



The STEM and Special Education Teacher Pipelines: Why Don't We See Better Alignment Between Supply and Demand?

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Executive Summary

Improving the quality of the teacher workforce is high on the nation's education policy agenda. The United States faces particular difficulties in staffing classrooms with qualified teachers in the areas of Science, Technology, Engineering, and Mathematics (STEM) and Special Education (SPED); there are long-standing and well-documented difficulties recruiting and retaining teachers in these areas. Yet despite rhetoric articulating the need to enhance the pipeline of STEM and SPED teachers, little progress has been made over the last decade.

In this policy brief, we report on research investigating the front-end of the teacher pipeline using data on graduates from a sample of teacher training institutions in Washington State. Not surprisingly, we find that prospective teachers from these programs endorsed to teach STEM and SPED are more likely to find in-state employment as teachers, all else equal, than other prospective teachers. We also find that the relatively low production of STEM- and SPED-qualified teachers helps explain the difficulty in staffing classrooms in these areas. Moreover, there is little evidence that the situation in Washington State has changed over the last decade or is likely to change without a more concerted labor market response to the supply and demand conditions for STEM and SPED teachers. In particular:

- Over the last twenty years the production of STEM and SPED teachers by Washington State teacher training programs has remained largely static. In fact, despite all the rhetoric about the importance of STEM education, the production of STEM teachers was for many years in the 1980s was substantially higher than it is today.
- There is consistent evidence that STEM and SPED teaching candidates experience better employment prospects in teaching (at least as measured by the likelihood and timing that they end up teaching in Washington State), but when we look at teacher production in Washington State we do not see significant change in production over the last couple decades.
- The predicted probability of being employed as a public school teacher within one year of graduation, holding other observable characteristics constant, varies widely across prospective teachers in different endorsement areas: 53% for STEM, 52% for SPED, 33% for Elementary, and 38% for Other.
- 283 of 295 district-level collective bargaining agreements follow the compensation policy of the state's Salary Allocation Model (SAM), in which a teacher salary is a function only of education and experience, not credentialing area, effectively removing salary as an incentive for teacher trainees to choose to earn endorsements in difficult to staff fields.

While Washington State's economy is often characterized as vibrant and innovative, the state has done little to utilize incentive programs to attract teachers in high-need fields. The widespread use of the single salary schedule by school districts is a prohibitive factor in the recruitment and retention of teachers with particular training backgrounds. Washington would benefit from the implementation of a compensation policy that can adapt to the dynamics of the labor market.

Introduction

Policymakers and politicians across the country have increasingly prioritized improving the quality of the teacher workforce. Of particular and growing concern is the shortage of qualified teachers in the areas of Science, Technology, Engineering, and Mathematics (STEM). Fueled, in part, by the widespread belief in the “critical role that STEM education plays in enabling the U.S. to remain the economic and technological leader of the global marketplace” (Peterson & Woessmann, 2011) and by weak U.S. student performance in mathematics and science on international comparisons, the relative shortage of STEM teachers is seen by many as a policy “crisis” requiring immediate corrective action.

As but one example of a STEM initiative, in fall 2009, President Obama requested that his President’s Council of Advisors on Science and Technology (PCAST) draft a series of recommendations regarding the “most important actions that the administration could take to ensure that the United States is a leader in STEM education in the coming decades” (PCAST, 2010). Prompted by the Council’s finding that the “most important factor in ensuring excellence [in STEM] is great STEM teachers,” (PCAST, 2010) the President launched the Educate to Innovate campaign which calls for an all-hands-on-deck approach to STEM education and articulates a national need to “train an army of new teachers in these subject areas, and to make sure that all of us as a country are lifting up these subjects for the respect that they deserve” (Office of the Press Secretary, 2013). One of the programs within the campaign, the 100Kin10 initiative, is specifically designed to bolster the ranks of STEM teachers by setting a goal to recruit 100,000 teachers into STEM fields over the next 10 years (Office of the Press Secretary, 2013).

