacher turnover as a function of the organization and management of schools and concludes that many teachers leave for reasons other than retirement. He does not conclude that teacher shortages are a result of a lack of qualified teachers, but rather the result of teachers moving from one school to another (7.2 percent) or exiting the profession to pursue other jobs (6 percent), thereby creating a situation which he calls a "revolving door" (2001a, p. 24). Evidence suggests that when teachers move, they often transfer to other schools within their district. Between the school years 2011-2012, an analysis of TFS data found that of among those who transferred, 59% moved to another school within their district, and 38% moved to a school in another district (Goldring, Taie, & Riddles, 2014). This intra-district movement indicates that certain school characteristics (such as working conditions of schools, the socio-economic status and ethnicity of students) may motivate teachers to move or leave, in addition to the commonly-perceived reasons of retirement and child-rearing (Ingersoll, 2001b; Luekens, Lyter & Fox, 2004).

In particular, the composition of a school's student body with regard to race, ethnicity, and poverty, has been shown to influence teacher attrition and mobility (Guin, 2004; Hanushek, Kain, & Rivkin, 2001; Ingersoll, 2001b; Kelly, 2004; Lankford, Loeb & Wyckoff, 2002; NCES, 2005; Podgursky, Ehlert, Lindsay, & Wan, 2016; Shen, 1997). While these factors may pose particular challenges, other studies have found that the influence of student demographics on reported turnover and hiring problems may be reduced when factoring in certain positive working conditions (Loeb & Darling-Hammond, 2005). Others have noted a decline in the proportion of minority teachers in some cases, suggesting that minority teachers' careers have been less stable than those of White teachers (Albert Shanker Institute, 2015; Ingersoll & May, 2011).

Teacher turnover can negatively affect the cohesiveness and effectiveness of school communities by disrupting educational programs and professional relationships intended to improve student learning (Borman & Dowling, 2008; Bryk, Lee & Smith,

1990; Ingersoll, 2001b; Ronfeldt, Loeb, & Wyckoff, 2013). Most agree that some attrition is normal and that healthy turnover can promote innovation in schools (Macdonald, 1999). Harris and Adams (2007), however, found that teachers leave the profession at about the same rates as similar professions such as social work and nursing, and that teachers actually had a lower turnover rate than the average college graduate.

Often teachers leave for personal reasons—the desire for career change or family pressures—but many organizational conditions are potentially part of the story. According to a series of national studies, lack of collegial and administrative support, student misbehavior and disinterest, insufficient salary, lack of teacher autonomy, unreasonable teaching assignment, lack of professional development opportunities, and inadequate allocation of time, all contribute to the departure of teachers (Boyd, et al., 2011; Burkhauser, 2016; Ingersoll, 2003; Johnson, Kraft, & Papay, 2012; Kelly, 2004; Luekens, Lyter & Fox, 2004; NCES, 2003).

Teacher attrition is higher in the early years of teaching when compared with mid-career teachers (Goldring, Taie, & Riddles, 2014; Murnane, Singer & Willet, 1988, Lortie, 1975; Shen, 1997). In examining the TFA data from 2011-12, Goldring, Taie and Riddles (2014), found that 7% of teachers with one to three years of experience left the following year. In the 1993 Baccalaureate and Beyond Longitudinal Study, Henke, Zahn & Carroll (2001) found that 82 percent of novice teachers were still teaching three years later and note that none of the other occupational categories examined proved more stable than teachers. In a study of novice teacher turnover in four Midwest states, Theobald and Laine (2003) found that the percentage of those who left teaching during the first five years varied from 20 to 32 percent, depending on the state.

Novices also are considerably more likely to move than other teachers (Goldring, Taie, & Riddles, 2014; NCES, 2005). In a longitudinal study of new teachers in Massachusetts, Johnson and Birkeland (2003) found that experiences at the school site were central in influencing new teachers' decisions to stay in their schools and in teaching. They argue that novice teachers' professional success and satisfaction is tied to the particular school site and that working conditions found to support their teaching include collegial interaction, opportunities for growth, appropriate assignments, adequate resources and school-wide structures to support student learning. These issues may be particularly acute for new teachers in low-income schools (Johnson et al., 2004). Others have found that the participation in a combination of mentoring and group induction programs may reduce beginning teacher turnover (Ingersoll & Strong, 2011; Smith & Ingersoll, 2004), though the qualitative distinctions among these programs and their relative cost-effectiveness are not always clear (Ingersoll & Kralik, 2004).

II. Research Approach and Methods

A. Research Questions

The research questions addressed in this study of Washington's teacher workforce include the following:

1. What are the demographic characteristics of teachers in Washington state? To what extent have these demographics changed in recent years with respect to race/ethnicity, gender, and education level? To what extent do differences exist between beginning teachers and more experienced teachers?
2. What are the overall retention and mobility rates for teachers over the past five years? Have these rates changed in comparison to state averages in prior years? If so, in what specific ways? In what ways, if at all, do these changes coincide with major statewide initiatives?
3. What differences, if any, exist in the retention and mobility rates of beginning teachers compared to teachers with more experience?
4. In what ways do differences in teacher retention and mobility rates exist by: (a) demographic characteristics of teachers (b) region of the state, and (c) district and school demographics (e.g., size, poverty, student diversity)?

B. Methodology, Data Sources, Programming and Analyses

We use several data sources to conduct a statewide analysis of the retention and mobility patterns of teachers. The primary data source is the personnel data from the state's S-275 dataset. This dataset contains demographic and assignment information about all educators in Washington state. We link the S-275 data to other state databases, including school and district demographic data to form a portrait of teacher retention and mobility. We have access to multiple years of data, enabling us to conduct longitudinal analyses that are comparable over time. Using state administrative datasets, we examined demographic information about teachers over the last 20 years from 1995-96 to 2015-16, focusing specifically on the last ten years. In examining retention and mobility trends over time, we look at nine five-year time periods since 1998. We also examined year-by-year changes in demographic characteristics and retention and mobility for each year for the period 2005-2015. Both the five-year and year-by-year analyses are cohort-based. That is, we identify teachers in a given year, and then examine their assignment in the workforce in the subsequent year.

To help explain teacher retention and mobility patterns, we constructed multinomial logistic regression models using STATA 14 software, as this approach enables us to investigate the relationship between our dependent outcome variables of interest (retention and mobility status) and a number of continuous and categorical independent variables (e.g., district, school and individual

characteristics). The focal question for this work is "What variables consistently explain teachers' retention and mobility patterns in Washington state?" The two main populations investigated include all teachers statewide (across all years of experience), and beginning teachers (those with less than one year of experience).

C. Definition of Terms and Methodological Notes

As part of this study, we provide analyses of both five-year and year-by-year retention and mobility rates for all teachers statewide and for beginning teachers. For the purposes of this study, teacher retention and mobility includes both the extent to which teachers move to other schools and other districts, as well as leave the state education system. We describe the criteria for the teachers included in these analyses as follows:

- *Teachers* were defined as those public school teachers whose assignment is the instruction of pupils in a classroom situation and who have a designation as an elementary teacher, secondary teacher, other classroom teacher, or elementary specialist teacher.[1] Other teachers serving in specialist roles (e.g., reading resource specialist, library media specialist) were not included in the statewide analyses.

- *Beginning Teachers* were defined as those public school teachers with less than 1 year of experience as reported in the S-275.

In order to examine retention and mobility patterns, teachers are placed in one of four categories:
- "Stayers" – teachers assigned to the same school(s) in the initial school year and also in the subsequent year.

- "Movers in" – teachers who moved to other schools in the same district, or changed assignment (other than a classroom teacher) within the same district.

- "Movers out" – teachers who moved to other districts, either as a classroom teacher or in some other role.

- "Exiters" – teachers who exited the Washington education system, either temporarily or permanently.[2]

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[1] As reported by the Office of the Superintendent of Public Instruction, classroom teachers are certificated instructional staff with a duty root designation of 31,32, 33 or 34. Teachers whose full-time equivalent (FTE) designation was zero were excluded the analysis.
[2] Exiters may have retired, re-entered the system in subsequent years, left Washington to teach in another state or completely left the profession. It is not possible to distinguish voluntary and involuntary departures. It is not possible to determine whether teachers who left the state continued to be employed as teachers elsewhere.

D. Study Limitations

While this study provides a comprehensive and longitudinal analysis of teacher retention and mobility, including factors that may impact turnover rates, we do not examine some other related issues. First, we do not address the reasons why teachers choose to move to other schools or districts, or why they decide to leave the profession, either temporarily or permanently. Issues such as increased workload, quality of school and district leadership, support from parents and community, and personal and family factors are all known to influence teacher's views about their careers. We also do not distinguish between teachers who choose to make a change in their assignment or location, and those who have been involuntarily transferred. Additionally, we make no claims about the quality of the performance of teachers who stay in their schools, move to another school or district, or leave the profession.

This report also does not examine the extent to which the current supply of teachers is adequate to meet future staffing needs. Inquiry about the adequacy of the teacher "pipeline," including the number, endorsements, and quality of prospective teachers is another important aspect of understanding workforce dynamics. Based on the findings in this study, inquiry into these questions is likely to yield further insight into policies that may enhance the retention and support of teachers.

E. Report Organization

We begin by providing a portrait of the demographic characteristics of Washington teachers over time. We analyze teachers' five-year and year-by-year retention and mobility rates over multiple time periods, and discuss factors that may influence these rates. Next, we use statistical models to explore possible factors related to teacher retention and mobility, and conduct separate analyses for all teachers statewide and for all beginning teachers. The report concludes with a discussion of the findings and possible policy implications.

III. Findings

A. Trends in Statewide Teacher Characteristics

1) Demographic Characteristics of Teachers

As student enrollments have increased statewide in recent years, so have the number of teachers in the workforce. Approximately 60,000 teachers[3] were working in Washington during the 2015-16 school year, up from approximately 49,000 in

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[3] Certificated instructional staff with FTE designation >0 in a duty root of 31, 32, 33 or 34 in the S-275.

1995. The full-time equivalent (FTE) count of teachers employed in the state has fluctuated somewhat over this time period with a slight drop reported in the 2011-12 and 2012-13 school years.[4] The majority of teachers in Washington are White (90%), a statistic that has changed by only a few percentage points during the last twenty years. The experience levels of Washington teachers have remained fairly constant; approximately two-thirds of teachers have between 5 and 24 years of experience, and fewer than a quarter have less than five years of experience (see Table 1, and Appendix A).

Trends over the last twenty years do show gradual changes in the workforce. Over the twenty-year period, there is an aging of the teacher workforce. A higher proportion of the workforce is over the age of 50 (32% compared with 20% in 1995). A slightly higher proportion of teachers are women in 2015-16 than twenty years ago (73% compared with 68%), and a substantially higher proportion have a master's degree (66% compared with 46%). To further understand these descriptive statistics, we discuss some of them, such as teacher race/ethnicity, and age and experience, in greater detail.

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[4] For more information, see OSPI's annual "School District Personnel Summary Reports," and Appendix A of this report.

Table 1: Characteristics of Washington Teacher Workforce: Trend Data

	Statewide				
	1995/96	2000/01	2005/06	2010/11	2015/16*
Student Enrollment	951,795	1,004,843	1,013,189	1,041,892	1,084,359
# Teachers (Headcount)	48,997	53,216	56,403	56,222	59,809
FTE Teachers	46,882	50,744	53,615	53,591	57,628
Teacher Gender					
Female	68.0%	69.8%	71.1%	71.8%	73.3%
Male	32.0%	30.2%	28.9%	28.2%	26.7%
Education Level					
Bachelor's	52.6%	46.4%	38.2%	32.6%	32.6%
Master's	46.3%	52.2%	60.0%	65.7%	65.7%
Doctorate	0.5%	0.6%	0.6%	0.6%	0.6%
Other	0.6%	0.8%	1.2%	1.1%	1.1%
Teacher Age (in given year)					
21-30	14.2%	16.3%	15.4%	12.8%	15.0%
31-40	23.7%	22.6%	24.2%	25.9%	26.1%
41-50	41.6%	32.3%	26.2%	25.5%	26.8%
51-60	18.8%	26.8%	29.9%	27.7%	23.7%
61+	1.6%	2.1%	4.3%	8.1%	8.4%
Teacher Race/Ethnicity					
Asian/Pacific Islander	2.0%	2.3%	2.5%	2.5%	2.8%
Black/African American	1.6%	1.6%	1.5%	1.3%	1.2%
Hispanic	1.7%	2.0%	2.4%	3.2%	3.9%
Native American	0.8%	0.8%	0.8%	0.8%	0.7%
White (non-Hispanic)	93.9%	93.4%	92.8%	90.9%	89.9%
More than one race	NA	NA	NA	1.4%	1.4%
Teacher Experience					
0-4 years	20.1%	23.4%	21.8%	17.2%	23.5%
5-14 years	35.4%	35.2%	37.4%	40.8%	35.9%
15-24 years	30.6%	25.7%	24.5%	25.3%	25.4%
25 yrs or more	13.9%	15.7%	16.4%	16.7%	15.1%

Preliminary S275 duty root 31, 32, 33 or 34 with FTE designation greater than 0 in given year.

Teacher race/ethnicity

While approximately 9 out of 10 teachers are White, the teacher workforce has become slightly more diverse since 1995. The proportion of teachers who are White dropped from 93.9% in 1995-96 to 89.9% in 2015-16. The greatest increase has been among Hispanic teachers, growing from 1.7% of the workforce in 1995-96 to

3.9% in 2015-16. Teachers who identify as Asian, Native Hawaiian or Pacific Islander have also increased slightly from 2.0% to 2.8% over this twenty-year period. The proportion of teachers who identify as Native American or Black/African American has declined slightly. The proportion of teachers identifying as more than one race comprised 1.4% of the workforce in 2015-16 and has remained unchanged since the category was added in 2010.

