Examining Beginning Teacher Retention and Mobility in Washington State

Final Report

Prepared for the Office of Superintendent of Public Instruction

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Executive Summary

Purpose of the Study

The purpose of this report is to provide educators and policy makers in Washington state with information and analyses about statewide beginning teacher retention and mobility and to inform and enhance decision making regarding teacher quality policies, particularly with respect to supporting beginning teachers. We examine the characteristics of beginning teachers and look at factors associated with their retention and mobility. We also examine a specific set of beginning teachers who began their first year of teaching in districts that received BEST (Beginning Educator Support Team) grants from the state to support beginning teacher induction. This report on beginning teachers serves as a companion piece to a report issued in January 2017 regarding retention and mobility of all teachers in Washington state.[1]

Methodology and Data Sources

The primary data source is the personnel data from the state's S-275 dataset. This dataset contains individual teacher level demographic and assignment information about all educators in Washington state. We link the S-275 data to other state databases, including school 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.

After providing a portrait of the demographic characteristics of beginning teachers, we examine their year-by-year and five-year retention and mobility rates for the time period from 2009-10 to 2015-16. Our analysis is limited to examining first year teachers only. Specific comparisons are made at the district and school level for BEST-funded districts. Both the five-year and year-by-year analyses are cohort-based. We use four categories to analyze beginning 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 beginning teacher retention and mobility patterns, we constructed multinomial logistic regression models, as this approach enables us to investigate the relationship between several outcomes of interest (retention and mobility status) and a number of district, school, and individual teacher variables. The focal question for this work is "What variables consistently explain beginning teachers' retention and mobility outcomes in Washington state?" The two main populations

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[1] See Elfers, A., Plecki, M., & Van Windekens, A. (2017). Examining Teacher Retention and Mobility in Washington State. A report prepared for the Office of the Superintendent of Public Instruction by the Center for the Study of Teaching and Policy, College of Education, University of Washington, Seattle.

investigated include all beginning teachers statewide and beginning teachers located in districts that received BEST funding in recent years.

Our analysis also includes a subset of BEST-funded districts in 2013 and 2014 that met a set of seven criteria for full-fledged induction programs. The focal question for this analysis is "How do the retention rates of beginning teachers who were located in BEST-funded districts that met a set of criteria for full-fledged induction programs compare to other beginning teachers in the state?"

Selected Findings

Growth in the number of new teachers

The number of beginning teachers (less than one year of experience), has increased steadily from nearly 2,000 in 2010-11 to over 3,600 in 2015-16. Nationally and in Washington state, new teachers comprise a larger segment of the population than in previous years. Nationally, 12% of all public school teachers were in their first or second year of teaching in 2014-15. 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. The number of first and second year teachers more than doubled in the past six years, from 3,387 in 2010-11 to 6,918 in 2015-16.

Characteristics of all beginning teachers and the schools in which they work

From 2010-11 to 2015-16, the statewide percentage of students of color increased from 39% to 44%, while the percentage of beginning teachers of color increased from 12% to 15%. 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 racial and ethnic groups increased or fluctuated slightly over this time.

During the period from 2009-10 to 2015-16, close to half of all beginning teachers in Washington worked in elementary schools. Just under half of these teachers were working in high poverty schools (50% or more FRPL). Across all years examined, the majority of all beginning teachers worked in schools where White students comprised the majority of students (50% or more).

Variation in the number of BEST districts and the years of BEST funding

Since the inception of the BEST program, there has been significant variation in the number of participating districts. In the first year of the program, there were 30 participating districts. The number of participating districts has ranged from a low of 7 districts to a number 10 times greater (71) in a given year. Districts also varied in the number of years in which they participated in the BEST program, ranging from 1 to 6 years. During the period from 2009-10 to 2015-16, more than half of BEST-funded districts (53%) have received only one year of funding. These

important variations in program implementation and levels of funding make it particularly challenging to conduct clear analyses of retention and mobility of beginning teachers in BEST-funded districts.

Most beginning teachers in Washington state have not participated in BEST-funded induction and support. During the time period from 2009-10 to 2014-15, the percent of all beginning teachers located in BEST districts ranged from 7% to 32% of all beginning teachers statewide. In 2015-16, the proportion of beginning teachers served by the BEST program increased to 54%.

Characteristics of BEST beginning teachers

No large differences were noted in the proportion of BEST teachers compared to all beginning teachers with respect to race/ethnicity or age distribution. No consistent pattern of differences existed between the two groups when examining education level. However, in each year examined, there were slightly higher proportions of BEST teachers who were full-time.

Characteristics of schools where BEST teachers worked

While only about a third of BEST teachers worked in high poverty schools during the two earliest years examined (2009-10 and 2010-11), there was a dramatic shift beginning in 2011-12, when more than half and up to three-fourths of BEST teachers worked in schools with poverty rates of 50% or more.

Retention and mobility across five-year time periods

We examined retention and mobility in two 5-year time periods: 2010-11 to 2014-15 and 2011-12 to 2015-16. The percentage of stayers in BEST districts is higher (50% for both periods) than beginning teachers in non-BEST districts (40% in one period and 43% in the other). A lower proportion of teachers in BEST districts moved within their districts for both periods, and a lower proportion of teachers in BEST districts moved out of district for one period, but not the other. Finally, the proportion of exiters was nearly identical for BEST and non-BEST teachers for one period (2010 to 2014), but somewhat different in the later period, with 18% of BEST teachers exiting, compared to 21% of all teachers statewide.

Year-by-year retention and mobility trends

The majority of beginning teachers (on average 70%) 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.

On average, beginning teachers in BEST-funded districts are retained in their school at somewhat higher rates than beginning teachers statewide (77% vs 73%).

Mobility and exiting patterns for teachers in BEST districts are, on average, slightly lower.

Statistical models of beginning teacher retention and mobility statewide and in BEST districts

We conducted statistical analyses using multinomial logistic regressions which compared retention and mobility outcomes to a reference group. Staying in one's same school five years later was selected as the reference group, since this outcome represents the majority of beginning teachers in our datasets.

The following statistically significant results from the models examining retention and mobility are consistent for both five-year time periods:

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

- *Movers out of district.* 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.

- *Movers in 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.

Statistically significant findings from the analysis of the relationships between BEST participation for beginning teachers and their subsequent retention and mobility outcomes after five years are as follows:

- *Movers out of district.* In the five-year time period for 2010-11 to 2014-14, there was a significant effect of BEST participation on a beginning teachers' likelihood of moving to a new district. BEST participation was associated with approximately half the likelihood of beginning teachers moving out of district, suggesting that BEST may have encouraged new teachers to remain in their original schools.

- *Movers in district.* BEST participation approached significance at the $p<.05$ level in both five-year time periods for beginning teachers moving within their original districts. BEST participation was associated with a decreased likelihood of movement within teachers' original school districts, suggesting

that these beginning teachers were more likely to remain in their original schools as compared to beginning teachers who were not in BEST-funded districts in 2010-11 or 2011-12.

After running separate models for each of the six years of data (2009-10 to 2014-15), the six multinomial logistic regressions resulted in the following significant findings:

- In 2009-10, BEST was found to be a significant and negative predictor of beginning teachers exiting and moving to a new district one year later. Specifically, beginning teachers in BEST districts were less likely to exit the workforce one year later, as compared to their peers in non-BEST districts. BEST beginning teachers were, on average, less than half as likely to leave the district one year later, as compared to their non-BEST counterparts. In both cases, this indicates that BEST beginning teachers were significantly more likely to remain in their original schools.

- In 2013-14,[2] BEST was found to be a significant and positive predictor of beginning teachers moving to a different school within their district. Specifically, beginning teachers in BEST districts were more than twice as likely as their peers in non-BEST districts to move within the district as compared to remaining in one's original school one year later. Although this suggests that BEST beginning teachers were leaving their original schools, it also demonstrates that they were remaining within their original BEST-funded districts. Given that BEST was conceptualized as a district-level intervention for new teachers, one could argue that this outcome provides evidence of the effectiveness of the BEST program.

Identifying BEST districts with full-fledged induction programs

Given the potential for variation in the quality of induction programs among BEST districts, we conducted an additional set of statistical analyses using a subset of BEST-funded districts that received grants in 2013 and 2014. Each district that received a grant in these two years was asked to respond to seven questions developed by OSPI about their teacher induction program. These questions served as a proxy for determining whether a BEST district was engaging in full-fledged implementation of a teacher induction program.

Fourteen BEST-funded districts verified that all seven criteria had been met. Beginning teachers in these 14 districts were combined to create "BEST subset districts," and were compared to all remaining beginning teachers statewide in 2014-15.

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[2] It should be noted that 2013-14 represents the year with the fewest number of BEST districts.

Statistical models of BEST districts with full-fledged induction programs

Beginning teachers in BEST-funded districts with full-fledged induction programs had statistically significantly lower rates of exiting the Washington teaching workforce one year later than beginning teachers in all other districts. On average, approximately 10 percent of beginning teachers working in all other districts are predicted to exit the teaching workforce one year later, compared to approximately 6 percent of their peers working in BEST-funded districts with full-fledged induction programs.

Conclusions and Implications

This study focused on understanding the retention and mobility of beginning teachers in Washington state. We found that there is a relationship between full-time status and retention, as full-time beginning teachers are half as likely to exit as compared to part-time beginning teachers. Beginning high school teachers are more likely to move out of district as compared to beginning elementary teachers. 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. It is important to note that, contrary to the findings from the majority of other studies in the research literature, the poverty level of the school was not a consistently significant predictor of beginning teacher turnover. Further investigation into the reasons why full-time status, high school teaching, and student race/ethnicity are related to teacher retention and mobility would be a worthy endeavor.