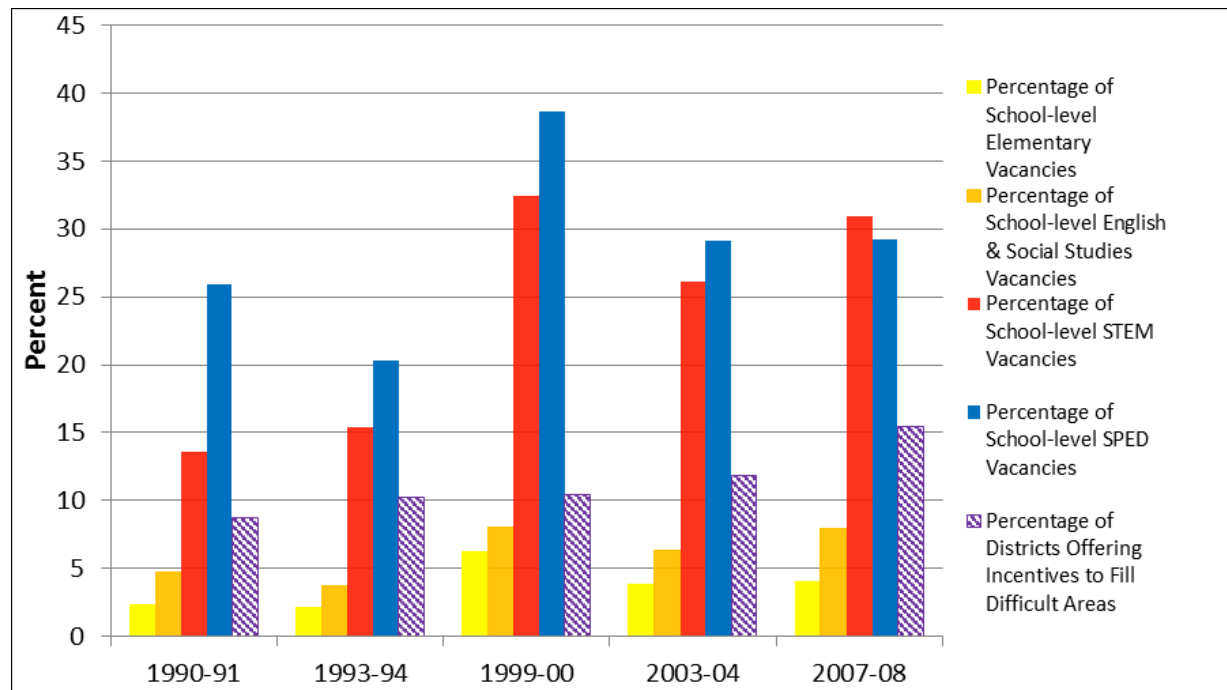
The success of new STEM initiatives like 100Kin10 is yet to be determined, but it is clear that concerns about STEM teachers are not new. For instance, over 50 years have passed since a 1962 RAND report identified problems in the recruitment of STEM teachers:

[T]he problem facing the schools is not so much a shortage in the total numbers of teachers available as it is a problem of shortages of well-qualified teachers in specific subject-matter areas. The specific shortages vary in degree from one subject to another and are more acute in some localities than in others. Some shortages, such as those in mathematics and the physical sciences, are nationwide and may become more acute in the future because of increasing demands, outside of teaching, for people with college training in these subjects [Kershaw and McKean 1962, p. vii].

Yet, despite this knowledge and the consistent rhetoric articulating the need to enhance the teacher pipeline, staffing issues continue to pervade school systems. Indeed, as we describe below, school systems often face difficulties in staffing certain classrooms with qualified teachers. This is certainly true for STEM subjects, which receive much of the high-profile policy

attention, but Special Education (SPED) is another area where staffing problems are acute.¹ For instance, for over two decades the U.S. Department of Education has provided annual listings for the nation’s teacher shortage areas. According to the listings for all 50 states and the District of Columbia, every state but one (Vermont) has experienced a critical shortage within the last year in either STEM or SPED fields or both (U.S. Department of Education, 2013). Moreover, shortage areas have remained largely consistent since the first listings were reported in 1990 (U.S. Department of Education, 2013). In fact, over half of all districts and over 90 percent of high-minority districts report difficulties recruiting and retaining teachers designated as “highly qualified” in STEM and SPED under No Child Left Behind (U.S. Department of Education, 2011). This also reflects the views of school administrators who, consistently over time, report greater difficulty filling SPED and STEM teaching appointments compared to alternative endorsement areas (see **Figure 1**).