While it is important to understand statewide characteristics, a statewide analysis may mask important differences in the teacher workforce. In order to examine differences in teacher characteristics across larger districts, ten sample districts were selected. The districts reflect wide variation in socio-economic, regional location and student characteristics, factors which might influence the composition of the teacher workforce. Districts with a student enrollment of 10,000 or more were selected so that descriptive statistics would not be unduly influenced by small numbers of teachers within the categorical breakouts. These ten districts are used in several places in the report to illustrate differences sometimes masked by statewide aggregations. Table 2 shows differences in the percentage change in the teacher population by race and ethnicity from 1995 to 2015 in these ten districts. The table presents the two time periods separately (1995 to 2009, and 2010 to 2015), in order to more accurately reflect changes following new federal requirements for reporting teacher ethnicity and race.

While the overall teacher workforce has slowly grown more racially and ethnically diverse in the last twenty years, similar to large urban districts nationally (Albert Shanker Institute, 2015), Seattle, and to a lesser extent Tacoma, have both lost a substantial proportion of their Black/African American teachers. As can be seen in Table 2, in Seattle the proportion of Black/African American teachers dropped by 2.8 percentage points from 1995 to 2009, and 1.6 percentage points from 2010 to 2015. Tacoma saw decreases of 0.5 percentage points and 1 percentage point in the proportion of Black/African American teachers for the same time periods. Since 2010, the teacher workforce in Seattle, Spokane and Highline proportionately have become more White. In contrast, both Yakima and Kennewick have shown substantial increases the proportion of Hispanic teachers, and Bellevue has seen an increase among Asian, Native Hawaiian or Pacific Islander teachers across both time periods. Table 2 provides details for each of the ten selected districts.

	From 1995-96 to 2009-10 (fifteen year period)*					2010-11 to 2015-16 (five year period)*					
	White	Black/ African American	Hispanic	Asian /Pacific Islander	Native American	White (non-Hispanic)	Black/ African American	Hispanic	Asian /Pacific Islander	Native American	Two or More Races
Statewide	**-1.6**	**-0.2**	**1.1**	**0.7**	**no change**	**-1.0**	**-0.1**	**0.7**	**0.3**	**-0.1**	**no change**
Seattle	3.1	-2.8	NC	NC**	-0.3	1.6	-1.6	0.5	NC	-0.2	-0.3
Spokane	-1.3	0.4	0.6	NC	0.3	0.8	0.1	-0.6	-0.3	-0.1	NC
Tacoma	-2.6	-0.5	1.2	1.8	0.1	-1.4	-1.0	1.6	0.2	-0.1	0.7
Vancouver	-2.8	0.3	2.2	0.4	-0.1	-0.7	-0.4	-0.1	0.6	-0.1	0.8
Bellevue	-0.6	-1.3	-0.1	2.3	-0.3	-3.7	NC	1.9	2.3	-0.5	NC
Highline	-3.5	0.6	1.2	1.9	-0.3	1.3	-0.1	0.5	0.1	0.1	-1.8
Kennewick	-4.0	0.3	3.0	0.5	0.2	-1.2	0.2	1.6	NC	NC	-0.5
Yakima	-4.9	-1.0	6.1	-0.1	-0.2	-1.9	-0.6	2.6	-0.2	-0.1	0.2
Bellingham	-1.7	-0.1	0.3	0.9	0.7	-1.8	-0.2	1.1	NC	0.1	0.8
Central Kitsap	-0.1	NC	-0.3	0.6	-0.2	-0.3	-0.1	0.9	0.2	-0.5	-0.3

Table 2: Percent Change in Teacher Population by Race/Ethnicity, From 1995 to 2009 and from 2010 to 2015: Select Washington Districts with Student Enrollment of 10,000 or More

The two time periods are presented separately to more accurately reflect the addition of the "two or more races" category in 2010-11.
**NC stands for "No change"*

The following charts show the race/ethnicity disparity between Washington students and teachers. In 2015-16, while the proportion of students of color (non-White) enrolled in public schools was approximately 44%, teachers of color represented only 10% of the overall teaching workforce (see Charts 1 and 2).

Chart 1: Percent Student Race/Ethnicity in Washington State in 2015-16

- American Indian/Alaskan Native
- Asian/Pacific Islander
- Black/African American
- Hispanic
- White
- Two or More Races

7.4, 8.3, 1.3, 4.4, 22.4, 56.1

Chart 2: Percent Teacher Race/Ethnicity in Washington State in 2015-16

1.4   0.7   2.8   1.2   3.9

89.9

- American Indian/Alaskan Native
- Asian/Pacific Islander
- Black/African American
- Hispanic
- White
- Two or More Races

Teacher age and experience

The distribution of teachers by age in Washington state has followed a similar pattern over the last twenty years, with a few peaks in age and a larger proportion of older teachers remaining in the workforce in recent years. Classroom teachers' age reveals how the demographic group born during the post-World War II baby boom has moved through the Washington state workforce. In Washington, the proportion of teachers over the age of 50 continued to rise from 20% in 1995, until it peaked at 36% in 2011. Since then, the proportion of older teachers has gradually declined to 32% in 2015. Only 32% of current Washington teachers were born before 1965. Chart 3 examines four time periods over the last twenty years. Additional trend data on teacher age is located in Appendix A.

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Chart 3: Washington Teacher Workforce Age Distribution over 20 Years
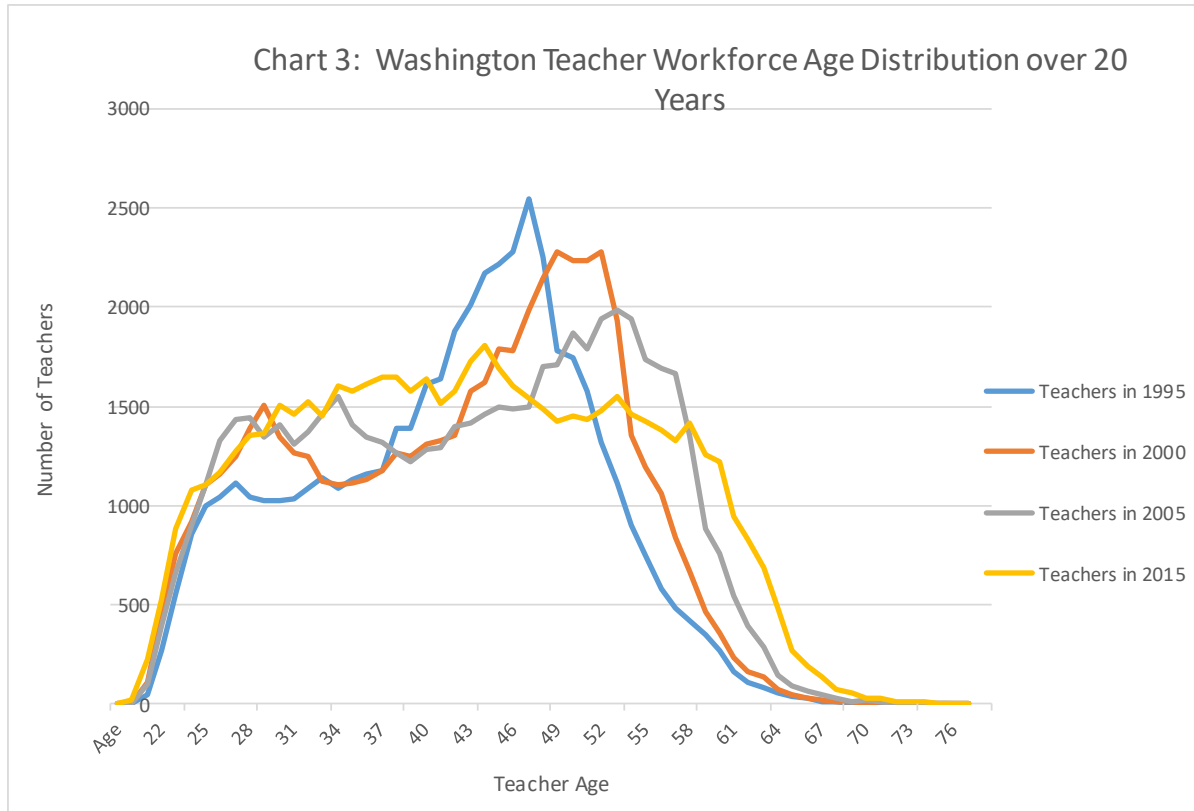
The distribution of teachers by experience is a factor frequently examined, particularly with regard to those who are novices (0 to 4 years of experience), and those who are most veteran (25 or more years of experience) and perhaps nearing retirement. Chart 4 displays how teacher experience ranges have remained fairly constant over the five time periods. The actual numbers are shown in Table 1. Novice teachers statewide comprise less than 25% of the workforce in any time period, and the most veteran teachers comprise less than 20%.

Chart 4: Washington Teacher Workforce Experience Distribution over 20 Years
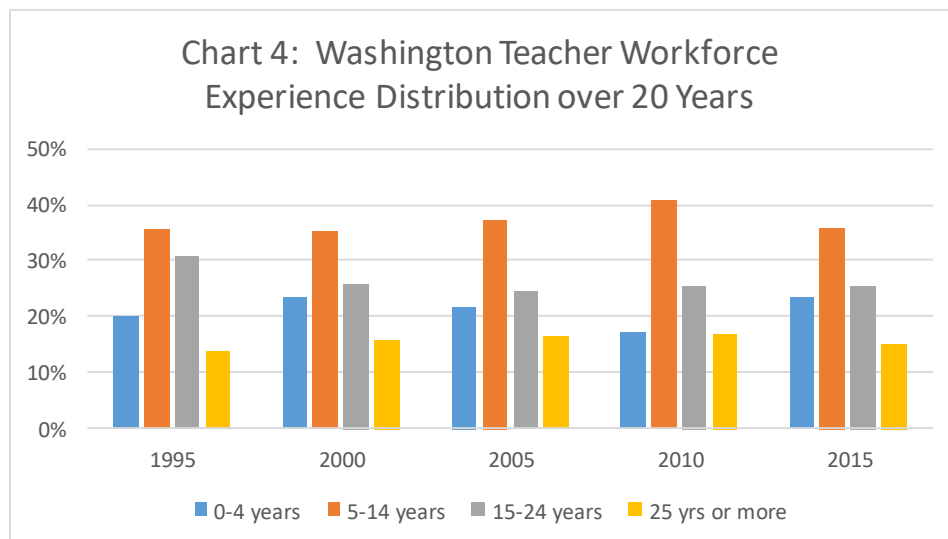
Another way to consider the proportion of the teacher workforce that leaves each year due to retirement is to examine the distribution of exiting teachers by age in a given year. We take up issues of exiting age and experience in a later section of the report.

2) Variation in Teacher Placement by Regional Distribution and School Context

The context and conditions for schooling look somewhat different depending on the region of the state. In an effort to examine regional differences, Table 3 represents the characteristics of all teachers within three large geographical areas of the state grouped by Educational Service District (ESD). School districts served by the Puget Sound Educational Service District (ESD 121) are represented as the Central Puget Sound region. The districts in Western Washington outside the Central Puget Sound are represented as a group (ESDs 112, 113, 114 and 189). Eastern Washington is represented by the four ESDs which roughly correspond to the eastern side of the state (ESDs 101, 105, 123, and 171).

In 2015-16, the Central Puget Sound represented 39% of Washington teachers, while the Western Washington region outside the Central Puget Sound, and Eastern Washington had 35% and 26% of the state's teachers, respectively. Overall teacher characteristics by region are similar with a few variations. Eastern Washington has a higher proportion of male teachers (29.1%) compared to teachers working in Western Washington and the Central Puget Sound. There are slight variations by level of experience and age. Teachers in Eastern Washington and Western Washington outside the Central Puget Sound tend to be slightly older and more experienced.

As might be expected, there are regional differences by teacher race/ethnicity, with a higher proportion of teachers identifying as Asian/Pacific Islander, Black/African American or of more than one race working in the Central Puget Sound region. Eastern Washington has the highest proportion of Hispanic teachers. Eastern Washington and Western Washington outside the Central Puget Sound have proportionately slightly more Native American teachers than the Central Puget Sound (see Table 3).

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	Statewide 2015-16	Central Puget Sound (ESD 121)	Western WA (outside ESD 121)	Eastern WA
Table 3: Regional Distribution and Characteristics of Washington Teachers (2015-16)*				
Student Enrollment*	1,081,657	420,273	385,942	275,442
# Teachers (Headcount)*	59,809	23,096	21,150	15,563
Teacher FTE*	57,593	22,192	20,285	15,116
Teacher Gender				
Female	73.3%	75.1%	73.3%	70.9%
Male	26.7%	24.9%	26.7%	29.1%
Education Level				
Bachelor's	32.6%	31.8%	31.1%	33.7%
Master's	65.7%	65.8%	66.6%	64.2%
Doctorate	0.6%	0.8%	0.5%	0.4%
Other	1.1%	1.6%	1.9%	1.2%
Teacher Age (in given year)				
20-30	15.0%	18.4%	10.3%	14.5%
31-40	26.1%	27.1%	25.0%	26.1%
41-50	26.8%	25.3%	28.2%	27.0%
51-60	23.7%	21.4%	25.6%	24.5%
61+	8.4%	7.7%	9.4%	7.9%
Teacher Ethnicity				
Asian/Pacific Islander	2.8%	5.0%	1.8%	1.0%
African American	1.2%	2.4%	0.6%	0.5%
Hispanic	3.9%	3.1%	2.2%	7.3%
Native American	0.7%	0.6%	0.8%	0.8%
White (non-Hispanic)	89.9%	86.9%	93.5%	89.5%
More than one race	1.4%	2.0%	1.1%	0.9%
Teacher Experience				
0-4 years	23.5%	27.3%	20.6%	21.9%
5-14 years	35.9%	36.7%	35.8%	35.0%
15-24 years	25.4%	23.2%	26.8%	26.9%
25 yrs or more	15.1%	12.8%	16.8%	16.2%

*Based on preliminary S-275 data, and downloadable 2015-16 School Report Card demographic information by district. S275 duty roots 31, 32, 33 or 34 with FTE designation greater than 0 in given year.

Region as defined by Washington's 9 Educational Service Districts: Central Puget Sound (ESD 121), Western WA outside Central Puget Sound (ESDs 112, 113, 114,and 189) and Eastern WA (ESDs 101, 105, 123 and 171).