This study also examined teacher retention and mobility for all beginning teachers located in BEST-funded districts. Findings indicate that the BEST program has had some positive impact on teacher retention and mobility. When looking at two five-year time periods for teachers who were located in BEST-funded districts (2010-11 to 2014-15 and 2011-12 to 2015-16), we find that for the earlier time period, beginning teachers in BEST-funded districts are statistically less likely to move out of district after five years.

Perhaps more importantly, when examining outcomes for beginning teachers in a subset of BEST-funded districts that met standards for a full-fledged induction program, we find that beginning teachers in such districts had a lower rate of exiting the Washington workforce after one year than other beginning teachers. This result was statistically significant. These findings suggest that continuing efforts aimed at high-quality, comprehensive mentoring and support of teachers new to the profession can be effective in reducing beginning teacher attrition.

While it is likely that some districts not receiving any BEST funding have quality induction programs in place, currently data is not available to identify those districts statewide. It also should be noted that 53% of all BEST-funded districts received only one year of funding, and many BEST-funded districts have just received BEST funding for the first time in 2015-16. Thus, it is not possible yet to assess the long-

term impact of BEST funding on a sizeable portion of teachers in BEST-funded districts. Additional inquiry is needed to examine the impact of high quality teacher induction in Washington state, perhaps including all districts that meet standards for high quality teacher induction programs, irrespective of BEST funding.

An important potential implication to consider based on this work is the following: Only about a third of BEST-funded districts in 2013-14 and 2014-15 met the standards for full-fledged induction programs. Further inquiry is needed in order to understand why the majority of BEST-funded districts were not able to implement all features of a fully-fledged induction program. Factors which may influence the capacity of districts to provide comprehensive induction support include the lack of stable or sufficient funding to support new teachers, a lack of experienced mentors who can bring the program to life for those new to the profession, and a need to develop district-wide capacity to support new teacher induction, even when the numbers of new teachers fluctuate from year to year.

As stated in this report, the number of first and second year teachers has more than doubled since 2010-11. This rapid increase in the number of teachers new to the profession indicates that the need for efficient and effective teacher induction, mentoring and support programs is more pronounced than has been in the past.

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 related issues. Further inquiry is needed into matters such as reasons why teachers make particular career decisions, the impact of school working conditions and leadership, and the adequacy and quality of the teacher preparation pipeline.

A. Study Purpose

The purpose of this report is to provide educators and policy makers in Washington state with information and analyses about statewide beginning teacher retention and mobility, and to inform and enhance decision making regarding teacher quality policies, particularly with respect to supporting beginning teachers. We examine the characteristics of beginning teachers and look at factors associated with their retention and mobility.

In recent years, Washington state has provided some support for districts to create and implement programs that attract, induct, and retain new teachers through the Beginning Educator Support Team (BEST) grant program. As part of a focus on induction supports for new teachers, we compare all beginning teachers statewide with those located in districts that were funded through the BEST program in recent years. We also investigate retention outcomes for a specific set of districts that received BEST grants in 2013 and 2014 and that met a set of standards for full-fledged induction programs.

This report serves as a companion piece to a report issued in January 2017 regarding retention and mobility of all teachers in Washington state.[1]

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). A recent study examining ten years of data on teacher retention and mobility in Washington state reveals findings similar to national statistics. In Washington state, 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 on average, 2% change districts. The percentage of teachers who leave the workforce from one year to the next is approximately 7% (Elfers, Plecki & Van Windekens, 2017).

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[1] See Elfers, A., Plecki, M., & Van Windekens, A. (2017). Examining Teacher Retention and Mobility in Washington State. A report prepared for the Office of the Superintendent of Public Instruction by the Center for the Study of Teaching and Policy, College of Education, University of Washington, Seattle.

Few studies point to widespread national teacher shortages. However, it has been more difficult for schools to find fully qualified teachers in some fields than in others, such as mathematics, science, English learners, 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).

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, 2001; 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; 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, 2001; 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) 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 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 midcareer 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% 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%, 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 beginning teacher workforce include the following:

1. What are the demographic characteristics of beginning teachers in Washington state? How do the demographic characteristics of beginning teachers who worked in BEST-funded districts compare to all beginning teachers statewide?

2. What differences, if any, exist in the retention and mobility rates of beginning teachers from BEST-funded districts compared to those located in districts that did not receive BEST grants?

3. In what ways do differences in beginning teacher retention and mobility rates exist by: (a) demographic characteristics of teachers, (b) region of the state, (c) district and school demographics (e.g., size, poverty, student diversity), and (d) districts that received BEST grants compared to those that did not?

4. How do the retention rates of beginning teachers who were located in BEST-funded districts that met a set of criteria for full-fledged induction programs compare to other beginning teachers in the state?

B. Methodology and Data Sources

We use several data sources to conduct a statewide analysis of the retention and mobility patterns of beginning teachers. The primary data source is the personnel data from the state's S-275 dataset. This dataset contains individual teacher level demographic and assignment information about all educators in Washington state. We link the S-275 data to other state databases, including school 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. After providing a portrait of the demographic characteristics of beginning teachers, we examine their year-by-year and five-year retention and mobility rates for the time period from 2009-10 to 2015-16. Specific comparisons are made at the district and school level for BEST districts. Both the five-year and year-by-year analyses are cohort-based. That is, we identify all beginning teachers in a given year, and then examine their individual assignments in the workforce in the subsequent year.

We also construct multinomial logistic regression models using STATA 14.1 software to help explain beginning teacher retention and mobility, 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 teacher characteristics). The focal question for this work is "What variables consistently explain beginning teachers' retention and mobility outcomes in Washington state?"

The two main populations investigated include all beginning teachers statewide and beginning teachers located in districts that received BEST funding in recent years. While we were interested in identifying which variables help to explain retention and mobility outcomes more generally, we also had a special focus on whether the BEST program, meant as an induction support for new teachers, had a significant effect on the observed outcomes. After analyzing retention and mobility outcomes for all beginning teachers enrolled in the BEST program, we focused our attention

on a specific subset of BEST districts. This subset consists of BEST districts that received funding in 2013 and 2014. All funded districts were assessed to determine if they met a set of seven criteria for full-fledged induction programs, and only those BEST districts who self-reported that they met each of the seven criteria were included in the subset for analysis.

C. Definition of Terms

As noted above, we provide analyses of both five-year and year-by-year retention and mobility rates for all beginning teachers statewide and for beginning teachers in districts served by the BEST program. We describe the criteria for the teachers included in these analyses as follows:

- *Beginning Teachers* were defined as those public school teachers with less than one year of experience as reported in the S-275 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.[2] Other teachers serving in specialist roles (e.g., reading resource specialist, library media specialist) were not included.

- *BEST Teachers* were defined as those public school teachers with less than one year of experience as reported in the S-275 who worked in a district that received BEST funding in particular years of interest.

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.[3]

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[2] 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 for the initial year were excluded from the analysis.
[3] 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 an analysis of beginning teacher retention and mobility, including factors that may impact turnover rates, we do not examine some 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 or did not have their contracts renewed. 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, while beyond the scope of this report, 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 than may enhance the retention and support of new teachers.

III. Findings

A. Growth in the Number of New Teachers

1) Beginning Teachers

As seen in Table 1, the number of beginning teachers (less than one year of experience), has increased steadily from nearly 2,000 in 2010-11 to over 3,600 in 2015-16. Over the course of the time period examined, between 68% and 82% of beginning teachers worked full-time, and between 54% and 63% held a bachelor's degree only. As one might expect, on average, the majority of teachers entering the profession (63%) are between the ages of 20 and 30, with an additional 16% over the age of 40. During this time period, the statewide percentage of students of color increased from 39% to 44%, while the percentage of beginning teachers of color increased from 12% to 15%. 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 racial and ethnic groups increased or fluctuated slightly over this time period. Table 1 provides details about beginning teacher characteristics.

Table 1: Characteristics of All Beginning Teachers* Statewide: from 2009-10 to 2015-16							
	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16**
# Teachers (Headcount)	1,344	1,959	1,883	2,412	2,914	3,372	3,675
Teacher Gender							
Female	72%	72%	72%	73%	76%	75%	77%
Male	28%	28%	28%	27%	24%	25%	23%
Full-time/Part-time Status							
Full-Time (Teacher FTE > .9)	68%	75%	72%	76%	77%	82%	NA
Not Full-Time (Teacher FTE < .9)	32%	25%	28%	25%	23%	18%	NA
Education							
Bachelor	63%	57%	54%	54%	59%	61%	63%
Masters and above	34%	40%	42%	43%	38%	36%	37%
Unidentified	3%	3%	4%	3%	2%	3%	0%
Teacher Age (in given year)							
19-30	61%	66%	60%	63%	62%	64%	63%
31-40	22%	19%	22%	21%	22%	21%	22%
41-50	12%	11%	12%	12%	12%	11%	11%
51-60	4%	4%	5%	4%	4%	4%	4%
61+	1%	1%	1%	0%	1%	1%	0%
Teacher Race/Ethnicity							
Asian/Pacific Islander/Native Hawaiian	4%	4%	4%	4%	4%	4%	4%
Black/African American	2%	1%	2%	2%	2%	2%	2%
Hispanic	5%	5%	6%	5%	4%	6%	6%
Native American/Alaskan Native	1%	1%	1%	1%	1%	1%	1%
White (non-Hispanic)	89%	88%	85%	86%	88%	86%	85%
More than one race	NA***	2%	2%	2%	2%	2%	3%

Notes: *Duty root 31, 32, 33 or 34 with FTE designation >0. Beginning teachers are teachers with less than one year of experience.