3) Teachers New to the Profession

Nationally and in Washington state, new teachers comprise a larger segment of the teacher workforce than in previous years. Nationally, 12% of all public school teachers were in their first or second year of teaching in 2014-15 (U.S. Department of Education, 2016). In Washington state in 2014-15, first and second year teachers comprised 10.7% of the workforce, but the percentage rose to 11.6% in 2015-16. In the last six years, the number of first and second year teachers more than doubled, from 3,387 in 2010-11 to 6,918 in 2015-16 (see Table 4).

Table 4: Trend Data for First and Second Year Teachers			
Year	Total Number Teachers	Number 1st and 2nd year Teachers Statewide	Percent Teachers Statewide
2010-11 School Year	56,222	3,387	6.0%
2011-12 School Year	55,279	3,668	6.6%
2012-13 School Year	55,772	4,314	7.7%
2013-14 School Year	56,761	5,336	9.4%
2014-15 School Year	58,246	6,261	10.7%
2015-16 School Year	59,809	6,918	11.6%

Teachers with less than 2.0 years of experience

While still not a large proportion of the overall workforce, the influx of new teachers may differentially impact districts and can be a substantive issue when schools or districts experience high levels of staff turnover. It also raises questions regarding a district's ability to provide adequate support to increasing numbers of new teachers. Without adequate support, new teachers can become part of the turnover cycle.

Characteristics of beginning teachers

Since 2010-11, the number of beginning teachers (less than one year of experience), has increased steadily from close to 2,000 to over 3,500 in 2015-16. As one might expect, the majority entering the profession are between the ages of 20 and 30 (on average, 63%), and on average, 16% were over the age of 40. During this time period, the statewide percentage of students of color has increased from 38.7% to 43.9%, while the percentage of beginning teachers of color increased from 11.8% to 14.6%. Proportionately, beginning Hispanic teachers have experienced the greatest increase since 2010, representing 6.3% of all beginning teachers in 2015-16. The proportion of White teachers declined slightly, as most other race/ethnic groups increased or fluctuated slightly over this time period (see Table 5). Appendix B provides additional information about beginning teachers during these years.

Table 5: Characteristics of All Beginning* Teachers Statewide from 2010-11 to 2015-16

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16*
Number Teachers	1,960	1,883	2,412	2,914	3,372	3,675
Race/Ethnicity**						
Asian/Pacific Islander/Native Hawaiian	3.8%	4.0%	4.2%	3.8%	4.0%	3.6%
Black/African American	0.7%	1.6%	1.5%	1.5%	1.7%	1.6%
Hispanic	5.0%	5.9%	5.1%	4.1%	5.7%	6.3%
American Indian/Alaskan Native	0.5%	0.8%	0.8%	0.8%	0.5%	0.7%
White (non-Hispanic)	88.2%	85.3%	86.2%	87.9%	86.1%	85.4%
More than one race	1.9%	2.2%	2.2%	1.9%	2.0%	2.5%
Age in given year						
20-30	65.6%	60.4%	63.1%	61.8%	63.5%	62.7%
31-40	18.9%	21.5%	20.6%	22.1%	21.2%	21.6%
41+	15.5%	18.1%	16.3%	16.1%	15.3%	15.6%

*Numbers for 2015-16 are based on preliminary S275 data

Beginning teachers statewide (duty root 31, 32, 33 or 34) with FTE designation greater than 0 and based on an unduplicated count of teachers

B. Trends in Statewide Retention and Mobility of Teachers

The analyses in this section include five-year, and also year-by-year retention and mobility trend data. Annual teacher retention rates in Washington state are similar to rates seen nationally; about 84% of teachers remain teaching in their school from one year to the next. This is the same as the national average of 84% (Goldring, Taie, & Riddles, 2014; Marvel et al; 2006). However, these one-year retention statistics hide changes going on over the course of several years – namely the fluidity with which teachers move from school to school and enter and leave the workforce over time. Statewide, five-year retention and mobility statistics portray a relatively stable workforce in which 59% of teachers are retained in the same school after a five-year period, with 20% exiting the state's workforce, either temporarily or permanently (including retirement). Among the remaining teachers, proportionately twice as many move between schools in the same district than to another district.

The analyses presented invite further questions about district and school conditions that may be important to consider when examining differences in teacher retention. Other factors, such as declining student enrollment, school climate, school leadership, parental engagement, and teacher assignment and transfer policies may all impact teacher retention in a specific school.

1) Statewide Retention and Mobility Trends Across Five-Year Time Periods

Nearly 60% of Washington teachers are located in the same school after five years, and this retention rate has changed little in nearly 15 years. Table 6 shows statewide teacher retention and mobility trends across nine time periods since 1998. Approximately 20% of teachers exit the workforce after five years and many of these teachers are of retirement age. Of the remaining teachers, 14% move to other schools within their district and 7% relocate to another district within the state. Consequently, this longitudinal analysis suggests that any perceived statewide shortage of teachers in recent years is not due to recent changes in the statewide retention, movement or attrition of teachers.

Table 6: Statewide Teacher Retention and Mobility Five-Year Trend Data				
Five Year Period	Stayers in School	Movers in District	Movers out District	Exiters from WA system
1998/99 to 2002/03	58%	14%	9%	20%
1999/00 to 2003/04	59%	13%	8%	20%
2000/01 to 2004/05	60%	13%	7%	19%
2001/02 to 2005/06	60%	14%	7%	20%
2002/03 to 2006/07	59%	14%	7%	20%
2003/04 to 2007/08	58%	14%	7%	21%
2005/06 to 2009/10	59%	16%	6%	20%
2010/11 to 2014/15	58%	15%	7%	20%
2011-12 to 2015-16	57%	14%	8%	21%

Differences by district

While the statewide portrait reveals considerable stability, the rates of teacher retention and mobility for individual districts often vary considerably. Using the most recent five-year trend data, we looked at the ten previously mentioned sample districts with student enrollments of 10,000 or more. Three of the ten districts retained teachers in the same school at a rate higher than the state average (57%), and seven of the districts retained teachers either in the same school or in their district (stayers and movers within district) at rates higher than the state average (71%) over the five-year period from 2011-12 to 2015-16 (see Table 7).

Table 7: Teacher Retention and Mobility in Select Washington Districts with Student Enrollment of 10,0000 or More After Five Years (2011-12 to 2015-16)				
	Stayers in School	Movers in District	Movers out District	Exiters from WA system
Statewide	*57%*	*14%*	*8%*	*21%*
Seattle	53%	16%	6%	25%
Spokane	55%	21%	5%	20%
Tacoma	52%	20%	5%	23%
Vancouver	53%	19%	4%	23%
Bellevue	50%	19%	8%	23%
Highline	45%	17%	13%	26%
Kennewick	62%	14%	4%	20%
Yakima	56%	17%	5%	21%
Bellingham	59%	18%	5%	18%
Central Kitsap	58%	15%	4%	22%

Retention and mobility of beginning teachers

While it is widely known that beginning teachers are more likely to leave their position than teachers with more experience, the trend data over four time periods verifies that the rate of beginners' retention and mobility is relatively stable, with between 42% and 47% retained in the same school compared to 59% of all teachers after a five-year period (see Table 8). A higher proportion of beginning teachers move both within district (16-18%) or to another district (13-19%) compared with all teachers statewide (14% and 7%, respectively). However, the rate of beginning teachers exiting the Washington workforce has declined in the most recent five-year period to a low of 21%, similar to all teachers statewide.

Table 8: Statewide Beginning Teacher Retention - Five-Year Trend Data											
	Total # Teachers Statewide	Total Beginning Teachers	Percent Beginning Teachers	Beginning Stayers in School		Beginning Movers in District		Beginning Movers out district		Beginning Exiters from WA System	
5 Year Period				Number	Percent	Number	Percent	Number	Percent	Number	Percent
2003/04 - 2007/08	55,560	2,344	4.2%	991	42.3%	399	17.0%	347	14.8%	607	25.9%
2005/06 - 2009/10	56,403	2,849	5.1%	1,331	46.7%	463	16.3%	361	12.7%	694	24.4%
2010/11 - 2014/15	56,222	1,960	3.5%	809	41.3%	350	17.9%	371	18.9%	430	21.9%
2011/12 - 2015/16*	55,277	1,882	3.4%	822	43.7%	316	16.8%	352	18.7%	392	20.8%

Washington state experienced a drop in the total number of teachers employed in 2011-12 school year.

Regional variation in the retention and mobility of beginning teachers

While our analyses of beginning Washington teachers indicate that most are retained in their same school or district after a five-year period, there is considerable variation by region. In order to examine this more closely, we used the Educational Service District (ESD) as a proxy for region. The nine ESDs in the state vary considerably in size and number of districts, and teachers and students served. Table 9 reveals regional variation in beginning teacher retention and mobility during the 2010-11 to 2014-15 period. During this time period, ESDs 112 and 123 had the highest rates of beginning stayers in school, while ESDs 171, 105, and 114 had the highest rates of exiters from the Washington education system.

				Beginning Stayers in School		Beginning Movers in District		Beginning Movers out District		Beginning Exiters from WA System	
ESD	Total # Teachers	Total Beginning Teachers	Percent Beginning Teachers	Number	Percent	Number	Percent	Number	Percent	Number	Percent
101	5,236	145	2.8%	55	37.9%	34	23.4%	29	20.0%	27	18.6%
105	3,305	135	4.1%	57	42.2%	12	8.9%	32	23.7%	34	25.2%
112	5,267	174	3.3%	80	46.0%	34	19.5%	22	12.6%	38	21.8%
113	4,004	134	3.3%	55	41.0%	19	14.2%	32	23.9%	28	20.9%
114	2,646	72	2.7%	26	36.1%	5	6.9%	23	31.9%	18	25.0%
121	21,273	865	4.1%	355	41.0%	169	19.5%	146	16.9%	193	22.3%
123	3,582	154	4.3%	69	44.8%	27	17.5%	24	15.6%	34	22.1%
171	2,350	58	2.5%	24	41.4%	5	8.6%	13	22.4%	16	27.6%
189	8,557	223	2.6%	86	38.6%	45	20.2%	50	22.4%	42	18.8%

Table 9: Beginning Teacher* Retention by ESD (Five-Year Trend Data: 2010-11 to 2014-15)

*Duty root 31, 32, 33 or 34 with FTE designation >0. Beginning teachers is based on an unduplicated count of teachers with less than one year of experience.

2) Year-by-Year Retention and Mobility Trends (10 years, 2005-06 to 2015-16)

Statewide year-by-year trends

In this section we examine teacher retention and mobility using one-year intervals over the last ten years (2005-06 to 2014-15). This level of detail explains some teacher movement and why there is often confusion regarding how retention and mobility statistics are reported. By examining the teacher workforce in one-year intervals, we see similar but more pronounced patterns of movement than in the five-year time period. For example, from one year to the next, on average, 84% of teachers are retained in their same school, 7% move to another school within the

district, and 2% change districts (though this number has increased in recent years). The percentage of teachers who leave the workforce from one year to the next is approximately 7% (see Table 10).

It should be noted that while we provide average statistics for the 10-year period, the year-by-year data is not cumulative and attempts to sum it would lead to incorrect interpretations. For example, the one-year interval data indicates that 7% of teachers leave the workforce from one year to the next. Adding the 7% annually over five years would lead one to believe that 35% of the workforce exited after five years. The two-point in time data indicates that only 20% of the workforce has actually exited over the five-year period.

What these statistics enable us to understand is that some teachers may change assignments or leave the workforce for a year or two, but return to the same school or district within a given five-year period. In the short-term, schools may deal with a greater amount of staff movement, but long term, the workforce may be more stable than one-year intervals would suggest.

The year-by-year descriptive statistics also allow us to see how the teacher workforce may have been impacted by the recent economic downturn. As was the case in many states, in the spring of 2009, thousands of teachers received layoff notices in Washington. In fact, a portion of the federal stimulus dollars allocated in the summer of 2009 was specifically targeted at reducing the need for teacher layoffs. While a number of individuals who received Reduction in Force (RIF) notices are often re-hired in the subsequent year, the layoff process usually results in considerable shifts in teacher distribution and assignment, particularly with respect to the employment status of teachers with the fewest years of experience. Table 10 shows that during period from the 2008-09 to 2011-12, proportionately fewer teachers moved out of district, and in the first two years, fewer exited the workforce, perhaps due to the economic uncertainty.

Table 10: Statewide Year-by-Year Teacher Retention and Mobility Trend Data				
Year by Year	Stayers in School	Movers in District	Movers out District	Exiters from WA system
2005/06 to 2006/07	83.1%	7.0%	2.5%	7.4%
2006/07 to 2007/08	82.5%	7.0%	2.7%	7.8%
2007/08 to 2008/09	83.5%	6.9%	2.3%	7.3%
2008/09 to 2009/10	85.2%	7.8%	1.0%	6.0%
2009/10 to 2010/11	86.1%	6.9%	1.3%	5.8%
2010/11 to 2011/12	84.7%	7.1%	1.4%	6.8%
2011/12 to 2012/13	85.0%	6.9%	1.8%	6.3%
2012/13 to 2013/14	84.6%	6.4%	2.5%	6.5%
2013/14 to 2014/15	82.4%	7.2%	3.4%	7.0%
2014/15 to 2015/16	82.7%	6.2%	3.8%	7.3%
Ten Year Average	84.0%	6.9%	2.3%	6.8%

Beginning teacher year-by-year trends

An examination of year-by-year beginning teacher retention and mobility data reveals trends similar to those of teachers statewide (see Table 11). The majority of beginning teachers (on average 71%) stay in their school from one year to the next, 11% move within the district and 7% move out of district. On average, 12% exit the workforce in the following year. From this data, one can see how the number of beginning teachers in the workforce dropped during the economic recession period of 2008-09 through 2011-12. A higher proportion of beginning teachers moved from one school to another within their district during these years, and in 2008-09, we see a spike in the percentage of beginning teachers who exited (18%), which corresponds with the timing of RIF notices statewide in the spring of 2009.

Table 11: Statewide Beginning Teacher Year-by-Year Retention and Mobility Trend Data					
	# Beginning Teachers	Stayers in School	Movers in District	Movers out District	Exiters from WA system
2005/06 to 2006/07	2,841	72.2%	9.0%	6.8%	11.9%
2006/07 to 2007/08	2,835	69.6%	9.5%	6.7%	14.1%
2007/08 to 2008/09	2,725	67.2%	10.7%	5.7%	16.5%
2008/09 to 2009/10	2,460	64.6%	13.7%	3.9%	17.8%
2009/10 to 2010/11	1,309	67.8%	13.9%	7.0%	11.4%
2010/11 to 2011/12	1,959	67.4%	12.4%	7.2%	13.0%
2011/12 to 2012/13	1,883	72.3%	11.0%	6.5%	10.2%
2012/13 to 2013/14	2,411	76.3%	8.0%	7.4%	8.3%
2013/14 to 2014/15	2,914	73.3%	9.4%	9.0%	8.3%
2014/15 to 2015/16	3,372	74.9%	7.4%	8.7%	9.0%
Ten Year Average	2,471	70.5%	10.5%	6.9%	12.1%

We also examined the retention, mobility and attrition patterns of teachers at each year of experience over the most recent five-year period to see if there were changes after a certain number of years of experience. As would be expected, teachers in the first two years of teaching represent a higher proportion of exiters than teachers with 3-10 years of experience (see Appendix C).

The data is summarized in Table 12, showing the percent of exiters with five or fewer years of experience, and the percent of exiters with 10 or fewer years of experience. Generally speaking, about 40% of all exiters have less than 10 years of experience, and about 25% of all exiters have less than five years of experience. These analyses are consistent with other statistics we have examined over the years. For example, we find that, in general, about half of exiters are likely retirees, a conclusion we discuss in greater detail in the next section.

Table 12: Statewide Trend Data: Summary of Teacher Exiters by Experience in First 10 Years										
	2010/11 to 2011/12		2011/12 to 2012/13		2012/13 to 2013/14		2013/14 to 2014/15		2014/15 to 2015/16	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Exiters Statewide	*3808*	*6.8%*	*3470*	*6.3%*	*3637*	*6.5%*	*3983*	*7.0%*	*4248*	*7.3%*
% Teachers exiting with 5 or fewer years of experience	1036	27.2%	845	24.4%	790	21.7%	891	22.4%	1109	26.1%
% Teachers exiting with 10 or fewer years of experience	1689	44.4%	1454	41.9%	1418	39.0%	1563	39.2%	1815	42.7%

C. Factors Influencing Teacher Retention and Mobility

1) Teacher Experience

Teacher mobility is related to the experience level of the teacher. Novice teachers (less than four years of experience) move and leave at higher rates than their more experienced colleagues, while veteran teaches are more likely to leave, often due to retirement. The experience patterns found in other parts of the United States are similar to those found in Washington state. A majority of teachers fall in between novice teachers and the most veteran, and are thus less likely to leave their school. Chart 5 shows that retention and mobility patterns vary considerably by experience during the most recent five-year period (2011-12 through 2015-16).
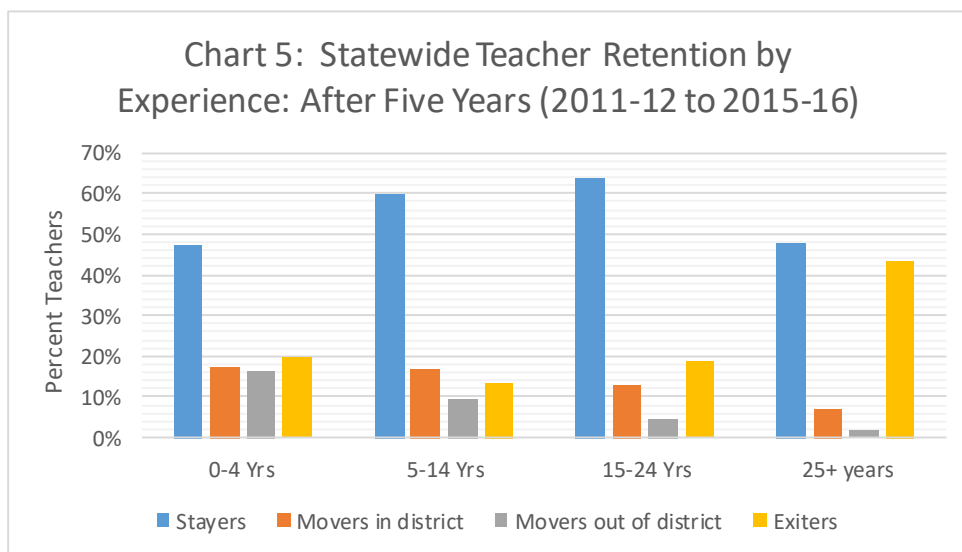
Chart 5: Statewide Teacher Retention by Experience: After Five Years (2011-12 to 2015-16)

Novice teachers (0-4 years of experience) and veteran teachers (25 or more years of experience) stay in their schools at lower rates (47% and 48%, respectively), than mid-experience teachers (5-14 years, 60%, and 15-14 years, 64%). Veteran teachers have the highest rates of exiting (44%), compared with 20% of novices, and 13% and 19% of mid-experience teachers. Understanding the overall experience and age distribution of a state's workforce helps to account for patterns of teacher retention while signaling particular aspects that may merit a closer look.

2) Exiters in Relation to Age

Closely related to years of teaching experience, teacher age also impacts retention. Chart 6 shows the frequency distribution of teacher exiters by age in 2014-15. One can see that by age 58, there is a definite uptick in the number of teachers exiting, with pronounced increases at ages 61 and 64.

Chart 6: Teacher Exiters by Age in 2014-15
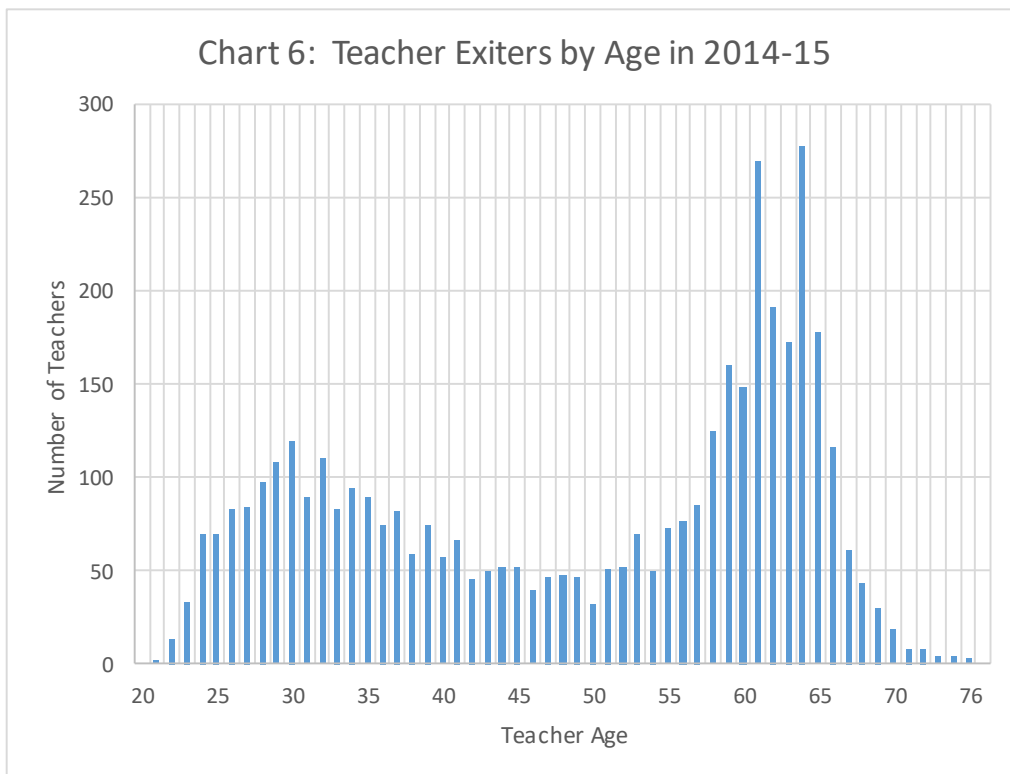
By examining those teachers in the oldest age ranges who are leaving the Washington education system (assuming that few individuals leave the WA system at this age to take a new job or raise a family), we can estimate the proportion that are leaving due to retirement. As we have seen, trend data over the last ten years shows that less than 7% of the workforce leaves in any given year, though there is some variation.

Over the last ten years, the percentage of exiters age 55 or older has increased from 35% in 2005-06 to a high of 52% in 2012-13. The percentage of teacher exiters age

60 or older has shown a similar pattern. In the last two years, the proportion of exiters age 55 or older has declined slightly (see Table 13).

Year by Year	Total Number of Exiters	% Exiters from WA System	Number Exiters Age 55 or older	% Exiters Age 55 or older	Number Exiters Age 60 or older	% Exiters Age 60 or older
Table 13: Statewide Trend Data Teacher Exiters Age 55 or Older and Age 60 or Older						
2005/06 to 2006/07	4191	7.4%	1478	35.3%	709	16.9%
2006/07 to 2007/08	4391	7.8%	1650	37.6%	835	19.0%
2007/08 to 2008/09	4113	7.2%	1512	36.8%	855	20.8%
2008/09 to 2009/10	3,456	6.0%	1311	37.9%	797	23.1%
2009/10 to 2010/11	3223	5.8%	1507	46.8%	1,084	33.6%
2010/11 to 2011/12	3808	6.8%	1783	46.8%	1,226	32.2%
2011/12 to 2012/13	3470	6.3%	1698	48.9%	1,254	36.1%
2012/13 to 2013/14	3637	6.5%	1877	51.6%	1,410	38.8%
2013/14 to 2014/15	3983	7.0%	1957	49.1%	1,484	37.3%
2014/15 to 2015/16	4248	7.3%	2054	48.4%	1,534	36.1%

While statewide statistics of teacher characteristics and retention and mobility are an important part of the story, districts and schools vary considerably with regard to other factors. National research suggests that teacher retention also is related to the composition of the school's student population – in particular to the poverty level and racial/ethnic makeup of the students at the school. In some cases, school poverty, retention and school performance are linked to one another and poverty rates are strongly associated with student performance.   In the next section, we consider potential factors associated with teacher retention and mobility through the use of multinomial logistic regression models for all teachers statewide.

3) Statistical Models of Retention and Mobility for All Teachers Statewide

Introduction to analyses, models and datasets

The analyses presented in this section aim to identify variables significantly associated with the four mutually exclusive outcomes of teacher retention and mobility described earlier in this report: exiting the Washington state workforce ("Exit"), moving from one school district to another ("MOUT"), moving within one's original school district ("MVIN"), or staying as a teacher in one's original school ("STAY"). The focal question is, "What variables consistently explain teacher retention and movement in Washington state?"

We constructed multinomial logistic regression models using STATA 14.1 software to investigate the relationship between our dependent nominal outcome variables of interest (e.g., exiting, moving out of district, moving within district, or staying) and a number of continuous and categorical independent variables. The independent variables included district, school, and individual level characteristics, such as student enrollment at the district level, the percentage of students in poverty at the school level, and full-time teaching status at the individual level. The variables used in these analyses are located in Appendices D through G. The two main populations investigated include all teachers (across all years of experience), and beginning teachers (those with less than 1 year of teaching experience).[5]

We used three distinct datasets to investigate the retention and mobility of teachers in Washington across time. The 2010-11 to 2014-15 dataset (N=56,222), consisted of all teachers statewide during the 2010-11 academic year, whose retention and mobility outcomes are analyzed five years later, in the 2014-15 academic year. A more recent five-year dataset for 2011-12 to 2015-16 (N=55,277), consisted of all teachers statewide during the 2011-12 academic year, whose retention and mobility outcomes are analyzed five years later, in the 2015-16 academic year.

Analysis of all teachers statewide by retention and mobility outcomes

We first present findings for the entire sample of all teachers (across all years of experience), noting consistent patterns that emerged from both datasets. The complete multinomial logistic regression STATA output for the 2010-11 to 2014-15 dataset can be found in Appendix D, while Appendix E presents output for the 2011-12 to 2105-16 timeframe.

Exiters from the WA teacher workforce

The first group discussed is teachers who exit from the Washington workforce. As the analyses run were multinomial logistic regressions, each outcome is compared to a reference group. Staying in the same school five years later (stayer) was selected as the reference group since this outcome represents the majority of teachers in our datasets. See Table 14 for the descriptive statistics on teachers from both five-year time periods.

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[5] With beginning teachers, we were especially interested in not only which variables helped to explain retention and mobility outcomes more generally, but also whether the state's Beginning Educator and Support Team program (BEST) meant as an induction support for new teachers, had a significant effect on the observed outcomes. Analysis of retention and mobility outcomes for the BEST program are presented in a separate report.

Five-Year Period	Total Number	Stayers in School		Movers in District		Movers out District		Exiters from WA system	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
2010/11 to 2014/15	56,200	32,723	58.2%	8269	14.7%	3708	6.6%	11500	20.5%
2011-12 to 2015-16	55,277	31,455	56.9%	7834	14.2%	4489	8.1%	11499	20.8%

Table 14: Statewide Retention and Mobility Outcomes for Two Five-Year Time Periods

As seen in Table 15, most independent variables included in the model were identified as significant predictors of the Exit outcome ($p<.05$) in both of the five-year time periods, indicating their individual contributions to the models above and beyond the other included measures of district, school, and individual level characteristics. Some models include years of teacher experience, as well as squared years of experience, to reflect the nonlinear relationship of experience with mobility outcomes. For example, as illustrated in Chart 6, likelihoods of exiting are higher near the ends of the age/experience range. Including squared years of experience allows us to model this type of nonlinearity. Unless otherwise noted, only statistically significant predictors that exhibit consistent patterns across both five-year time periods will be discussed. However, not every significant, consistent predictor will be discussed. It is hoped that by presenting a number of detailed examples, the reader will be positioned to apply the same interpretation process to other variables of interest.