**Based on preliminary data which does not include some programmed fields.

***"More than one race" category was added in 2010-11.

Percentages may not add up to 100% due to rounding.

2) First and Second Year Teachers

Nationally and in Washington state, new teachers comprise a larger segment of the population than in previous years. Nationally, 12% of all public school teachers were in their first or second year of teaching in 2014-15 (DOE, Civil Rights, 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. The number of first and second year teachers more than doubled in the past six years, from 3,387 in 2010-11, to 6,918 in 2015-16 (see Table 2).

Table 2: 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			

The influx of new teachers may be more pronounced in some districts as compared to others, depending on factors such as increases in student enrollment, changes in class size, and retirements or other forms of teacher 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.

3) Schools Where Beginning Teachers Work

Table 3 provides information about the characteristics of the schools where beginning teachers worked during the time period from 2009-10 through 2015-16. In general, close to half of all beginning teachers in Washington worked in elementary schools. This number has increased slightly in the most recent three years, when more than half of all beginning teachers worked in elementary schools. When considering the poverty level of the schools where all beginning teachers worked, we see a relatively stable trend over time, with just under half of these teachers working in the highest poverty schools (50% or more Free or Reduced Price Lunch Program (FRPL) participation). Between 34% and 43% of beginning teachers were assigned to schools where students of color represented more than half of the student body. Conversely, across all years examined, the majority of all beginning teachers worked in schools where White students comprised the majority of students (50% or more).

Table 3: District and School Characteristics of All Beginning Teachers* Statewide: from 2009-10 to 2015-16							
	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16**
# Teachers (Headcount)	1,344	1,959	1,883	2,412	2,914	3,372	3,675
Region of the State							
Central Puget Sound (ESD 121)	44%	44%	50%	49%	45%	46%	44%
Western WA (ESDs 112, 113, 114, 189)	31%	31%	28%	28%	32%	30%	31%
Eastern WA (ESDs 101, 105, 123, 171)	25%	25%	22%	23%	23%	24%	24%
District Total Student Enrollment							
Fewer than 999	6%	6%	6%	6%	6%	6%	6%
1,000-4,999	20%	20%	18%	17%	18%	18%	18%
5,000-9,999	14%	16%	14%	15%	16%	15%	15%
10,000-19,999	30%	28%	29%	29%	27%	30%	26%
20,000+	29%	30%	33%	33%	32%	32%	34%
School Level							
Elementary	47%	44%	45%	47%	52%	54%	55%
Middle School	16%	19%	19%	18%	17%	17%	15%
High School	30%	30%	30%	28%	24%	24%	21%
Other (e.g., PK-8, 1-8, 6-1	7%	7%	6%	8%	6%	5%	6%
Poverty of School							
0-25% FRPL	25%	22%	22%	20%	18%	18%	20%
26-49% FRPL	32%	33%	31%	31%	30%	30%	30%
50-74% FRPL	27%	27%	26%	28%	29%	29%	29%
75+% FRPL	14%	17%	20%	20%	21%	20%	19%
Unidentified	2%	2%	1%	1%	2%	3%	2%
Student Race/Ethnicity							
0-25% White students	17%	17%	19%	18%	18%	20%	20%
26-49% White students	17%	18%	21%	20%	19%	22%	23%
50-74% White students	34%	38%	38%	39%	41%	36%	37%
75+% White students	31%	25%	21%	21%	21%	19%	18%
Unidentified	2%	2%	1%	1%	2%	3%	2%

Notes: *Duty root 31, 32, 33 or 34 with FTE designation >0. Beginning teachers are teachers with less than one year of experience.

**Based on preliminary data which does not include some programmed fields.

Percentages may not add up to 100% due to rounding.

B. Supports for New Teachers – BEST Program

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 and a high turnover of beginning teachers can impact the quality of instruction that students receive.

Teachers who are newer to the profession change schools at a higher rate than more experienced teachers, often to another school within the district. Many things may cause new 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) Overview of the BEST program

Providing high-quality induction and mentoring support is seen as a viable approach to improve the retention and performance of beginning teachers. In Washington state, the Beginning Educator Support Team (BEST) program promotes strategies for improving district and regional capacity to retain and support beginning teachers. Washington has provided some state support for beginning teachers since 1987, initially through the Teacher Assistance Program (TAP). The total amount of funding for TAP remained constant over the years, while the number of beginning teachers increased, thereby reducing the amount of funding available per teacher. In 2009-10, the Washington state legislature authorized the development and funding of the BEST program. According to the Office of the Superintendent of Public Instruction, the goals of the BEST program are to 1) close learning gaps experienced by novice teachers when they enter a new system so they can close their students' learning gaps, 2) attract and retain skillful novice teachers in Washington's public schools, and 3) build comprehensive, coordinated systems of support within school districts to sustain induction work. BEST provides competitive grants to districts and regional consortia, and also funds professional development for instructional mentors throughout the state. Initially, the BEST program aimed to provide support for teachers in their first three years, but later this was reduced to support for first and second year teachers. In this report, we look specifically at first year teachers.

2) Characteristics of BEST districts

Since the inception of the BEST program, there has been significant variation in the number of participating districts. In the first year of the program, there were 30 participating districts. The number of participating districts has ranged from a low of 7 districts to a number ten times greater (71) in the most recent year of the analysis. Figure 1 displays the variation in the number of disticts with BEST grants since 2009-10.
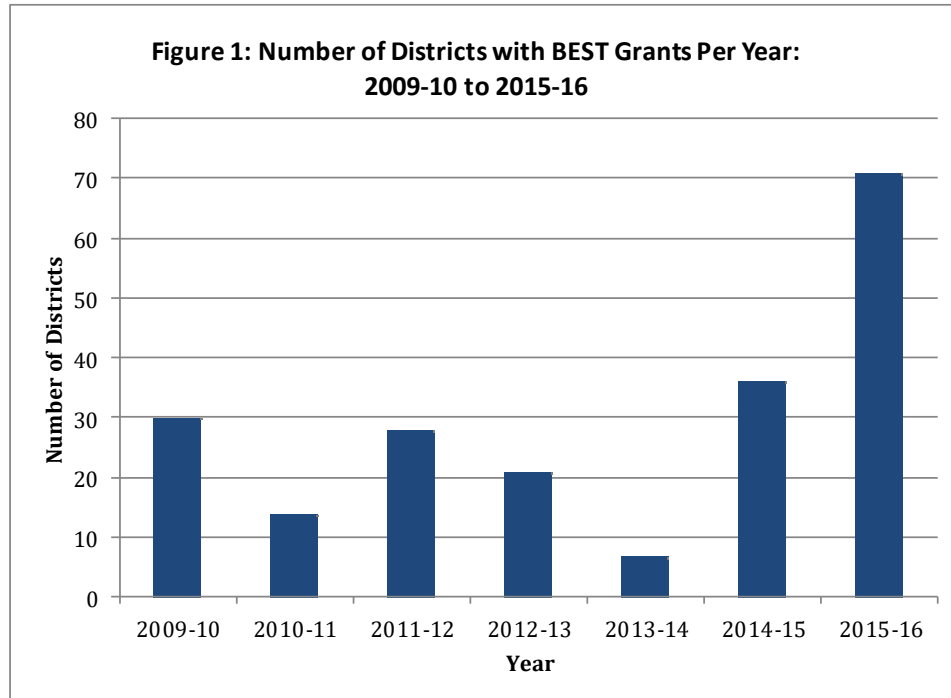
Figure 1: Number of Districts with BEST Grants Per Year: 2009-10 to 2015-16

Districts also varied in the number of years in which they participated in the BEST program, ranging from 1 to 6 years. There are 4 districts that have received 6 years of BEST funding: Battle Ground, Evergreen (in Clark County), Federal Way, and Grandview. Seven districts have received 5 years of BEST funding: Cheney, Hockinson, Kalama, Toppenish, Wapato, Washougal, and Zillah. None of the districts that received 5 or 6 years of BEST funding received any state support in the 2013-14 school year. During the period from 2009-10 to 2015-16, more than half (53%) of BEST-funded districts have received only one year of funding. When examing the characteristics of all BEST-funded districts, irrespective of the number of years of funding, the majority of districts were concentrated in Eastern Washington (57%) and had enrollments of less than 5,000 students (68%). Only 9% of BEST-funded districts had enrollments of more than 20,000 students. More than half (52%) of all BEST funded-districts were districts where 50% or more of students were low-income (as measured by FRPL participation). Table 4 provides details regarding the characteristics of BEST-funded districts by the number of years of BEST funding, and for all BEST districts over the period from 2009-10 to 2015-16.

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Table 4: Characteristics of BEST-Funded Districts by Years of BEST Funding: 2009-10 to 2015-16														
	6 years		5 years		4 years		3 years		2 years		1 year		TOTALS	
Years of BEST Funding	#	%	#	%	#	%	#	%	#	%	#	%	#	%
# of Districts	4		7		7		13		15		51		97	
Region of the State														
Central Puget Sound (ESD 121)	1	25%	0	0	0	0	4	31%	5	33%	6	12%	16	16%
Western WA (ESDs 112, 113, 114, 189)	2	50%	3	43%	2	29%	3	23%	2	13%	14	27%	26	27%
Eastern WA (ESDs 101, 105, 123, 171)	1	25%	4	57%	5	71%	6	46%	8	53%	31	61%	55	57%
District Enrollment														
Fewer than 999	0	0	1	14%	1	14%	2	15%	5	33%	22	43%	31	32%
1,000-4,999	1	25%	6	86%	4	57%	5	38%	3	20%	16	31%	35	36%
5,000-9,999	0	0	0	0	1	14%	2	15%	2	13%	5	10%	10	10%
10,000-19,999	1	25%	0	0	1	14%	3	23%	2	13%	5	10%	12	12%
20,000+	2	50%	0	0	0	0	1	8%	3	20%	3	6%	9	9%
District Poverty														
0-25% FRPL	0	0	1	14%	1	14%	1	8%	2	13%	4	8%	9	9%
26-49% FRPL	2	50%	3	43%	4	57%	4	31%	8	53%	21	41%	42	43%
50-74% FRPL	1	25%	2	29%	2	29%	8	62%	5	33%	18	35%	36	37%
75+% FRPL	1	25%	1	14%	0	0	0	0	0	0	8	16%	10	10%
Student Race/Ethnicity														
0-25% White	1	25%	2	29%	0	0	1	8%	1	7%	9	18%	14	14%
26-49% White	1	25%	1	14%	0	0	4	31%	3	20%	1	2%	10	10%
50-74% White	1	25%	0	0	2	29%	2	15%	4	27%	16	31%	25	26%
75+% White	1	25%	4	57%	5	71%	6	46%	7	47%	25	49%	48	49%

3) Beginning Teachers in BEST Districts

In addition to the significant variation in the number and characteristics of districts with BEST grants, there is also variation in the proportion of teachers who were served by the BEST program over time. The vast majority of beginning teachers have not been located in districts with BEST funding, meaning that most beginning teachers in Washington have not participated in BEST-funded teacher induction and support. The only exception is found in 2015-16, when slightly more than half of all beginning teachers (54%) were located in BEST-funded districts. During the time period from 2009-10 to 2015-16, the percent of all beginning teachers located in BEST districts ranged from 7% to 54% of all beginning teachers statewide. See Figure 2 for a display of the proportion of beginning teachers located in BEST districts from 2009-10 to 2015-16.

Figure 2: Percent of Beginning Teachers Served by BEST and Non-BEST Districts: 2009-10 to 2015-16
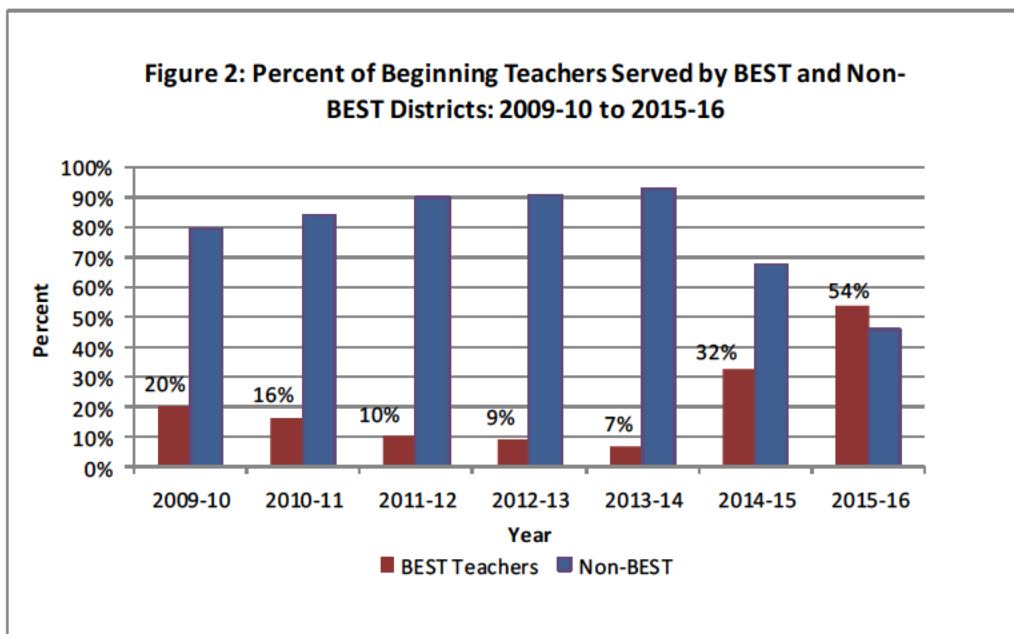
When comparing the individual characteristics of all beginning teachers with beginning teachers in BEST districts, we find several similarities and a few differences across the years we examined. No large differences were noted in the proportions of BEST teachers compared to all beginning teachers with respect to race/ethnicity or age distribution. There also was no consistent pattern of differences between the two groups when examining education level. For example, in 2010-11, 51% of BEST teachers held a Master's degree, compared to 40% of all beginning teachers in that year. Yet in 2013-14, the proportion of BEST teachers with a Master's degree (28%) was lower than for all beginning teachers (38%).

In each year examined, there were slightly higher proportions of BEST teachers who were full-time. On average, across all six years, 80% of BEST teachers were full-time, compared to 75% of all beginning teachers. And while the percentage of all beginning teachers who were female never dropped below 72%, in two of the years examined (2009-10 and 2011-12) slightly lower proportions of BEST teachers were female (68% and 65% female, respectively) compared to 72% of all beginning teachers statewide for both of those years (see Table 5).

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	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16**
Table 5: Characteristics of Beginning Teachers* in BEST Districts: from 2009-10 to 2015-16							
Number of BEST districts	30	14	28	21	7	36	71
# Teachers (Headcount)	275	316	194	225	206	1,093	1,981
Teacher Gender							
Female	68%	73%	65%	70%	77%	73%	75%
Male	32%	27%	35%	30%	23%	28%	25%
Full-time/Part-time Status							
Full-Time (FTE > .9)	70%	80%	76%	83%	85%	85%	NA
Not Full-Time (FTE < .9)	30%	20%	24%	17%	15%	16%	NA
Education							
Bachelor	58%	47%	53%	54%	70%	55%	60%
Masters and above	40%	51%	42%	42%	28%	42%	40%
Unidentified	2%	2%	5%	4%	2%	3%	1%
Teacher Age (in given year)							
19-30	68%	70%	60%	63%	70%	65%	64%
31-40	15%	17%	23%	21%	16%	22%	22%
41-50	12%	9%	13%	12%	11%	10%	11%
51-60	5%	4%	4%	4%	3%	3%	3%
61+	0%	0%	1%	0%	0%	0%	1%
Teacher Race/Ethnicity							
Asian/Pacific Islander/Native Hawaiian	4%	4%	3%	3%	3%	5%	4%
Black/African American	2%	1%	2%	2%	2%	3%	2%
Hispanic	6%	7%	5%	4%	4%	6%	7%
Native American/Alaskan Native	0%	0%	1%	0%	1%	0%	1%
White (non-Hispanic)	88%	85%	87%	89%	87%	85%	83%
More than one race	NA***	4%	3%	2%	2%	2%	3%

Notes: *Duty root 31, 32, 33 or 34 with FTE designation >0. Beginning teachers are teachers with less than one year of experience.

**Based on preliminary data which does not include some programmed fields.

***"More than one race" category was added in 2010-11.

Percentages may not add up to 100% due to rounding.

4) Schools Where BEST Teachers Work

Since there is great variation from one year to the next in terms of the number and type of districts that received BEST grants, it is not surprising to see variation across time in the characteristics of schools in which BEST teachers work. In general, close to half of all beginning teachers in Washington worked in elementary schools between 2009-10 and 2015-16. This number has increased slightly in the most recent three years, when more than half of all beginning teachers worked in elementary schools. Over this same seven-year time span, the school level assignments of BEST beginning teachers have shown slightly more variability, with slightly lower proportions working in elementary schools in the most recent years in the data set. However, BEST beginning teachers mirrored the recent trend (since 2013-14) of rising proportions of all beginning teachers working in elementary schools.

When considering the poverty level of the schools where all beginning teachers worked, we see a relatively stable trend over time, with just under half of these teachers working in the highest poverty schools (50% or more FRPL participation). BEST beginning teachers, however, exhibited a different pattern. While only about a third of BEST beginning teachers worked in the highest poverty schools during the two earliest years of the data set (2009-10 and 2010-11), we see a dramatic shift beginning in 2011-12, when more than half and up to three-fourths of BEST beginning teachers worked in the highest poverty schools.

There is also more variation in the student composition of the schools where BEST beginning teachers worked during these same seven years—ranging from a low of 32% working in schools where a majority of students were students of color in 2009-10 to a high of 74% in 2013-14. Beginning in 2013-14 and continuing through the 2015-16 year, the majority of beginning BEST teachers worked in schools with 50% or more students of color, compared to less than half (between 37-43%) of all beginning teachers statewide. Table 6 provides details about school characteristics for beginning teachers in BEST districts (see Table 3 for a comparison with all beginning teachers statewide).