Table 15: Significant Predictors of Teacher Exit Outcome (as compared to Stayers): Relative Risk Ratios		
	Predictor significant at $p <.05$ More likely (>1) = + Less likely (<1) = -	
	2010-11 to 2014-15 **(N = 54,814)**	**2011-12 to 2015-16** **(N=54,297)**
Total District Enrollment_by 100	+	+
School %White Students_by 10	– (0.97)	– (0.96)
School Enrollment_by 50	–	–
Teacher Experience	– (0.89)	– (0.90)
Teacher Experience^2	+	+
Full-time Teacher	– (0.45)	– (0.53)
Teacher of Color	– (0.87)	– (0.91)
Female Teacher	+ (1.34)	+ (1.29)
Master's or Higher Degree	– (0.83)	– (0.76)
Western WA (outside ESD 121)	– (0.91)	– (0.91)
Eastern WA Region	– (0.81)	– (0.80)
High School Grade Level	+ (1.26)	+ (1.20)
Other School Grade Level	+ (1.32)	+ (1.22)

In this table, coefficients are not listed if they are within plus or minus 0.02 of 1.0.

In these models, the coefficients are presented as relative risk ratios (RRR), which provide a measure of the expected change in the likelihood of the focal outcome relative to the reference group for every unit change in the predictor variable, holding all other variables constant. Predictors less than 1.0 suggest a decreased likelihood in the relative risk of teachers with that characteristic falling into the focal outcome group as compared to the reference group. For example, as compared to part-time teachers, full-time teachers demonstrate, on average, a decrease in the relative risk of exiting from the teacher workforce five years later as compared to staying in their schools. In the 2010-11 to 2014-15 time period, a full-time teacher has less than half the risk (0.45) of exiting as compared to a part-time teacher, holding all other variables in the model constant. We see a similar result in the 2011-12 to 2015-16 time period where the relative risk of a full-time teacher exiting teaching is expected to decrease by a factor of 0.53, given the other variables in the model are held constant. More generally, it could be said that if a teacher is full-time, he or she would be expected to be a stayer rather than an exiter.

Regional location of a teacher's school was another consistently negative predictor of exiting. Holding all other variables constant, teachers in Eastern Washington were less likely to exit (by a factor of 0.80 to 0.81, depending on the year) than their Central Puget Sound peers (reference group). Likewise, teachers in Western Washington outside the Central Puget Sound area were also less likely than their

Puget Sound peers to exit rather than remain in their original schools (by a factor of 0.91 across both time periods).

On the other hand, predictors greater than 1.0 suggest an increased likelihood in the relative risk of teachers with that characteristic falling into the focal outcome group as compared to the reference group. For example, being female is associated with a 1.3 increased likelihood of a teacher exiting the workforce five years later as compared to staying in the same school, holding all other variables constant. As shown in Table 15 above, this result was consistent across both time period models. Another significant and strong predictor of a teacher exiting five years later as compared to staying within an individual's original school was the grade level of school where the teacher worked. Compared to elementary school teachers, both high school teachers and teachers working in "other," or nontraditional grade level schools, exhibited a 1.2 to 1.3 increased likelihood of exiting the workforce, as compared to staying within their original schools, holding all other variables constant. See Table 16 for the definitions used to categorize the grade levels of schools where teachers worked, and the proportions of teachers working in each type of school.

Table 16: School Grade Level Definitions and Proportions of Teachers by School Levels			
School Grade Levels	Definition	2010-11 to 2014-15 (N = 54,814)	2011-12 to 2015-16 (N =54,297)
Elementary School	Schools serving any of grades K-6 and none of grades 7-12	49.4% (N =27,791)	48.9% (N =27,005)
Middle School	Schools serving primarily any of grades 6-9	19.1% (N =10,759)	19.4% (N =10,733)
High School	Schools serving any of grades 9-12 and none of grades K-8	26.1% (N =14,645)	26.2% (N =14,466)
Other	Schools serving one or more of grades K-6 AND one or more of grades 7-12	5.4% (N =3,027)	5.6% (N =3,073)

Movers from one district to another

The second outcome discussed is teachers moving from one district to another. This was the least frequent outcome observed, with only 7% to 8% of teachers represented in the "movers out of district" group (depending on the year). As with the exiter analysis discussed above, staying as a teacher in the same school five years later (stayer) was the reference group. Table 17 presents the predictors of the "movers out of district" outcome found to be statistically significant across both five-year time periods. As can be seen by comparing Table 15 to Table 17, many of the variables found to be significant predictors of exiting were also significant predictors of moving to a new district, although the direction of the predictor was not always the same. For example, teachers who held as their highest degree a

master's or above were less likely to exit than to stay as compared to their peers holding a bachelor's degree (coefficients of -0.83 and -0.76, depending on the year). However, these same teachers with advanced degrees were more likely to move to a teaching position in a different school district as compared to their peers with bachelor's degrees (coefficients of 1.24 and 1.26, depending on the year).

On the other hand, certain predictors were found to have an effect on one outcome but not the other. For instance, holding all other variables constant, being a teacher of color (approximately 10% of the statewide teacher workforce), as compared to being a White teacher, was associated with a decreased likelihood of exiting the teaching workforce (coefficients of -0.87 and -0.91, depending on the year). There was no such observed effect of teacher race/ethnicity on moving to a new school district. Likewise, while being female was a significant predictor of exiting (coefficient of 1.3 regardless of year), gender of teacher was found not to matter when it came to the likelihood of moving to a new district.

Similar to the results of the exiter model presented above, full-time teacher status was associated with a decreased likelihood of moving out of one's original district (coefficients of -0.63 and -0.80, depending on the year), indicating that full-time teachers were more likely to remain in their original schools. Region was also a significant predictor, with teachers in Western Washington outside the Central Puget Sound and Eastern Washington less likely to move out of their districts than their Central Puget Sound counterparts (coefficients ranging from -0.63 to -0.72, depending on the year and region). Finally, we see an emerging pattern between the grade level of the school where teachers work and retention and mobility outcomes. Higher grades (middle and high schools) and "other" configurations of schools are associated with much higher likelihoods of movement out of one's original school (coefficients ranging from 1.24 to 2.26, depending on the year and grade level of school).

Table 17: Significant Predictors of Teacher Mobility Out of District Outcome (as compared to Stayers): Relative Risk Ratios		
	Predictor significant at $p < .05$ More likely (>1) = + Less likely (<1) = -	
	2010-11 to 2014-15 (N = 54,814)	**2011-12 to 2015-16 (N=54,297)**
Total District Enrollment_by 100	–	–
School % Poverty_by 10	+ (1.08)	+ (1.05)
School %White Students_by 10	– (0.96)	– (0.93)
Teacher Experience	– (0.86)	– (0.89)
Teacher Experience^2	+	+
Full-time Teacher	– (0.63)	– (0.80)
Master's or Higher Degree	+ (1.24)	+ (1.26)
Western WA (outside ESD 121)	– (0.67)	– (0.72)
Eastern WA Region	– (0.63)	– (0.65)
Middle School Grade Level	+ (1.32)	+ (1.24)
High School Grade Level	+ (1.41)	+ (1.41)
Other School Grade Level	+ (2.26)	+ (1.89)

In this table, coefficients are not listed if they are within plus or minus 0.02 of 1.0.

Movers within district

The final outcome discussed is teacher movement within one's original school district, as compared to the reference outcome of staying within one's own school. This was the third most frequently observed outcome after staying and exiting, representing 14% to 15% of teachers statewide, depending on the year. Table 18 presents the predictors of the movers in district outcome found to be statistically significant across both five-year time periods. Compared to exiting and moving out of district, fewer variables were found to be consistently significant predictors of a teacher movement within one's original school district.

Similar to the results of the exiter and mover out of district model presented above, full-time teacher status was associated with a decreased likelihood of moving within one's original district (coefficients of -0.51 and -0.62, depending on the year), indicating that full-time teachers were more likely to remain in their original schools. Region was also a significant predictor, with teachers in Western Washington outside the Central Puget Sound and Eastern Washington more likely to move within their original district than their peers teaching in the Central Puget Sound region (coefficients ranging from 1.11 to 1.19, depending on the year and region). Finally, we see again that teaching in schools with "other" school grade configurations as opposed to elementary schools was associated with a differential outcome; specifically, teachers who teach in "other" schools were less likely to move

within their district than to remain in their original schools five years later, accounting for all other variables in the models.

Table 18: Significant Predictors of Teacher Mobility Within District Outcome (as compared to Stayers): Relative Risk Ratios		
	Predictor significant at $p < .05$ More likely (>1) = + Less likely (<1) = -	
	2010-11 to 2014-15 (N = 54,814)	2011-12 to 2015-16 (N=54,297)
Total District Enrollment_by 100	+	+
School %White Students_by 10	− (0.95)	− (0.93)
School Enrollment_by 50	− (0.96)	− (0.97)
Teacher Experience	− (0.95)	− (0.97)
Full-time Teacher	− (0.51)	− (0.62)
Master's or Higher Degree	+ (1.19)	+ (1.16)
Western WA (outside ESD 121)	+ (1.19)	+ (1.14)
Eastern WA Region	+ (1.19)	+ (1.11)
Other School Grade Level	− (0.83)	− (0.79)

In this table, coefficients are not listed if they are within plus or minus 0.02 of 1.0.

To summarize, three factors in our models consistently appear as predictors of teacher five-year retention and mobility. These included full-time status of teachers, region of the state and grade level of the school. We conducted a similar analysis for beginning teachers using multinomial logistic regression models. These findings are discussed next.

D. Statistical Models of Retention and Mobility for Beginning Teachers

Statewide retention and mobility patterns prompt a closer look at the retention and mobility of beginning teachers. Attrition is common in the early stages of most occupations as individuals learn about the work place and determine whether or not the job is a good fit. However, induction into the teaching profession is particularly important because teaching requires a significant acquisition of skills in the first few years. A high turnover of beginning teachers can impact the quality of instruction that students receive.

Beginning teachers are clearly less rooted in their schools than other teachers. These teachers change schools at a higher rate, often to another school within the district. Many things may cause beginning teachers to move more than other teachers. For some, teaching as a whole (or teaching at this school) is not what they thought it would be. But other forces beyond personal preference may come into play. As the staff members with the least seniority, they are more likely to be

impacted by a reduction in force, changes in enrollment or school or district organizational changes.

1) School Characteristics of Beginning Teachers

In order to understand the variables used in the statistical models for beginning teachers, we include a descriptive look at their school characteristics in 2010-11. Table 19 shows that the largest proportion of beginning teachers were located in the Central Puget Sound region (44%), and 45% worked at the elementary school level. Forty-three percent of beginning teachers worked in schools with poverty rates of 50% or more. Earlier in this report, we present the regional variation in retention and mobility rates of beginning teachers (see Table 9). The statistical models take into account regional, district, school, and individual level differences.

Table 19: School Characteristics of Beginning Teachers* Statewide in 2010-11		
	Number	**Percent**
# Teachers (Headcount)	1,960	*NA*
FTE Teachers	1,732	*NA*
Region of the State		
ESD 112 (Southwest)	174	8.9%
ESD 113 (Capital Region)	134	6.8%
ESD 114 (Olympic)	72	3.7%
ESD 189 (Northwest)	223	11.4%
Central Puget Sound ESD 121	865	44.1%
ESD101 (Spokane)	145	7.4%
ESD 105 (Yakima)	135	6.9%
ESD 123 (Southeast)	154	7.9%
ESD 171 (North Central)	58	3.0%
School Level		
Elementary	872	44.5%
Middle School	381	19.4%
High School	586	29.9%
Other (e.g., PK-8, 1-8, 6-12)	121	6.2%
Poverty of School		
0-25% FRPL	422	21.5%
26-49% FRPL	663	33.8%
50-74% FRPL	520	26.5%
75+% FRPL	321	16.4%
District location/not reported	34	1.7%
Student Race/Ethnicity		
0-25% students of color	472	24.1%
26-49% students of color	734	37.4%
50-74% students of color	399	20.4%
75+% students of color	321	16.4%
District location/not reported	34	1.7%

Duty root 31, 32, 33 or 34 with FTE designation >0. Beginning teachers is based on teachers with less than one year of experience.

2) Statistical Models of Beginning Teacher Retention and Mobility

Introduction to the analyses, models, and datasets

This section presents an analysis of retention and mobility outcomes for all beginning teachers statewide. As was the case in our analysis of all teachers, the focal question for this population was, "What variables consistently explain beginning teachers' retention and mobility in Washington state?"

For these analyses, we used multinomial logistic regression models similar those conducted for all teachers. Specifically, as with the analyses for all teachers, we constructed multinomial logistic regression models using STATA 14.1 software. As described in a prior section of the report, multinomial logistic regression allows us to investigate the relationship between our dependent nominal outcome variables of interest (e.g., exiting, moving out of district, moving within district, or staying) and a number of continuous and categorical independent variables.

Our first analysis focused on the five-year cohort-based dataset for 2010-11 to 2014-15. This dataset includes teachers who were in their first year of teaching in 2010-11 (*N*=1,960).   Next, we conducted an analysis of the five-year dataset for 2011-12 to 2015-16, which included teachers who were in their first year of teaching in 2011-12 (*N*=1,882).

Compared to the models for all teachers, fewer variables were found to be significant predictors of beginning teachers' retention and mobility outcomes, resulting in leaner, less complex regression equations. For instance, while gender of the teacher and teacher of color status were in some cases found to be significant predictors of the five-year outcomes for all teachers, these variables were not significant predictors of beginning teachers' outcomes. The complete beginning teachers' multinomial logistic regression STATA output based the dataset for the 2010-11 to 2014-15 time period can be found in Appendix F, while the output of the dataset for the 2011-12 to 2015-16 time period can be found in Appendix G.

Beginning exiters from the WA teacher workforce

The first outcome discussed is the exit of beginning teachers from the Washington workforce. As previously described, since the analyses run were multinomial logistic regressions, each outcome is compared to a reference group. Staying in the same school five years later was selected as the reference group, as this outcome represents the majority of beginning teachers in our datasets. See Table 20 for the descriptive statistics from both five-year time periods for beginning teachers statewide who stayed in their original schools, exited from the Washington state teacher workforce, moved within the district, or moved from one district to another. Comparison of the retention and mobility outcomes of all teachers versus beginning teachers shows that while the five-year exit rates of beginning teachers and all teachers were virtually identical (21.4% and 20.7%, respectively), the staying rate of beginning teachers was 15.1 percentage points lower (42.5% versus 57.6% for all teachers). Beginning teachers also demonstrated a relatively higher propensity for movement, either to a new district (18.9% of beginning teachers versus 7.4% of all teachers) or to a different school within their original district (17.4% of beginning teachers versus 14.5% of all teachers).