Table 6: District and School Characteristics of Beginning Teachers* in BEST Districts: from 2009-10 to 2015-16							
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16****
Number of BEST districts	30	14	28	21	7	36	71
# Teachers (Headcount)	275	316	194	225	206	1,093	1,981
Region of the State							
Central Puget Sound	54%	53%	23%	32%	68%	66%	51%
Western WA (ESDs 112, 113, 114, 189)	24%	37%	42%	38%	6%	17%	24%
Eastern WA (ESDs 101, 105, 123, 171)	22%	10%	36%	29%	26%	17%	26%
District Enrollment							
Fewer than 999	0%	0%	8%	4%	0%	1%	2%
1,000-4,999	20%	16%	34%	26%	11%	13%	14%
5,000-9,999	6%	4%	0%	5%	10%	3%	7%
10,000-19,999	17%	18%	8%	16%	41%	32%	30%
20,000+	57%	62%	50%	50%	38%	52%	47%
School Level							
Elementary	47%	43%	39%	44%	59%	55%	55%
Middle School	15%	24%	19%	26%	13%	18%	14%
High School	32%	31%	36%	22%	23%	22%	23%
Other (e.g., PK-8, 1-8, 6-12)	6%	3%	6%	8%	5%	6%	6%
Poverty of School							
0-25% FRPL	31%	23%	9%	2%	2%	14%	13%
26-49% FRPL	42%	42%	29%	33%	20%	27%	29%
50-74% FRPL	21%	23%	42%	48%	40%	32%	32%
75+% FRPL	7%	13%	19%	17%	36%	25%	24%
Unidentified	0%	0%	1%	0%	2%	3%	3%
Student Race/Ethnicity							
0-25% White	12%	19%	19%	20%	37%	31%	29%
26-49% White	20%	21%	20%	25%	37%	25%	23%
50-74% White	30%	38%	35%	21%	19%	26%	30%
75+% White	38%	22%	25%	34%	4%	15%	16%
Unidentified	0%	0%	1%	0%	2%	3%	3%

Notes: *Duty root 31, 32, 33 or 34 with FTE designation >0. Beginning teachers are teachers with less than one year of experience.

**Based on preliminary data which does not include some programmed fields.

Percentages may not add up to 100% due to rounding.

In the next section, we examine the issue of the retention and mobility of all beginning teachers and for teachers who worked in BEST districts during the time period from 2009-10 to 2015-16.

C. Retention and Mobility of Beginning Teachers Statewide and in BEST Districts

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

Trend data over four time periods verifies that the rate of beginning teacher 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. As can be seen in Table 7, a higher proportion of beginning teachers move both within district (16-18%) or to another district (13-19%). This can be compared to 14% of all teachers statewide who move within district, and 7% who move out of district. However, the rate of beginning teachers exiting the Washington workforce has been declining slightly over time, to a low of 21% in the most recent five-year period, a rate that is similar to all teachers statewide.[4]

Table 7: Statewide Beginning Teacher Retention - Five Year Trend Data								
5 Year Period	Total Beginning Teachers	Beginning Stayers in School		Beginning Movers in District		Beginning Movers out district		Beginning Exiters from WA System	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
2003 to 2007	2,344	991	42.3%	399	17.0%	347	14.8%	607	25.9%
2005 to 2009	2,849	1,331	46.7%	463	16.3%	361	12.7%	694	24.4%
2010 to 2014	1,960	809	41.3%	350	17.9%	371	18.9%	430	21.9%
2011 to 2015	1,882	822	43.7%	316	16.8%	352	18.7%	392	20.8%

We compared the five-year retention and mobility rates of beginning teachers who were located in BEST-funded districts with those located in non-BEST districts. To draw these comparisons, we identified those beginning teachers who were located in BEST districts in 2010-11 and 2011-12 and calculated their retention and mobility status after five years. Consequently, we examined two 5-year time periods: 2010-11 to 2014-15 and 2011-12 to 2015-16. When examining the descriptive statistics in Table 8, we see that the percentage of stayers in BEST districts is higher (50% for both time periods) than the rate of stayers in non-BEST districts (40% in one time period and 43% in the other). We also note that a lower proportion of teachers in BEST districts moved within their districts for both time periods, and a lower proportion of teachers in BEST districts moved out of district for one time period, but not the other. Finally, the proportion of exiters was nearly identical for BEST and non-BEST teachers in one time period (2010 to 2014), but somewhat different in the later time period, with 18% of BEST teachers exiting, compared to 21% of all teachers statewide.

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[4] See Elfers, A., Plecki, M., & Van Windekens, A. (2017) *Examining Teacher Retention and Mobility in Washington State* for additional information about the retention and mobility rates of all teachers statewide.

Table 8: Five-Year Retention and Mobility Rates for Beginning Teachers in BEST and Non-BEST Districts									
	2010-11 to 2014-15				2011-12 to 2015-16				
	Non-BEST teachers		BEST teachers		Non-BEST teachers		BEST teachers		
# Teachers	1,644		316		1,686		196		
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Stayers	649	39.5%	158	50.0%	724	42.9%	98	50.0%	
Movers In	300	18.3%	50	15.8%	291	17.3%	25	12.8%	
Movers Out	333	20.3%	38	12.0%	315	18.7%	37	18.9%	
Exiters	360	21.9%	70	22.2%	356	21.1%	36	18.4%	

It is important to note that these are descriptive statistics, which do not control for important variables associated with teacher retention and mobility outcomes. It is also possible that the variations noted do not represent statistically significant differences. In Section D of these findings, we develop statistical models that control for such important predictors while testing for statistically significant differences in retention and mobility rates for beginning teachers located in BEST-funded districts.

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, teachers, and students served. Table 9 presents beginning teacher retention and mobility during the 2010-11 to 2014-15 period, and reveals regional variation. 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.

Table 9: Beginning Teacher* Retention by ESD (Five Year Trend Data: 2010-11 to 2014-15)											
ESD	Total # Teachers	Total Beginning Teachers	Percent Beginning Teachers	Stayers in School		Movers in District		Movers out district		Exiters from WA System	
				#	%	#	%	#	%	#	%
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%

*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

The majority of beginning teachers (on average 70%) 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. In 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 Reduction in Force (RIF) notices statewide in the spring of 2009 (see Table 10).

Table 10: 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 provide a look at beginning teacher retention and mobility in BEST districts by comparing six-year averages for the time period 2009-10 to 2014-15 (using year-by-year datasets). On average, beginning teachers in BEST-funded districts are retained in their school at somewhat higher rates than beginning teachers statewide (77% vs 73%). Mobility and exiting patterns for teachers in BEST-funded districts are, on average, slightly lower (see Table 11).

Table 11: Average Retention and Mobility Rates for Beginning Teachers Six-Year Averages (2009-10 to 2014-15)				
	Statewide		All BEST districts	
	Average #	Average %	Average #	Average %
# Teachers (Headcount)	2,154		175	
FTE Teachers	1,904		160	
Retention and Mobility (from 1 yr to next)				
Stayers in School	1569	72.8%	135	77.0%
Movers in District	216	10.0%	14	7.8%
Movers out District	162	7.5%	11	6.2%
Exiters from WA system	207	9.6%	16	9.0%

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

In order to test the statistical significance of our descriptive findings about beginning teacher retention and mobility, we develop statistical models that are discussed in the next section. We use the descriptive statistics about the characteristics of beginning teachers, and the schools and districts in which they are located, to inform our selection of variables to include in our statistical analysis.

D. Statistical Models of Beginning Teacher Retention and Mobility Statewide and in BEST Districts

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: stayers, movers in district, movers out of district and exiters. The focal question is, "What variables consistently explain beginning teachers' retention and mobility in Washington state?"

In this portion of the report, we first provide an introduction to our analyses, models and datasets (section 1). Next, we present the results from our models which compare retention and mobility outcomes for all BEST districts with outcomes for all beginning teachers statewide (section 2). Since implementation was variable across BEST districts during the time period examined, we also focus on a subset of BEST districts meeting specified criteria regarding the features of their induction programs (section 3). In doing so, we find that the subset of districts which met criteria for full-fledged induction programs show a favorable and statistically significant difference in exit rates for beginning BEST teachers. However, evidence from comparing beginning teacher retention and mobility in all BEST districts to non-BEST districts was less clear. We provide a summary at the conclusion of section.

1) Introduction to analyses, models and datasets

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 thought to influence teacher retention and mobility outcomes (e.g., district, school, and individual level characteristics, such as the total student enrollment at the district level, the percentage of students in poverty at the school level, and full-time teaching status at the individual teacher level).

In the models, we included a variable indicating whether or not a beginning teacher was working in a BEST-funded district. This variable was included in order to conduct preliminary exploration into the potential impact of the BEST program. However, it is important to recognize that significant variation exists in our sample. First, as previously mentioned, the number of districts funded in a given year varied from 7 to 71 districts. Second, the amount of funding in any given year for the BEST program also varied. Consequently, districts experienced different levels of support depending on the year in which they participated in the program. Third, the BEST program included support for teachers in their first 3 years at one point, but later the program only included teachers in the first 2 years. Because of these variations, our analyses are limited only to first year teachers. These important variations in program implementation and levels of funding make it particularly challenging to conduct clear and meaningful analyses of retention and mobility of beginning teachers in BEST districts, since the effects calculated are based on averages of widely varying numbers and types of districts.

Since districts were not randomly selected to receive BEST funding and these districts also were not representative of all districts statewide, we built and fitted regression models to control for district, school, and individual level characteristics thought to have relationships to teachers' retention and mobility outcomes, including the BEST status of the district where the teacher worked, using both five-year and year-by-year datasets.

We begin with an analysis of the five-year cohort-based dataset for 2010-11 to 2014-15. This dataset includes all teachers statewide who were in their first year of teaching in 2010-11 (N=1,960). Next, we conduct an analysis of the five-year dataset for 2011-12 to 2015-16 (N=1,882). Where applicable and appropriate, supporting evidence is provided from a year-by-year dataset that includes six years of cohort data for teachers in 2009-10, 2010-11, 2011-12, 2012-13, 2013-14, and 2014-15. The year-by-year dataset includes beginning teachers in each year for a total of 13,884 records. We ran separate models for each of the six years of data to avoid issues related to duplicate teacher records and to provide a more precise understanding of BEST effect by year.

The complete beginning teachers' multinomial logistic regression STATA output based the 2010-11 to 2014-15 dataset can be found in Appendix A, while output for the 2011-12 to 2015-16 dataset can be found in Appendix B. The BEST beginning teachers' multinomial logistic regression STATA output for two illustrative years of the year-by-year dataset can be found in Appendices C and D.

2) Beginning Teachers Statewide and in BEST Districts

Beginning exiters from the WA teacher workforce

The first outcome discussed is the exit of beginning teachers from the Washington workforce. We conducted analyses in the form of multinomial logistic regressions, requiring each outcome to be compared to a reference group. Staying in one's same school five years later was selected as the reference group, since this outcome represents the majority of beginning teachers in our datasets. As seen in Table 12, less than half of the 12 independent variables included in the model for beginning teachers were identified as significant predictors of the exiting outcome ($p<.05$) 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 and school level proportions of both student poverty and White students were not found to be significant predictors of the exiting outcome, we retained these variables in the model to control for variation in these measures across the state.

Table 12: Significant Predictors of Beginning Teacher Exit Outcome (as compared to Stayers)		
	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)**
School Enrollment	−	*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. Coefficients are in relative risk ratios (RRR).

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. Negative predictors, or those less than 1.0, suggest a decreased likelihood in the relative risk of teachers with that characteristic in the outcome group rather than 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 from the teacher workforce five years later as compared to staying in their original schools (coefficient of 0.55), holding all other variables constant. More generally, it could be said that if a beginning teacher were full-time, the individual would be expected to be a stayer rather than an exiter.

Conversely, positive predictors, or those greater than 1.0, suggest an increased likelihood in the relative risk of teachers with that characteristic in the outcome group rather than 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, "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, indicating that beginning elementary school teachers were more likely to stay in their original schools five years later than their secondary and "other" counterparts. In the more recent 2011-12 to 2015-16 dataset, teaching in a high school, rather than elementary school, as a beginning teacher was associated with two times the risk of exiting the workforce five years later (coefficient of 2.03). With the later cohort of beginning teachers, there was no significant difference in likelihood of exit five years later for those working at the middle school or "other" school levels, as compared to those working at the elementary level.

The majority of variables included in the beginning teacher exiter models were not found to be statistically significant, regardless of the time period examined. For instance, highest degree held by the teacher was not a significant predictor, and neither was the regional location of the school where the teacher worked. In these exiter models, participation in BEST was not found to be a significant predictor of whether a beginning teacher exited the teacher workforce or remained in the school five years later.

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 one's same school five years later was the reference group. Being located in a different district was the third most frequent outcome observed for beginning teachers, representing approximately 19% of teachers in both the five-year time periods examined.

As seen in Table 13, in the first five-year dataset (2010-11 to 2014-15), school level student poverty was a significant and positive predictor of a beginning teacher moving to a new district five years later. This indicates that as school level student poverty rises 10 percent, beginning teachers are, on average, 1.11 times more likely to move to a new district (rather than remain in their original school), holding all other variables constant. This effect of school level poverty on beginning teachers' movement to new districts was not evident in the more recent five-year dataset

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(2011-12 to 2015-16). Also in the earlier dataset, BEST participation was associated with approximately half the likelihood of moving out of district as compared to remaining in one's same school, suggesting that BEST may have encouraged new teachers to remain in their original district.

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 in a high school. As the proportion of White students in a school increased by 10 percent, the likelihood that a beginning teacher would move to a new district decreased slightly (coefficient of 0.92), holding all other variables constant. Compared to their elementary school counterparts, beginning teachers in high schools are more likely to move to a new district, by a factor of 1.71, holding all other variables constant. It is worth pointing out that this increased likelihood of beginning high school teachers moving out of district was echoed in our analyses of all teachers statewide (see Elfers, Plecki & Van Windekens, 2017). This higher likelihood of out-of-district movement for high school teachers, regardless of years of teaching experience, perhaps points to structural or contextual features of high schools that prompt teachers to find work in new districts.

Only one variable—district level student enrollment—was found to be a significant negative predictor across both five-year time periods. As enrollment increases, teachers are less likely to move out of the district. This is to be expected, since larger districts often provide more opportunities for teachers to change schools within the district.

Table 13: Significant Predictors of Beginning Teacher Mobility Out of District Outcome (as compared to Stayers)		
	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	–	–
School % Poverty	+ (1.11)	*Not significant*
%White Students	*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. Coefficients are in relative risk ratios (RRR).

Beginning movers within district

The final outcome discussed is moving as a beginning teacher to another school within one's original school district, as compared to the reference outcome of staying within one's original school. This was the least frequently observed

outcome for beginning teachers, representing about 17% of all beginning teachers statewide. As seen in Table 14, 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.

Although not significant at the $p<.05$ level, BEST participation approached significance at the $p<.05$ level in both five-year time periods ($p=.085$ and $p=.091$, depending on the year). BEST participation was associated with a decreased likelihood of teachers moving within their original district, suggesting that beginning teachers in BEST districts were more likely to remain in their original schools, as compared to beginning teachers who were not in BEST-funded districts.

As seen in Table 14, differences emerged when examining results for the two five-year time periods. In the first five-year dataset, full-time teacher status was associated with less than half the likelihood of a beginning teacher moving to a different school within the same district five years later, as compared to remaining in one's original school (coefficient of 0.48), holding all other variables constant. In other words, full-time beginning teachers were more likely to stay 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 one's 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 within-district movers. 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) increases, the likelihood of a beginning teacher moving within district as opposed to remaining in their original school decreases. This is interesting, as we might expect higher levels of school poverty to have the opposite effect, which would be to drive beginning teachers away from such a school, perhaps to a different school within the same district. It could be that schools with higher levels of poverty also have more developed structures to support teachers or students, making it more likely for teachers in such schools to stay.

Highest degree held and teaching in "other" school grade 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 14: Significant Predictors of Beginning Teacher Mobility Within District Outcome (as compared to Stayers)		
	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	+	+
School % Poverty	*Not significant*	– (0.92)
School Enrollment	*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. Coefficients are in relative risk ratios(RRR).

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

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

- *Movers out of district.* 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.

- *Movers in 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.

The following points summarize the findings from analysis of the five-year datasets regarding the relationships between BEST participation for beginning teachers and their subsequent retention and mobility outcomes after five years:

- *Movers out of district.* In the five-year dataset for 2010-11 to 2014-14, there was a significant effect of BEST participation on a beginning teachers'

likelihood of moving to a new district. BEST participation was associated with approximately half the likelihood of beginning teachers moving out of district, suggesting that BEST may have encouraged new teachers to remain in their original schools.

- *Movers in district.* Although not significant at the $p<.05$ level, BEST participation approached significance in both five-year datasets ($p=.085$ and $p=.091$) in regard to beginning teachers moving within their original districts. BEST participation was associated with a decreased likelihood of movement within teachers' original school districts, suggesting that these beginning teachers were more likely to remain in their original schools as compared to beginning teachers who were not in BEST-funded districts in 2010-11 or 2011-12.

Year-by-year analyses

We examine BEST-related retention and mobility outcomes of beginning teachers in a more in-depth way using the year-by-year dataset for each of the years from 2009-10 to 2014-15. Across these six years, the year-by-year analyses involved 2,309 beginning teachers, who were located in BEST-funded districts, and 11,575 who were located in non-BEST-funded districts.

After running separate models for each of the six years of data (2009-10 to 2014-15), the six multinomial logistic regressions resulted in the following significant findings:

- In 2009-10, BEST was found to be a significant and negative predictor of beginning teachers exiting ($p=.037$), and also of moving to a new district ($p=.027$) one year later. Specifically, beginning teachers in BEST districts were less likely to exit the workforce one year later, as compared to their peers in non-BEST districts (coefficient of 0.60). Regarding moving to a new district, BEST beginning teachers were, on average, less than half as likely to leave the district one year later, as compared to their non-BEST counterparts. In both cases, this indicates that BEST beginning teachers were significantly more likely to remain in their original schools. The multinomial logistic regression STATA output on which this finding is based can be found in Appendix G.

- In 2013-14,[5] BEST was found to be a significant and positive predictor of beginning teachers moving to a different school within their district ($p=.001$). Specifically, beginning teachers in BEST districts were more than twice as likely as their peers in non-BEST districts to move within the district as compared to remaining in one's original school one year later (coefficient of 2.16). Although this suggests that BEST beginning teachers were leaving

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[5] It should be noted that 2013-14 represents the year with the fewest number of BEST districts.

their original schools, it also demonstrates that they were remaining within their original BEST-funded districts. Given that BEST was conceptualized as a district-level intervention for new teachers, one could argue that this outcome provides evidence of the effectiveness of the BEST program. The multinomial logistic regression STATA output on which this finding is based can be found in Appendix H.

Model limitations

While the models already presented include a variable of whether or not teachers were located in a BEST-funded district, the analyses do not address the critical question of the quality of BEST program implementation, which would directly address the issue of variability in beginning teacher support and induction programs across districts. It is reasonable to assume that such variation exists; that is, some BEST districts may have a more rigorous, comprehensive, or otherwise higher quality set of induction supports in place than other BEST districts. This suggests that the statistical models presented above may not be able to consistently detect significant variation in retention and mobility outcomes. It is possible that variation may be present, but might be masked by differences in the quality of teacher induction program implementation across BEST districts. In the next section, we provide additional analyses aimed at specifically addressing variation in outcomes of beginning teachers located in districts with BEST induction programs that met standards for a full-fledged induction program.