Table 20: Statewide Retention and Mobility Outcomes for Beginning Teachers for Two Five-Year Time Periods								
Five-Year Period	Total Number	Stayers in School		Movers in District		Movers out District		Exiters from WA system	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
2010/11 to 2014/15	56,200	807	41.2%	350	17.9%	371	19.0%	430	22.0%
2011-12 to 2015-16	55,277	822	43.7%	316	16.8%	352	18.7%	392	20.8%

As seen in Table 21, less than half of the 12 independent variables included in the model for beginning teachers were identified as significant predictors of teacher exit ($p<.05$) in the first five-year time period (2010-11 to 2014-15). In the more recent five-year time period (2011-12 to 2015-16), only one variable—teaching at a high school—was found to be a significant predictor of exiting. Although district level student enrollment, school level proportions of student poverty, and percentage of White students were not found to be significant predictors of the exiting outcome, they were left in the model to control for these important measures which vary greatly across the state. As noted above, when compared to the models for all teachers, fewer variables were found to be significant predictors of beginning teachers' retention and mobility outcomes. There was also less congruence in the findings between the two five-year time periods.

It is possible that while the variables to which we had access were able to significantly predict the retention and mobility outcomes of teachers across all experience levels, there may be measures that have not been included here which would also be appropriate for predicting the outcomes of beginning teachers. In addition, with sample sizes 30 times smaller than for all teachers statewide, the beginning teacher models had much less statistical power to detect significant differences than the models for all teachers.

Table 21: Significant Predictors of Beginning Teacher Exit Outcome (as compared to Stayers): Relative Risk Ratios		
	Predictor significant at $p<.05$ More likely (>1) = + Less likely (<1) = -	
	2010-11 to 2014-15 (*N*=54,814)	2011-12 to 2015-16 (*N*=54,297)
School Enrollment_by 50	–	*Not significant*
Full-time Teacher	– (0.55)	*Not significant*
Middle School Grade Level	– (1.51)	*Not significant*
High School Grade Level	+ (1.67)	+ (2.03)
Other School Grade Level	+ (2.05)	*Not significant*

In this table, coefficients are not listed if they are within plus or minus 0.02 of 1.0.

As with the models for all teachers, the coefficients presented are in relative risk ratios (RRR), which indicate the expected change in the likelihood of the focal outcome relative to the reference group for every unit change in the predictor variable, holding all other variables constant. Predictors less than 1.0 suggest a decreased likelihood in the relative risk of teachers with that characteristic falling into the focal outcome group as compared to the reference group. For example, as compared to part-time beginning teachers, full-time beginning teachers in the 2010-11 to 2014-15 dataset demonstrated, on average, approximately half the relative risk of exiting the teacher workforce five years later as compared to staying in their schools (coefficient of 0.55), holding all other variables constant. More generally, it could be said that if a beginning teacher is full-time, the individual would be expected to be a stayer rather than an exiter.

Conversely, predictors greater than 1.0 suggest an increased likelihood in the relative risk of teachers with that characteristic falling into the focal outcome group as compared to the reference group. In the case of the 2010-11 to 2014-15 dataset, each of the three school grade level categories listed (middle school, high school or "other" school) was found to be associated with an increased likelihood of exit for beginning teachers, as compared to the reference category of teaching in an elementary school. For instance, in the more recent 2011-12 to 2015-16 dataset, teaching in a high school as a beginning teacher was associated with two times the risk of exiting the workforce five years later (coefficient of 2.03). See Table 22 for the proportions of beginning teachers working in each type of school across both time periods. The school grade level teaching assignments of beginning teachers and all teachers were very similar, with only slightly higher proportions of all teachers working in elementary schools and slightly higher proportions of beginning teachers working in high schools. However, with almost a third of all beginning teachers working in high schools, a two-fold increase in likelihood of exit from the workforce could have important implications for teacher turnover and school stability at this grade level.

Table 22: Proportion of Beginning Teachers by School Grade Level Assignment		
School Grade Levels	2010-11 to 2014-15 (N = 1,960)	2011-12 to 2015-16 (N =1,882)
Elementary School	44.5% (N =872)	44.4% (N =836)
Middle School	19.4% (N =381)	19.4% (N =363)
High School	29.9% (N =586)	30.0% (N =564)
Other	6.2% (N =121)	6.3% (N =119)

As mentioned above, unlike the models for all teachers, the majority of variables included in the beginning teacher exiter models were not found to be statistically

significant, regardless of time period examined. For instance, highest degree held was not a significant predictor and neither was regional location.

Beginning movers from one district to another

The second outcome discussed is beginning teachers moving from one district to another. As with the exiter analysis discussed above, staying as a teacher in the same school five years later was the reference group. Moving to a new district five years later was the third most frequent outcome observed for beginning teachers, representing approximately 19% of teachers in both the five-year time periods examined. Unlike the earlier analysis of all teachers statewide, where there was a relatively large difference between the proportion of teachers who moved within district and those who moved to a new district, the proportions of beginning teachers who moved in district and those who moved of out of district were similar.

As seen in Table 23, only one variable—district level student enrollment—was found to be a significant predictor across both five-year time periods. As district level student enrollment increased by 100 students, the likelihood that a beginning teacher would move to a different district five years later decreased very slightly, suggesting the possibility that larger school districts are more attractive to new teachers, or that they are better equipped in some way to keep these teachers in-district, perhaps because there are more schools from which to choose. Similar to the results for the exiter model, several variables that were found to be significant predictors for all teachers statewide were not significant for the beginning teacher models when examining movers out of district. These variables included full-time teacher status, highest degree held, and regional location.

In the first five-year dataset for 2010-11 to 2014-15, the variable capturing school level student poverty was a significant positive predictor of beginning teachers moving to a new district five years later. This indicates that as school level student poverty rises 10 percent, beginner teachers are, on average, 1.11 times more likely to move to a school in a new district as compared to remaining in their original district, holding all other variables constant. This effect of school-level poverty on beginning teachers moving to a new district was not seen in the more recent five-year dataset for 2011-12 to 2015-16. [6]

In the 2010-11 to 2014-15 dataset, two additional variables were found to be significant predictors of beginning teachers' movement to new districts: 1) the school-level proportion of White students, and 2) teaching at the high school level. As the proportion of White students in a school increased by 10 percent, the

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[6] One of the variables included in the predictive models for beginning teachers was whether or not the teacher was located in a district that received funding from the BEST program. Only in the 2010-11 to 2015-16 dataset did BEST participation have a significant effect on beginning teachers' likelihood of moving to a new district. This finding, along with other analyses related to the BEST program is discussed in a separate report.

likelihood that a beginning teacher would move to a new district decreased slightly (coefficient of 0.92). Compared to their elementary school counterparts, beginning teachers in high schools are 1.71 times as likely to move to a new district, holding all other variables constant. This likelihood of beginning teachers moving out of district at the high school level was also a consistent finding for all teachers statewide.

Table 23: Significant Predictors of Beginning Teacher Mobility Out of District Outcome (as compared to Stayers): Relative Risk Ratios		
	Predictor significant at $p < .05$ More likely (>1) = + Less likely (<1) = -	
	2010-11 to 2014-15 (N =1,869)	2011-12 to 2015-16 (N =1,747)
Total District Enrollment_by 100	–	–
School % Poverty_by 10	+ (1.11)	*Not significant*
School %White Students_by 10	*Not significant*	– (0.92)
BEST District	– (0.51)	*Not significant*
High School Grade Level	*Not significant*	+ (1.71)

In this table, coefficients are not listed if they are within plus or minus 0.02 of 1.0.

Beginning movers within district

The final outcome discussed is moving as a beginning teacher within one's original school district, as compared to the reference outcome of staying in the same school. This was the least frequently observed outcome for beginning teachers, representing between 16.8% and 17.9% of all beginning teachers statewide. As seen in Table 24 only two of the 12 independent variables included in the model for beginning teachers were identified as significant predictors of the movers within district outcome ($p<.05$) across both five-year time periods: 1) district level student enrollment, and 2) regional location, in particular, teaching in Western Washington outside the Central Puget Sound.

As district level student enrollment increased by 100 students, the likelihood that a beginning teacher would move to a different school within her original district five years later increased very slightly as compared to the likelihood of teachers remaining in their original schools. This suggests, unsurprisingly, that larger school districts may offer more possibilities for assignment changes of beginning teachers. Beginning teachers in Western Washington outside the Central Puget Sound were found to be approximately 1.5 to 1.9 times more likely to move within in their original district than their beginning peers in the Central Puget Sound region.

Some differences emerged when examining results for the two different five-year time periods. In the first five-year dataset for 2010-11 to 2014-15, full-time teacher

status was associated with less than half the likelihood of a beginning teacher moving to a different school within the district five years later as compared to staying in the original school (coefficient of 0.48), holding all other variables constant. In other words, full-time beginning teachers were more likely to remain in their original schools than to move within district. In addition, teaching at the high school level was associated with a 0.58 decreased likelihood of a beginning teacher moving within the district as compared to staying in the original school. In this case, beginning high school teachers were more likely to remain in their original school than to move within district.

In the later five-year time period (2011-12 to 2015-16), other significant variables were found for predicting movers within district. Two school-level variables were found to be significant and negative predictors of beginning teachers within district movement: the proportion of students in poverty, and total school enrollment. In both cases, as poverty (or total school enrollment) increased, likelihood of a beginning teacher moving within district as opposed to remaining at one's original school decreased. Highest degree held and teaching in "other" school level configurations were also significant and negative predictors of the mover-in-district outcome. On the other hand, teaching in Eastern Washington as opposed to the Central Puget Sound region was associated with approximately twice the likelihood of beginning teachers moving within the district five years later (coefficient of 1.99).

Table 24: Significant Predictors of Beginning Teacher Mobility Within District Outcome (as compared to Stayers): Relative Risk Ratios		
	Predictor significant at $p < .05$ More likely (>1) = + Less likely (<1) = -	
	2010-11 to 2014-15 (*N* =1,869)	2011-12 to 2015-16 (*N* =1,747)
Total District Enrollment_by 100	+	+
School % Poverty_by 10	*Not significant*	– (0.92)
School Enrollment_by 50	*Not significant*	– (0.96)
Full-time Teacher	– (0.48)	*Not significant*
Master's or Higher Degree	*Not significant*	– (0.69)
Western WA (outside ESD 121)	+ (1.48)	+ (1.91)
Eastern WA Region	*Not significant*	+ (1.99)
High School Grade Level	– (0.58)	*Not significant*
Other School Grade Level	*Not significant*	– (0.50)

In this table, coefficients are not listed if they are within plus or minus 0.02 of 1.0.

To summarize, results from statistical models examining retention and mobility indicate the following about all beginning teachers statewide. These results are consistent for both the five-year time periods:

- Full-time beginning teachers are half as likely to exit, but high school beginning teachers are twice as likely to exit (as compared to staying in the same school).

- High school beginning teachers are more likely to move out of district as compared to elementary beginning teachers. Beginning teachers in districts with larger student enrollment are slightly less likely to move out of district. As the percent of White students enrolled in the school increases, there is a slight decrease in the likelihood that a beginning teacher will move out of district.

- Beginning teachers in larger enrollment districts are slightly more likely to move within district, while beginning teachers in Western Washington outside ESD 121 are more likely to move in district as compared to beginning teachers in ESD 121.

IV. Conclusions and Discussion

The results of this study illustrate the complexities involved in understanding teacher retention and mobility. As is the case throughout the nation, it is important to recognize that teacher mobility is as important a factor as teacher attrition. That is, in some ways, when a teacher leaves a school, the school can be negatively impacted, no matter whether the teacher left to go to another school in the same district, to another district, or completely left the profession.

While the statewide portrait of teachers reveals substantial consistency in turnover rates over time, there are ways in which significant variation exists. Differences exist by individual teacher characteristics, and by school and district contexts. For example, the aging of the teacher workforce can create additional demand for new teachers, resulting in a shift in the experience levels of teachers and prompting an increased need for mentoring and support of novices. Additionally, regional and district differences exist, and variation occurs even among schools within the same district. For example, we find that the grade level in which a teacher works (e.g., elementary vs secondary) and whether a teacher is full-time or part-time consistently impact retention and mobility. Differences in teacher turnover also exist by level of teaching experience, with beginning teachers being less rooted in their schools.

Policy changes can also impact the need for teachers in numerous ways. For example, a class size reduction policy can increase the need for additional teachers, while economic forces prompting a reduction in the workforce can impact the movement and turnover of teachers, especially for those new to the profession. New requirements for teacher certification and teacher evaluation can also impact teachers' views about remaining in the profession. Changes in the level of fiscal and

professional support that teachers receive, along with changing working conditions in schools can also influence teacher turnover. Given the variety of factors influencing a state's ability to attract, retain, and support teachers who positively impact student learning, policy responses need to be informed by data and crafted to address variations that exist.

The data from this study suggests several policy implications. In recent years, there has been substantial discussion about a perceived teacher shortage, including reports of difficulties in finding well-qualified teachers to fill vacancies. While we do not doubt that there are difficulties in certain subject and specialty areas and in particular regions or districts, our longitudinal analysis suggests that any perceived statewide shortage of teachers in recent years is not due to recent changes in the statewide retention or attrition of teachers. This implies that state strategies need to be differentiated and targeted in ways that recognize the variation that exists.

There is also a "myth" which has circulated widely in national conversations that "half of all beginning teachers leave the profession within five years." We find no evidence to support that claim. On the contrary, we find that in Washington state, on average over the past 20 years, one quarter of beginning teachers exit the state system, either permanently or temporarily after five years. In fact, the rate of beginning teachers exiting the Washington workforce has declined in the most recent five-year period to a point where it is similar to all teachers statewide.

One statewide challenge this study did identify was the lack of racial and ethnic diversity in the teaching workforce. This is a significant problem throughout the state. Very little progress has been made in the past 20 years in improving the diversity of the teacher workforce. While some districts have increased the diversity of their teachers, there are districts that have seen an actual decrease in the proportion of teachers of color over the past 20 years. Of particular concern is the decrease in the proportion of Black/African-American teachers statewide. State policies aimed at improving teacher diversity certainly seem indicated.