3) Retention in 2013 and 2014 BEST Districts that Met BEST Induction Standards

Analytic approach

Given the potential for variation in the quality of induction programs among BEST districts, we conducted an additional set of statistical analyses using a subset of BEST-funded districts that received grants in 2013 and 2014. Each district that received a grant in these two years was asked to respond to seven questions about their teacher induction program. These questions were developed by OSPI as proxies for determining whether a BEST district was engaging in full-fledged implementation of a teacher induction program. The questions are informed by BEST standards for induction and are provided below:

1. Have you been doing induction work for two or more years?
2. During this time, did you have a stakeholder team?
3. During this time, did you hold an orientation for new teachers during the summer that had at least one day related to instruction?
4. During this time, did you offer on-going professional development for new teachers?
5. During this time, did you send your mentors for training at the Mentor

Academy?

6. During this time, did you offer on-going professional development for mentors (roundtables, in-district training, etc.)?
7. During this time, did you have mentors observe new teachers and give them verbal and/or written feedback?

Districts that responded "yes" to all seven questions were identified as having a full-fledged induction program. In other words, districts meeting these criteria are said to have met BEST induction standards. A total of 14 districts verified that all seven criteria were met. Of these 14 districts, four districts received BEST funding in 2013 and were also funded in 2014. Ten of the 14 districts received funding beginning with the 2014-15 year. Beginning teachers in these 14 districts were combined into one group named "BEST subset." The teachers in the BEST subset were compared to all remaining beginning teachers statewide.

Model specification

There were 771 beginning teachers in the 14 districts selected for further analysis. Because the sample size is much smaller than that for all BEST districts examined in the prior section of this report, there were limitations to the types of analyses that were possible for this subset of BEST districts. We conducted tests of statistical power to determine the most appropriate modeling approach. The statistical power calculations indicated that the appropriate analysis was to compare the exit rate of beginning teachers to the rate of staying as a teacher in Washington, either in the same or a different school or district. While other outcomes are of interest (i.e., movers in and movers out), statistical power constraints limited us to investigating the exiter outcome at this time. Consequently, we use logistic regressions rather than multinomial logistic regression for this analysis.

The focal question for this analysis is: "Did beginning teachers in BEST-funded districts that met a set of criteria for full-fledged induction programs exit the Washington education system at statistically significantly lower rates, compared to all other beginning teachers in the state?" We want to emphasize that this is not a comparison of BEST versus non-BEST districts, but rather an analysis that compares beginning teachers in BEST districts meeting the seven criteria for BEST induction standards to teachers experiencing all other options. The comparison group for our reference outcome of interest (exiter) combines the three remaining potential outcomes mentioned above into one group—stayers, movers in, and movers out of district.

Table 15 provides descriptive, comparative retention and mobility statistics on the overall numbers and proportions of beginning teachers statewide working in BEST subset districts and all remaining districts in 2014-15. This table provides evidence that a smaller proportion of beginning teachers who worked in the BEST subset districts exited the Washington teaching workforce one year later (6.9%) as compared to their peers working in other districts (9.7%).

Table 15: Beginning Teacher Exiters in BEST Subset Compared to All Other Beginning Teachers: 2014-15 to 2015-16						
	Exiters only		Stayers, Movers in and Movers out Combined		Total	
	Number	Percent	Number	Percent	Number	Percent
Teachers in BEST subset districts	53	6.9%	718	93.1%	771	100.0%
Teachers in all other districts	251	9.7%	2,350	90.3%	2,601	100.0%
Total teachers	304	9.0%	3,068	91.0%	3,372	100.0%

We included seven variables in our specified model. The first three variables are continuous district- and school-level variables, while the remaining four variable categories are binary. The Total District Enrollment variable refers to the total number of students enrolled in the teacher's original district. The School % Poverty variable refers to the proportion of students enrolled in FRPL. The % White Students variable refers to the proportion of White students enrolled in the teacher's original school. Our variable of interest, BESTSubsetDistricts, is binary and notes whether teachers were working in 2014-15 in a subset district or not. The next binary variable, Full Time Teacher, indicates whether or not the teacher had a reported teacher FTE of 0.90 or above. Region indicates in which of three regions the teacher worked during the 2014-15 school year (Puget Sound region, where the majority of teachers work, is our reference category). Finally, School Grade Level indicates the type of school where the teacher taught that year (elementary school level, where the majority of teachers work, is our reference category). The grade level category named "other" refers to schools that are not exclusively either elementary or secondary (e.g., K-12 schools). Table 16 provides the definitions we used to categorize the grade levels of schools where teachers worked.

Table 16: School Grade Level Categories and Definitions	
Elementary	Schools serving any of grades K-6 and none of grades 7-12.
Middle	Schools serving primarily any of grades 6-9.
High	Schools serving any of grades 9-12 and none of grades K-8.
Other	Schools serving one or more of grades K-6 AND one or more of grades 7-12.

Findings and interpretation

Results from the logistic regression model are presented in Table 17. Information about model coefficients and confidence intervals are provided in Appendix E.

Table 17: Odds Ratio Results and Significant Predictors of "Exiter" Outcome (as compared to remaining 3 outcomes combined)		
2014-15 to 2015-16 (*N* =3,278)		
Independent variables	**Odds ratio**	***Predictor significant at *p* <.05?**
Total District Enrollment	1	No
School % Poverty	0.95	No
% White Students	0.88	Yes *(p* =.002)
BESTSubsetDistricts	0.57	Yes *(p* =.005)
Full Time Teacher	0.52	Yes *(p* <.001)
Region (Western WA)	1.09	No
Region (Eastern WA)	0.84	No
School Grade Level (Middle)	1.15	No
School Grade Level (High)	1.23	No
School Grade Level (Other)	2.01	Yes *(p* =.004)

Four of the variables included in our model were found to be statistically significant predictors at the *p*<.01 level of beginning teachers represented in the "exiter" outcome category. These four variables are: the proportion of White students at the school, the full-time status of the teacher, if the teacher taught in one of the "other" school grade level configurations, and, of most interest to the focus of this analysis, whether or not the beginning teacher worked in a BEST subset district. We note that although three variables were not found to be statistically significant (the total number of students enrolled in the district, the school-level proportion of students living in poverty, and the region in which the teacher worked), we retained these variables in the model because they control for important contextual factors which vary across the state and could shape teachers' decisions to remain in the workforce.

As compared to their peers who were not working in one of the BEST subset districts in 2014-15, the odds of beginning teachers in the BEST subset districts exiting the Washington state workforce one year later decrease by a factor of 0.57 (*p*=.005), holding constant all other variables in the model. In other words, beginning teachers in the BEST subset of districts meeting the criteria for BEST induction standards were significantly more likely to remain in the teaching profession in the state of Washington than their peers who were not in such districts, controlling for other important characteristics.

To provide a more concrete understanding of how working in one of the 14 BEST subset districts was predicted to impact the likelihood of exit from the Washington state teaching workforce one year later, we explored two types of margins: 1) the average marginal effect (AME), and 2) the marginal effect at the means (MEM). In general, margins provide the predicted change in likelihood of our variable of interest (exiter) when only one variable in the model is changed. In our case, the variable we changed is whether the teacher worked in a BEST subset district or not.

The AME approach draws on the empirical, recorded covariates of all observations within the dataset to predict what would happen if teachers were or were not in BEST subset districts, and then averages these probabilities. The MEM approach draws on the mean values of each of the covariates to predict what would happen if teachers were or were not in subset districts. Although these two approaches use somewhat different methods to approximate the outcome of interest (exiter)—or the probability of exiting based on the inputs to the specified model—the results presented below are quite similar.

According to our specified model and utilizing the average marginal effects (AME) approach, there is a difference of 4 percent (3.99) in the predicted likelihood of exit between beginning teachers working in the 14 BEST subset districts and their peers working in non-BEST subset districts. On average, approximately 10 percent of beginning teachers working in non-BEST subset districts are predicted to exit the teaching workforce one year later, compared to approximately 6 percent of their peers working in BEST subset districts. This difference is statistically significant at the p=.001 level (see Appendix F).

Similarly, according to our specified model and utilizing the marginal effect at the means (MEM) approach, there is a difference of approximately 3.8 percent in the predicted likelihood of exit between beginning teachers working in the 14 BEST subset districts and their peers working in non-BEST subset districts. On average, approximately 9.4 percent of beginning teachers working in non-BEST subset districts are predicted to exit the teaching workforce one year later, compared to approximately 5.6 percent of their peers working in BEST subset districts. These predicted values are statistically significant at the p=.001 level (see Appendix G).

To summarize our specified model and calculations of two types of margins, we found that beginning teachers in BEST-funded districts that met standards for a full-fledged induction program had statistically significantly lower rates of exiting the Washington teaching workforce one year later than beginning teachers in other districts.

IV. Conclusions and Implications

This study focused on understanding the retention and mobility of beginning teachers in Washington state. We found that for all beginning teachers, there is a relationship between full-time status and retention, as full-time beginning teachers are half as likely to exit as compared to part-time beginning teachers. We also found that 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. It is important to note that, contrary to the findings from the majority of other studies in the research

literature, the poverty level of the school was not a consistently significant predictor of beginning teacher turnover. Further investigation into the reasons why full-time status, high school teaching, and student race/ethnicity are related to teacher retention and mobility would be a worthy endeavor.