Another statewide issue articulated by this study is the increase in the proportion of new teachers in Washington state. The number of first and second year teachers has more than doubled since 2010-11. This suggests that the need for efficient and effective teacher mentoring and support programs is more pronounced than it has been in the past.

The findings from statistical models described in this study prompt some additional questions for consideration by state and local policymakers. First, for all teachers statewide, there is a relationship between full-time status and retention. Full-time teachers are more likely to stay in the same school, less likely to move within district or out of district, and less likely to exit. Thus, further investigation into the reasons why this is the case would be a worthy endeavor. Similarly, further inquiry into why high school teachers are more likely to exit or move out of district or how subject area (e.g., math, science, ELL) may be related to exiting is also indicated. It is

important to note that the poverty level of the school was not a consistently significant predictor of teacher turnover.   Finally, policies aimed at addressing teacher retention should take into account the regional variation that exists. For example, teachers in Eastern Washington and those in Western Washington outside the Central Puget Sound are less likely to exit. However, it is also important to note that certain regions of the state or certain districts may have more difficulty attracting teachers, which is an issue worthy of further investigation.

While this study provides a comprehensive and longitudinal analysis of teacher retention and mobility, including factors that may impact turnover rates, we do not examine some other related issues. Based on the findings in this study, it is clear that further inquiry is needed to help determine why teachers make particular career decisions, how school working conditions and leadership impact career choices, and how the adequacy and quality of the teacher preparation pipeline can influence teacher retention and mobility.

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	Statewide										
Appendix A: Demographic Characteristics of Washington Teacher Workforce: 2005/06 to 2015/16											
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Student Enrollment	1,013,189	1,026,682	1,031,846	1,038,345	1,036,135	1,041,892	1,043,536	1,050,900	1,056,809	1,075,107	1,084,359
# Teachers (Headcount)	56,403	56,620	56,894	57,282	56,004	56,222	55,279	55,772	56,761	58,246	59,809
FTE Teachers	53,615	53,804	54,103	54,479	53,349	53,591	52,760	53,308	54,407	56,007	57,628
Teacher Gender											
Female	71.1%	71.2%	71.5%	71.7%	71.8%	71.8%	71.9%	72.2%	72.5%	72.9%	73.3%
Male	28.9%	28.8%	28.5%	28.3%	28.2%	28.2%	28.1%	27.8%	27.5%	27.1%	26.7%
Education											
Bachelor	38.2%	37.0%	36.4%	35.4%	33.5%	32.6%	31.5%	31.0%	31.3%	32.4%	32.6%
Master	60.0%	61.0%	62.0%	63.0%	64.8%	65.7%	66.7%	67.2%	66.9%	65.8%	65.7%
Doctorate	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Other	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%
Unidentified	0.2%	0.4%	0.0%	0.0%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	NA
Teacher Age (in given year)											
20-30	15.4%	15.6%	15.5%	14.9%	13.1%	12.8%	12.1%	12.4%	13.0%	14.2%	15.0%
31-40	24.2%	24.6%	24.9%	25.3%	25.8%	25.9%	25.8%	25.7%	26.0%	26.0%	26.1%
41-50	26.2%	25.5%	25.0%	25.1%	25.3%	25.5%	26.1%	26.4%	26.5%	26.5%	26.8%
51-60	29.9%	29.7%	29.1%	28.2%	28.2%	27.7%	27.2%	26.5%	25.6%	24.6%	23.7%
61+	4.3%	4.7%	5.5%	6.5%	7.7%	8.1%	8.8%	9.1%	8.9%	8.6%	8.4%
Teacher Ethnicity											
Asian/Pacific Islander/Native Hawaiian	2.5%	2.6%	2.6%	2.6%	2.7%	2.5%	2.5%	2.5%	2.6%	2.7%	2.8%
African American	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%
Hispanic American	2.4%	2.5%	2.7%	2.8%	2.8%	3.2%	3.5%	3.4%	3.2%	3.7%	3.9%
Indian/Alaskan Native	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%
White (non-Hispanic)	92.8%	92.7%	92.5%	92.4%	92.3%	90.9%	89.7%	89.6%	90.9%	90.3%	89.9%
More than one race	*NA*	*NA*	*NA*	*NA*	*NA*	1.4%	2.4%	2.5%	1.3%	1.4%	1.4%
Teacher Experience											
0-4 years	21.8%	21.6%	22.1%	21.7%	18.3%	17.2%	15.9%	16.3%	18.3%	21.2%	23.5%
5-14 years	37.4%	37.6%	37.6%	37.8%	39.8%	40.8%	41.4%	40.9%	39.4%	37.5%	35.9%
15-24 years	24.5%	24.6%	24.5%	24.5%	25.2%	25.3%	25.9%	26.2%	26.0%	25.6%	25.4%
25 yrs or more	16.4%	16.2%	15.8%	15.9%	16.7%	16.7%	16.8%	16.7%	16.2%	15.7%	15.1%

*S275 duty root 31, 32, 33 or 34 with FTE designation greater than 0 in given year. Preliminary S-275 data in 2015-16.

	2010-11		2011-12		2012-13		2013-14		2014-15		2015-16*	
Appendix B: Characteristics of All Beginning* Teachers Statewide from 2010-11 to 2015-16												
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Beginning Teachers	1,960		1,883		2,412		2,914		3,372		3,675	
Race/Ethnicity**												
Asian/Pacific Islander/Native Hawaiian	74	3.8%	76	4.0%	102	4.2%	110	3.8%	134	4.0%	131	3.6%
Black/African American	14	0.7%	30	1.6%	36	1.5%	43	1.5%	58	1.7%	57	1.6%
Hispanic	98	5.0%	112	5.9%	122	5.1%	120	4.1%	192	5.7%	232	6.3%
American Indian/Alaskan Native	9	0.5%	16	0.8%	19	0.8%	24	0.8%	16	0.5%	26	0.7%
White (non-Hispanic)	1728	88.2%	1607	85.3%	2079	86.2%	2561	87.9%	2900	86.1%	3138	85.4%
More than one race	37	1.9%	42	2.2%	54	2.2%	56	1.9%	68	2.0%	91	2.5%
Age in given year												
20-30	1,286	65.6%	1,138	60.4%	1,522	63.1%	1,800	61.8%	2,142	63.5%	2305	62.7%
31-40	370	18.9%	405	21.5%	496	20.6%	644	22.1%	715	21.2%	795	21.6%
41+	304	15.5%	340	18.1%	394	16.3%	470	16.1%	515	15.3%	575	15.6%

*Duty root 31, 32, 33 or 34 with FTE designation greater than 0; 2015-16s numbers based on preliminary S275 data
Beginning teachers statewide is based on an unduplicated count of teachers with less than one year of experience

Appendix C: Statewide Trend Data Teacher Exiters by Experience in First 10 Years

	2010/11 to 2011/12			2011/12 to 2012/13			2012/13 to 2013/14			2013/14 to 2014/15			2014/15 to 2015/16		
	Total Number of Exiters	% Exiters from WA System	% Exiters from Exp Level	Total Number of Exiters	% Exiters from WA System	% Exiters from Exp Level	Total Number of Exiters	% Exiters from WA System	% Exiters from Exp Level	Total Number of Exiters	% Exiters from WA System	% Exiters from Exp Level	Total Number of Exiters	% Exiters from WA System	% Exiters from Exp Level
All Exiters	3808	6.8%	NA	3470	6.3%	NA	3637	6.5%	NA	3983	7.0%	NA	4248	7.3%	NA
Years Experience based on Prior Year															
1 Year (<1)	254	6.7%	13.0%	192	5.5%	10.2%	200	5.5%	8.3%	242	6.1%	8.3%	304	7.2%	9.0%
2 Years (1.0 to 2.0)	259	6.8%	11.3%	198	5.7%	8.7%	223	6.1%	8.6%	228	5.7%	7.2%	304	7.2%	7.9%
3 Years (2.1 to 3.0)	172	4.5%	7.7%	111	3.2%	6.4%	113	3.1%	6.6%	134	3.4%	6.8%	185	4.4%	7.7%
4 Years (3.1 to 4.0)	187	4.9%	7.4%	174	5.0%	7.9%	119	3.3%	6.5%	146	3.7%	7.9%	161	3.8%	7.6%
5 Years (4.1 to 5.0)	164	4.3%	6.3%	170	4.9%	6.9%	135	3.7%	6.1%	141	3.5%	7.3%	155	3.6%	8.1%
6 Years (5.1 to 6.0)	173	4.5%	6.7%	149	4.3%	5.8%	148	4.1%	6.1%	153	3.8%	6.7%	134	3.2%	6.7%
7 Years (6.1 to 7.0)	159	4.2%	6.5%	131	3.8%	5.3%	146	4.0%	5.7%	171	4.3%	7.1%	171	4.0%	7.5%
8 Years (7.1 to 8.0)	117	3.1%	5.2%	123	3.5%	5.1%	115	3.2%	4.7%	137	3.4%	5.4%	153	3.6%	6.4%
9 Years (8.1 to 9)	103	2.7%	4.3%	107	3.1%	4.9%	116	3.2%	5.0%	118	3.0%	4.9%	137	3.2%	5.6%
10 Years (9.1 to 10)	101	2.7%	4.2%	99	2.9%	4.3%	103	2.8%	4.8%	93	2.3%	4.1%	111	2.6%	4.7%

```
mlogit ndYearMOB TotalEnroll_by100 stPoverty_by10 stWhite_by10 stYearEnroll_by50 c.Exp##c.Exp FTteacher
TchrOfColor i.Sex i.HighestDegree i.region i.SchlGradeLevel, rr base(4)
```

```
Multinomial logistic regression              Number of obs   =      54,814
                                             LR chi2(45)     =     8863.04
                                             Prob > chi2     =      0.0000
Log likelihood = -55270.088                  Pseudo R2       =      0.0742
```

ndYearMOB	RRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Exit						
TotalEnroll_by100	1.000756	.0001183	6.39	0.000	1.000524	1.000988
stPoverty_by10	1.02286	.0077903	2.97	0.003	1.007704	1.038243
stWhite_by10	.9661251	.0075262	-4.42	0.000	.9514861	.9809893
stYearEnroll_by50	.987213	.0018226	-6.97	0.000	.9836473	.9907916
Exp	.894039	.0038191	-26.22	0.000	.886585	.9015557
c.Exp#c.Exp	1.004593	.0001184	38.86	0.000	1.004361	1.004825
FTteacher	.4544454	.0163093	-21.98	0.000	.423578	.4875622
TchrOfColor	.8663	.0370151	-3.36	0.001	.7967064	.9419727
Sex						
Female	1.343919	.0380817	10.43	0.000	1.271315	1.42067
HighestDegree						
MastersAndAbove	.8339544	.0204842	-7.39	0.000	.7947571	.8750848
region						
Western WA	.914924	.0291914	-2.79	0.005	.8594622	.9739648
Eastern WA	.8146731	.0296757	-5.63	0.000	.7585374	.874963
SchlGradeLevel						
Middle	1.04243	.0346068	1.25	0.211	.9767617	1.112514
High	1.259199	.052368	5.54	0.000	1.160632	1.366138
Other	1.317784	.0679192	5.35	0.000	1.191168	1.457859
_cons	.8967334	.0840211	-1.16	0.245	.7462914	1.077502
MOUT						
TotalEnroll_by100	.9970068	.0002098	-14.25	0.000	.9965957	.997418
stPoverty_by10	1.078655	.0131042	6.23	0.000	1.053275	1.104647
stWhite_by10	.9569413	.0112898	-3.73	0.000	.9350676	.9793267
stYearEnroll_by50	.9946269	.0027545	-1.95	0.052	.9892427	1.00004
Exp	.8600159	.0065417	-19.83	0.000	.8472894	.8729335
c.Exp#c.Exp	1.002105	.0002721	7.74	0.000	1.001571	1.002638
FTteacher	.6276394	.0343519	-8.51	0.000	.5637964	.6987118
TchrOfColor	.9354061	.0575522	-1.09	0.278	.8291417	1.055289
Sex						
Female	.9938611	.041679	-0.15	0.883	.9154389	1.079001
HighestDegree						
MastersAndAbove	1.239848	.048719	5.47	0.000	1.147945	1.339109
region						
Western WA	.6725501	.0335119	-7.96	0.000	.6099734	.7415464
Eastern WA	.6336642	.0347273	-8.32	0.000	.569128	.7055183
SchlGradeLevel						
	1.318528	.0661357	5.51	0.000	1.195072	1.454737
High	1.412655	.0879314	5.55	0.000	1.250411	1.595951
Other	2.257246	.1585304	11.59	0.000	1.966969	2.590361
_cons	.7861725	.1134798	-1.67	0.096	.5924497	1.04324
MVIN						

```
TotalEnroll_by100 |  1.001664   .0001271    13.10   0.000    1.001415    1.001913
    stPoverty_by10 |  1.021123   .0083427     2.56   0.011    1.004902    1.037606
      stWhite_by10 |  .9500674   .0078385    -6.21   0.000    .9348278    .9655554
  stYearEnroll_by50 |  .9635378   .0021406   -16.72   0.000    .9593514    .9677425
               Exp |  .9496153   .0050407    -9.74   0.000    .9397869    .9595466
                   |
         c.Exp#c.Exp |  1.000632   .0001688     3.74   0.000    1.000301    1.000962
                   |
          FTteacher |  .5144645   .0203328   -16.82   0.000    .4761173    .5559001
         TchrOfColor |  1.070405   .0462587     1.57   0.115    .9834732    1.165021
                   |
               Sex |
            Female |  1.067377   .0337852     2.06   0.039    1.003172    1.135692
                   |
     HighestDegree |
    MastersAndAbove |  1.185161   .0337444     5.97   0.000    1.120835    1.253179
                   |
            region |
         Western WA |  1.193473   .0435241     4.85   0.000    1.111145    1.281902
         Eastern WA |  1.189756   .0481917     4.29   0.000    1.098954     1.28806
                   |
      SchlGradeLevel |
            Middle |  1.088651   .0384028     2.41   0.016    1.015926    1.166582
              High |  .9882896   .0463831    -0.25   0.802    .9014363    1.083511
                   |  .8310966   .0512192    -3.00   0.003    .7365349    .9377989
                   |
             _cons |  .8543695   .0864838    -1.55   0.120    .7006202    1.041859
-------------------+----------------------------------------------------------------
STAY               | (base outcome)
-------------------------------------------------------------------------------------
```

```
mlogit ndYearMOB TotalEnroll_by100 stPoverty_by10 stWhite_by10 stYearEnroll_by50 c.Exp##c.Exp FTteacher
TchrOfColor i.Sex i.HighestDegree i.region i.SchlGradeLevel, rr base(5)
```

```
Multinomial logistic regression                    Number of obs    =    54,297
                                                    LR chi2(45)      =   8736.44
                                                    Prob > chi2      =    0.0000
Log likelihood = -56627.336                         Pseudo R2        =    0.0716
```