This study also examined teacher retention and mobility for all beginning teachers located in BEST-funded districts. Findings indicate that the BEST program has had some positive impact on teacher retention and mobility. When looking at two five-year time periods for teachers who were located in BEST-funded districts (2010-11 to 2014-15 and 2011-12 to 2015-16), we find that for the earlier time period, beginning teachers in BEST-funded districts are statistically less likely to move out of district after five years.

Perhaps more importantly, when examining outcomes for beginning teachers in a subset of BEST-funded districts that met standards for a full-fledged induction program, we find that beginning teachers in such districts had a lower rate of exiting the Washington workforce after one year than other beginning teachers. This result was statistically significant. These findings suggest that continuing efforts aimed at high-quality, comprehensive mentoring and support of teachers new to the profession can be effective in reducing beginning teacher attrition.

While it is likely that some districts not receiving any BEST funding have quality induction programs in place, currently data is not available to identify those districts statewide. It also should be noted that 53% of all BEST-funded districts received only one year of funding, and many BEST-funded districts have just received BEST funding for the first time in 2015-16. Thus, it is not possible yet to assess the long-term impact of BEST funding on a sizeable portion of teachers in BEST-funded districts. Additional inquiry is needed to examine the impact of high quality teacher induction in Washington state, perhaps including all districts that meet standards for high quality teacher induction programs, irrespective of BEST funding.

An important potential implication to consider based on this work is the following: Only about a third of BEST-funded districts in 2013-14 and 2014-15 met the standards for full-fledged induction programs described earlier. Further inquiry is needed in order to understand why the majority of BEST-funded districts were not able to implement all features of a fully-fledged induction program. Factors which may influence the capacity of districts to provide comprehensive induction support include the lack of stable or sufficient funding to support new teachers, a lack of experienced mentors who can bring the program to life for those new to the profession, and a need to develop district-wide capacity to support new teacher induction, even when the numbers of new teachers fluctuate from year to year.

As stated in this report, the number of first and second year teachers has more than doubled since 2010-11. This rapid increase in the number of teachers new to the profession indicates that the need for efficient and effective teacher induction, mentoring and support programs is more pronounced than has been in the past.

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 related issues. Further inquiry is needed into matters such as reasons why teachers make particular career decisions, the impact of school working conditions and leadership, and the adequacy and quality of the teacher preparation pipeline.

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Appendices

Appendix A: 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
	.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 B: 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						
	.6917679	.1029993	-2.47	0.013	.5166812	.926186

```
        region |
    Western WA |   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
               |   .5029484      .16958    -2.04   0.042     .2597301    .9739231
               |
         _cons |   .8430706     .375116    -0.38   0.701     .3524766    2.016497
---------------+----------------------------------------------------------------
STAY           | (base outcome)
--------------------------------------------------------------------------------
```

Appendix C: BEST beginning teachers' multinomial logistic regression STATA output based on the year-by-year dataset (2009-10 to 2010-11)

```
mlogit ndYearMOB TotalEnroll_by100 stPoverty_by10 stWhite_by10 stYearEnroll_by50 BEST
FTteacher i.HighestDegree i.region i.SchlGradeLevel if Exp<1 & yr==2009, rr base(5)

Multinomial logistic regression              Number of obs    =       1,278
                                              LR chi2(36)      =      114.05
                                              Prob > chi2      =      0.0000
Log likelihood =  -1178.203                   Pseudo R2        =      0.0462

--------------------------------------------------------------------------------
        ndYearMOB |      RRR    Std. Err.     z    P>|z|    [95% Conf. Interval]
------------------+-------------------------------------------------------------
Exit
TotalEnroll_by100 |  1.000354    .0008754    0.40   0.686    .9986392   1.002071
   stPoverty_by10 |  .9453755    .0561047   -0.95   0.344    .8415667   1.061989
     stWhite_by10 |  .9974127    .0566521   -0.05   0.964     .892334   1.114865
stYearEnroll_by50 |  .9847835    .0118487   -1.27   0.203    .9618322   1.008283
             BEST |  .5951737    .1479827   -2.09   0.037    .3655971   .9689127
         FTteacher |   .330597    .0635511   -5.76   0.000    .2268148   .4818663
                  |
    HighestDegree |
  MastersAndAbove |  1.078403    .2122527    0.38   0.701     .733241   1.586046
                  |
           region |
       Western WA |   1.03925     .269919    0.15   0.882    .6246574   1.729013
       Eastern WA |  1.243181    .3667913    0.74   0.461    .6972587   2.216537
                  |
    SchlGradeLevel |
           Middle |  .9784626    .2867559   -0.07   0.941    .5509147   1.737817
             High |  1.576682    .4185438    1.72   0.086    .9370989    2.65279
            Other |  1.264162    .4476801    0.66   0.508     .631488   2.530698
                  |
            _cons |  .4368115    .2625878   -1.38   0.168    .1344612   1.419029
------------------+-------------------------------------------------------------
MOUT
TotalEnroll_by100 |  .9972797     .001317   -2.06   0.039    .9947018   .9998643
   stPoverty_by10 |  .9658094    .0745146   -0.45   0.652    .8302696   1.123476
     stWhite_by10 |  1.051455    .0787277    0.67   0.503    .9079399   1.217656
stYearEnroll_by50 |  1.041477    .0193906    2.18   0.029    1.004157   1.080184
                  |  .4562014    .1615439   -2.22   0.027     .227898   .9132142
         FTteacher |   .428559    .1052832   -3.45   0.001    .2647877   .6936232
                  |
    HighestDegree |
  MastersAndAbove |  .7435143     .197276   -1.12   0.264    .4420188   1.250656
                  |
           region |
       Western WA |  .6733076    .2180642   -1.22   0.222    .3568903   1.270259
       Eastern WA |  .7758091    .2860082   -0.69   0.491    .3766627   1.597928
                  |
    SchlGradeLevel |
           Middle |  1.045073    .3643479    0.13   0.899    .5277021   2.069686
             High |  .5690117    .2461183   -1.30   0.192    .2437505   1.328302
            Other |  1.486734    .6545891    0.90   0.368     .627279   3.523757
                  |
            _cons |  .1942574    .1551315   -2.05   0.040    .0406087   .9292577
```

Appendix D: BEST beginning teachers' multinomial logistic regression STATA output based on the year-by-year dataset (2013-14 to 2014-15)

```
mlogit ndYearMOB TotalEnroll_by100 stPoverty_by10 stWhite_by10 stYearEnroll_by50 BEST
FTteacher i.HighestDegree i.region i.SchlGradeLevel if Exp<1 & yr==2013, rr base(5)

Multinomial logistic regression              Number of obs    =       2,803
                                             LR chi2(36)      =      183.25
                                             Prob > chi2      =      0.0000
Log likelihood = -2329.9109                  Pseudo R2        =      0.0378
```

MVIN

TotalEnroll_by100	1.001283	.0005715	2.25	0.025	1.000163	1.002403
stPoverty_by10	.9320766	.0384661	-1.70	0.088	.8596529	1.010602
stWhite_by10	1.006944	.0441226	0.16	0.875	.9240749	1.097245
stYearEnroll_by50	.9664263	.0107701	-3.06	0.002	.9455461	.9877676
BEST	**2.164353**	.5243752	3.19	**0.001**	1.346172	3.47981
FTteacher	.3612218	.0530106	-6.94	0.000	.2709299	.4816049
HighestDegree						
MastersAndAbove	.7854214	.1131827	-1.68	0.094	.5921624	1.041753
region						
Western WA	1.291673	.2467306	1.34	0.180	.8882991	1.878218
Eastern WA	1.55295	.341578	2.00	0.045	1.009095	2.389917
SchlGradeLevel						
Middle	1.33224	.2439674	1.57	0.117	.9304771	1.907477
High	.9361138	.215501	-0.29	0.774	.5961769	1.469881
Other	.5923396	.1804909	-1.72	0.086	.3259886	1.076314
_cons	.3783458	.1747049	-2.10	0.035	.1530517	.9352754

Appendix E. Coefficient Results and Accompanying 95 Percent Confidence Intervals of "Exiter" Outcome (as compared to remaining 3 outcomes combined)		
2014-15 to 2015-16 (*N* =3,278)		
Independent variables	**Coefficient**	**95% confidence interval**
Total Enrollment	<0.01	-0.0012 – 0.0014
School % Poverty	-0.05	-0.1244 – 0.0237
%White Students	-0.12	-0.1977 – -0.0467
BESTSubsetDistricts	-0.56	-0.9540 – -0.1714
Full Time Teacher	-0.66	-0.9460 – -0.3716
Region (Western WA)	0.09	-0.2465 – 0.4246
Region (Eastern WA)	-0.18	-0.5553 – 0.1968
Middle School Grade Level	0.14	-0.2010 – 0.4758
High School Grade Level	0.2	-0.0985 – 0.5077
Other School Grade Level	0.7	0.2223 – 1.1764

Appendix F: Average Marginal Effects (AME) "Exiter" Results: Delta Method						
	dy/dx	Std. Err.	z	P>|z|	[95% Confidence Interval]	
BESTSubsetDistricts	-0.0399062	0.0125096	-3.19	0.001	-0.0644246	-0.0153878

Note: dy/dx for factor levels is the discrete change from the base level.

Appendix G: Marginal Effect at the Means (MEM) "Exiter" Results: Delta Method						
	Margin	Std. Err.	z	P>|z|	[95% Confidence Interval]	
BESTSubsetDistricts						
0	.0943988	.0062705	15.05	0	.0821089	.1066888
1	.0560579	.0093289	6.01	0	.0377737	.0743421