ndYearMOB	RRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Exit						
TotalEnroll_by100	1.000491	.0001155	4.25	0.000	1.000265	1.000717
stPoverty_by10	1.004065	.0073234	0.56	0.578	.989814	1.018522
stWhite_by10	.9573887	.0073535	-5.67	0.000	.9430841	.9719104
stYearEnroll_by50	.9886543	.0018076	-6.24	0.000	.9851177	.9922035
Exp	.9008206	.0038479	-24.45	0.000	.8933104	.908394
c.Exp#c.Exp	1.004351	.0001172	37.20	0.000	1.004121	1.004581
FTteacher	.5292018	.0192482	-17.50	0.000	.4927894	.5683048
TchrOfColor	.9142447	.03731	-2.20	0.028	.8439664	.9903751
Sex						
Female	1.293561	.036458	9.13	0.000	1.224042	1.367028
HighestDegree						
MastersAndAbove	.7627656	.0187634	-11.01	0.000	.7268625	.800442
region						
Western WA	.91172	.0289392	-2.91	0.004	.8567286	.9702412
Eastern WA	.7986341	.0286934	-6.26	0.000	.7443305	.8568994
SchlGradeLevel						
Middle	1.002406	.033348	0.07	0.942	.9391305	1.069945
High	1.204395	.049734	4.50	0.000	1.110758	1.305925
Other	1.222591	.0625774	3.93	0.000	1.105893	1.351604
_cons	1.032319	.0950146	0.35	0.730	.8619247	1.236399
MOUT						
TotalEnroll_by100	.9974021	.000184	-14.10	0.000	.9970414	.9977629
stPoverty_by10	1.051476	.0111141	4.75	0.000	1.029917	1.073487
stWhite_by10	.930602	.0098639	-6.79	0.000	.9114686	.9501371
stYearEnroll_by50	.988585	.0025178	-4.51	0.000	.9836626	.993532
Exp	.8878082	.0062842	-16.81	0.000	.8755765	.9002108
c.Exp#c.Exp	1.001136	.0002524	4.50	0.000	1.000642	1.001631
FTteacher	.8016466	.0423585	-4.18	0.000	.7227798	.8891191
TchrOfColor	.8785621	.0488496	-2.33	0.020	.7878511	.9797172
Sex						
Female	1.008737	.0391317	0.22	0.823	.9348837	1.088425
HighestDegree						
MastersAndAbove	1.255527	.0459473	6.22	0.000	1.168626	1.34889
region						
Western WA	.7215355	.0328935	-7.16	0.000	.6598619	.7889735
Eastern WA	.650009	.0325469	-8.60	0.000	.5892485	.7170348
SchlGradeLevel						
	1.236695	.0570653	4.60	0.000	1.129757	1.353754
High	1.413863	.0796965	6.14	0.000	1.26598	1.579021
Other	1.893642	.1258571	9.61	0.000	1.662358	2.157105
_cons	.9464223	.122803	-0.42	0.671	.7339007	1.220485

```
MVIN
TotalEnroll_by100 |   1.00139     .000124    11.21   0.000    1.001146   1.001633
   stPoverty_by10 |   1.010542   .0079618     1.33   0.183    .9950571   1.026268
     stWhite_by10 |   .9319913   .0076403    -8.59   0.000    .9171361    .947087
  stYearEnroll_by50 |   .9738464   .0022194   -11.63   0.000    .9695062   .9782061
              Exp |   .9674792   .0052506    -6.09   0.000    .9572429    .977825
                  |
         c.Exp#c.Exp |   1.000067   .0001719     0.39   0.696    .9997304   1.000404
                  |
        FTteacher |   .6203416   .0255017   -11.62   0.000    .5723197   .6723928
        TchrOfColor |   1.200782   .0488825     4.49   0.000    1.108696   1.300516
                  |
              Sex |
           Female |   1.018888   .0324565     0.59   0.557    .9572191   1.084529
                  |
      HighestDegree |
     MastersAndAbove |   1.163818   .0337264     5.24   0.000    1.099558   1.231834
                  |
           region |
        Western WA |   1.142252   .0417455     3.64   0.000    1.063294   1.227073
        Eastern WA |   1.113187   .0446338     2.67   0.007    1.029056   1.204197
                  |
      SchlGradeLevel |
           Middle |   1.005505   .0357524     0.15   0.877    .9378173   1.078077
             High |   .7318878   .0363466    -6.29   0.000    .6640069    .806708
            Other |   .7851035   .0486148    -3.91   0.000    .6953752   .8864098
                  |
            _cons |   .8212568   .0826301    -1.96   0.050    .6742734   1.000281
------------------+----------------------------------------------------------------
STAY              | (base outcome)
------------------------------------------------------------------------------------
```

Appendix F: Beginning teachers' multinomial logistic regression STATA output for the Five-Year Period 2010-11 to 2014-15

```
mlogit ndYearMOB TotalEnroll_by100 stPoverty_by10 stWhite_by10 stYearEnroll_by50 BEST FTteacher
i.HighestDegree i.region i.SchlGradeLevel if Exp<1, rr base(4)
```

```
Multinomial logistic regression              Number of obs   =      1,869
                                             LR chi2(36)     =     172.75
                                             Prob > chi2     =     0.0000
Log likelihood = -2383.7011                  Pseudo R2       =     0.0350
```

ndYearMOB	RRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Exit						
TotalEnroll_by100	1.000465	.0006094	0.76	0.445	.9992714	1.00166
stPoverty_by10	1.014519	.0414194	0.35	0.724	.9365018	1.099036
stWhite_by10	.9573922	.0379106	-1.10	0.272	.885899	1.034655
stYearEnroll_by50	.9810246	.0087239	-2.15	0.031	.9640742	.9982731
BEST	.8887739	.1475043	-0.71	**0.477**	.6419816	1.230439
FTteacher	.5495029	.0797903	-4.12	0.000	.4134011	.7304127
HighestDegree						
MastersAndAbove	.9714987	.1268649	-0.22	0.825	.7521189	1.254868
region						
Western WA	1.026547	.1886748	0.14	0.887	.7160308	1.471722
Eastern WA	1.031867	.202403	0.16	0.873	.7025198	1.515615
SchlGradeLevel						
Middle	1.509534	.260555	2.39	0.017	1.076268	2.117218
High	1.666237	.327991	2.59	0.009	1.132874	2.45071
Other	2.053513	.5192258	2.85	0.004	1.251046	3.370713
_cons	.9259161	.3833946	-0.19	0.853	.4112578	2.084631
MOUT						
TotalEnroll_by100	.9982849	.0006899	-2.48	0.013	.9969337	.999638
stPoverty_by10	1.112775	.0490008	2.43	0.015	1.020763	1.213081
stWhite_by10	1.064482	.0448433	1.48	0.138	.9801209	1.156103
stYearEnroll_by50	.9898	.0093515	-1.09	0.278	.97164	1.008299
BEST	.5094516	.1026106	-3.35	**0.001**	.3432885	.7560432
FTteacher	.8805276	.1404495	-0.80	0.425	.6441265	1.20369
HighestDegree						
MastersAndAbove	1.133093	.153885	0.92	0.358	.8682891	1.478656
region						
Western WA	.9599843	.1788698	-0.22	0.827	.6662901	1.383136
Eastern WA	.7704092	.155849	-1.29	0.197	.5182373	1.145287
SchlGradeLevel						
Middle	1.173661	.2128095	0.88	0.377	.8226247	1.674493
High	1.382724	.2813193	1.59	0.111	.9280177	2.060227
Other	.9557703	.2854044	-0.15	0.880	.5323223	1.71606
_cons	.3193178	.146347	-2.49	0.013	.1300491	.7840408
MVIN						
TotalEnroll_by100	1.003683	.0006182	5.97	0.000	1.002472	1.004895
stPoverty_by10	.997246	.0433431	-0.06	0.949	.9158128	1.08592
stWhite_by10	.9948869	.0438398	-0.12	0.907	.9125685	1.084631
stYearEnroll_by50	.9866798	.0109634	-1.21	0.227	.9654243	1.008403
BEST	.7256034	.1351985	-1.72	**0.085**	.5036151	1.045442
FTteacher	.4784454	.0749579	-4.71	0.000	.3519451	.650414
HighestDegree						
MastersAndAbove	.90906	.1290005	-0.67	0.502	.6883391	1.200557
region						
	1.484442	.3035453	1.93	0.053	.9942737	2.21626
Eastern WA	1.347474	.3010918	1.33	0.182	.8696013	2.087952
SchlGradeLevel						

```
    Middle |    .8584752    .1611692    -0.81   0.416    .5941884    1.240313
      High |    .5752229    .1398726    -2.27   0.023    .3571543    .9264381
     Other |     .727954    .2252379    -1.03   0.305    .3969463    1.334984
           |
     _cons |     .546887     .244011    -1.35   0.176    .2280904    1.311258
-----------------+----------------------------------------------------------------
STAY             | (base outcome)
------------------------------------------------------------------------------------
```

Appendix G: Beginning teachers' multinomial logistic regression STATA output for the Five-Year Period 2011-12 to 2015-16

```
mlogit ndYearMOB TotalEnroll_by100 stPoverty_by10 stWhite_by10 stYearEnroll_by50 BEST FTteacher
i.HighestDegree i.region i.SchlGradeLevel if Exp<1, rr base(5)
```

```
Multinomial logistic regression                Number of obs   =       1,747
                                               LR chi2(36)     =      131.86
                                               Prob > chi2     =      0.0000
Log likelihood = -2217.577                     Pseudo R2       =      0.0289
```

ndYearMOB	RRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Exit						
TotalEnroll_by100	.9994915	.0005702	-0.89	0.373	.9983745	1.00061
stPoverty_by10	.9556934	.0386181	-1.12	0.262	.8829231	1.034462
stWhite_by10	.9656994	.0410165	-0.82	0.411	.8885638	1.049531
stYearEnroll_by50	.9855491	.009143	-1.57	0.117	.967791	1.003633
BEST	.7882194	.1731273	-1.08	**0.279**	.512491	1.212294
FTteacher	.920253	.1343461	-0.57	0.569	.6912607	1.225103
HighestDegree						
MastersAndAbove	.9931404	.1310122	-0.05	0.958	.7668715	1.286171
region						
Western WA	1.016569	.1895871	0.09	0.930	.7053271	1.465155
Eastern WA	1.027693	.2101955	0.13	0.894	.6882812	1.534479
SchlGradeLevel						
Middle	1.376894	.255258	1.73	0.084	.9574119	1.980168
High	2.029156	.4238936	3.39	0.001	1.347405	3.055854
Other	1.603549	.4290377	1.76	0.078	.9491586	2.709103
_cons	.7915287	.3446555	-0.54	0.591	.3371536	1.858256
MOUT						
TotalEnroll_by100	.9978332	.0006529	-3.31	0.001	.9965544	.9991138
stPoverty_by10	.9668588	.0396932	-0.82	0.412	.8921092	1.047872
stWhite_by10	.9202998	.0392848	-1.95	0.052	.846436	1.000609
stYearEnroll_by50	.9850877	.0097776	-1.51	0.130	.9661092	1.004439
BEST	.8863008	.1947016	-0.55	**0.583**	.5762223	1.36324
FTteacher	1.065278	.1679229	0.40	0.688	.7821415	1.450909
HighestDegree						
MastersAndAbove	.8508445	.1189069	-1.16	0.248	.6469837	1.118941
region						
Western WA	1.057231	.2061817	0.29	0.775	.721387	1.549429
Eastern WA	1.061496	.2201553	0.29	0.774	.7069335	1.59389
SchlGradeLevel						
Middle	1.42895	.2695439	1.89	0.058	.9873113	2.068139
High	1.713301	.3748545	2.46	0.014	1.115832	2.630684
Other	1.429511	.4060158	1.26	0.208	.8192671	2.494304
_cons	1.088647	.4848232	0.19	0.849	.4547878	2.605944
MVIN						
TotalEnroll_by100	1.002218	.0005986	3.71	0.000	1.001045	1.003392
stPoverty_by10	.9227416	.0371501	-2.00	0.046	.8527274	.9985044
stWhite_by10	.9628644	.0414889	-0.88	0.380	.8848867	1.047714
stYearEnroll_by50	.9631341	.0115482	-3.13	0.002	.9407639	.9860363
BEST	.6455115	.1669696	-1.69	**0.091**	.3888034	1.071711
FTteacher	.8695848	.1403713	-0.87	0.387	.6337356	1.193207
HighestDegree						
MastersAndAbove	.6917679	.1029993	-2.47	0.013	.5166812	.926186
region						
	1.910023	.4009039	3.08	0.002	1.265831	2.882049
Eastern WA	1.991034	.4409938	3.11	0.002	1.289871	3.073344

```
SchlGradeLevel |
        Middle |   1.065703    .2039161     0.33   0.739    .7324257    1.550632
          High |    .6832319   .1744891    -1.49   0.136    .4141728     1.12708
         Other |    .5029484     .16958    -2.04   0.042    .2597301    .9739231
               |
         _cons |    .8430706    .375116    -0.38   0.701    .3524766    2.016497
---------------+----------------------------------------------------------------
STAY           | (base outcome)
--------------------------------------------------------------------------------
```