Figure 1. Percentage of difficult-to-fill teacher vacancies over time²



¹ Billingsley & McLeskey (2004), for instance, report that schools with greater numbers of disadvantaged students list qualified SPED teachers as the hardest to locate, while Boe (2006) provides evidence that suggests the quantity of SPED teachers has lagged in relation to growth in student enrollment. Connelly and Graham (2009) conclude that nowhere are the effects of shortages “more acute, and more keenly experienced,” than in SPED.

² These data are derived from school-level Schools and Staffing Survey (SASS) questionnaire items “For this school year, were there teaching vacancies in this school, that is, teaching positions for which teachers were recruited and interviewed?” and “How easy or difficult was it to fill the vacancies in each of the following fields?” Responses of “Very difficult” and “Could not fill the vacancy” were coded as being difficult-to-fill.

In Washington State, the trends in teacher shortages largely mirror those observed at the national level. Nearly every year since 1990, Washington has been listed as having shortages in STEM or SPED fields or both (U.S. Department of Education, 2013).³ This policy brief focuses on the issues of supply and demand for teachers with different training in Washington State. Specifically, utilizing a unique set of data that spans several years of recently credentialed teaching candidates from six Washington State teacher training institutions (TTIs), we present new evidence on the probability and timing that a prospective teacher obtains employment in a teaching position in a public school in Washington State given one's training, with a particular focus on the variation attributable to one's endorsement (teaching specialty) area.⁴ This work is novel as it presents the likelihood, from a prospective teacher's point of view, of being employed in a public school as a function of training experiences and endorsement area.

Not surprisingly, the research described here shows there are significant differences across endorsement area in both the time from graduation to employment and the probability of eventual employment in public schools. All else equal, candidates endorsed to teach either in STEM or SPED find employment in public schools far more quickly and are far more likely to ultimately be employed than teaching candidates endorsed in other areas. Moreover, while these trends have persisted for over a decade, investigation of the labor market in Washington State shows that endorsement production outputs by the network of institutions charged with training new teachers has failed to respond to relative shortages by training more teachers in high-need areas.

Subject Specialty and the Probability of Employment

This analysis uses data provided by three sources. State-level data collected by the Washington State Office of the Superintendent of Public Instruction (OSPI) provide annual observations of every K-12 employee in the state, and data from the Professional Educator Standards Board (PESB) provide statewide certificate and endorsement information. These data are linked with data from six Washington State teacher training institutions (TTIs), which, when combined, offer a unique and novel view into the state's teacher pipeline.^{5,6} We also employ data from the Baccalaureate and Beyond Longitudinal Survey (B&B), collected by the National Center for

³ Ten of the fifteen field shortages in Washington fall under STEM or SPED categories (U.S. Department of Education, 2013).

⁴ For more details about the methodologies used to assess these relationships and a more comprehensive description of the relationship between teacher training experiences and entry into the teacher workforce, see "Knocking on the Door to the Teaching Profession? Modeling the Entry of Prospective Teachers into the Workforce" (D. Goldhaber, Krieg, & Theobald, 2013), which can be downloaded from www.cedr.us/publications.html

⁵ Roughly one-third of the teachers who enter the Washington State teacher workforce receive their training at one of these universities, which include: Central Washington University, Pacific Lutheran University, University of Washington-Bothell, University of Washington-Seattle, University of Washington-Tacoma, and Western Washington University

⁶ The range of years for which Washington data are available varies by TTI. Probability estimates (**Figure 2**) use TTI data from 1999-2011. See footnote 4 for more information related to the data and methodologies used in this paper.

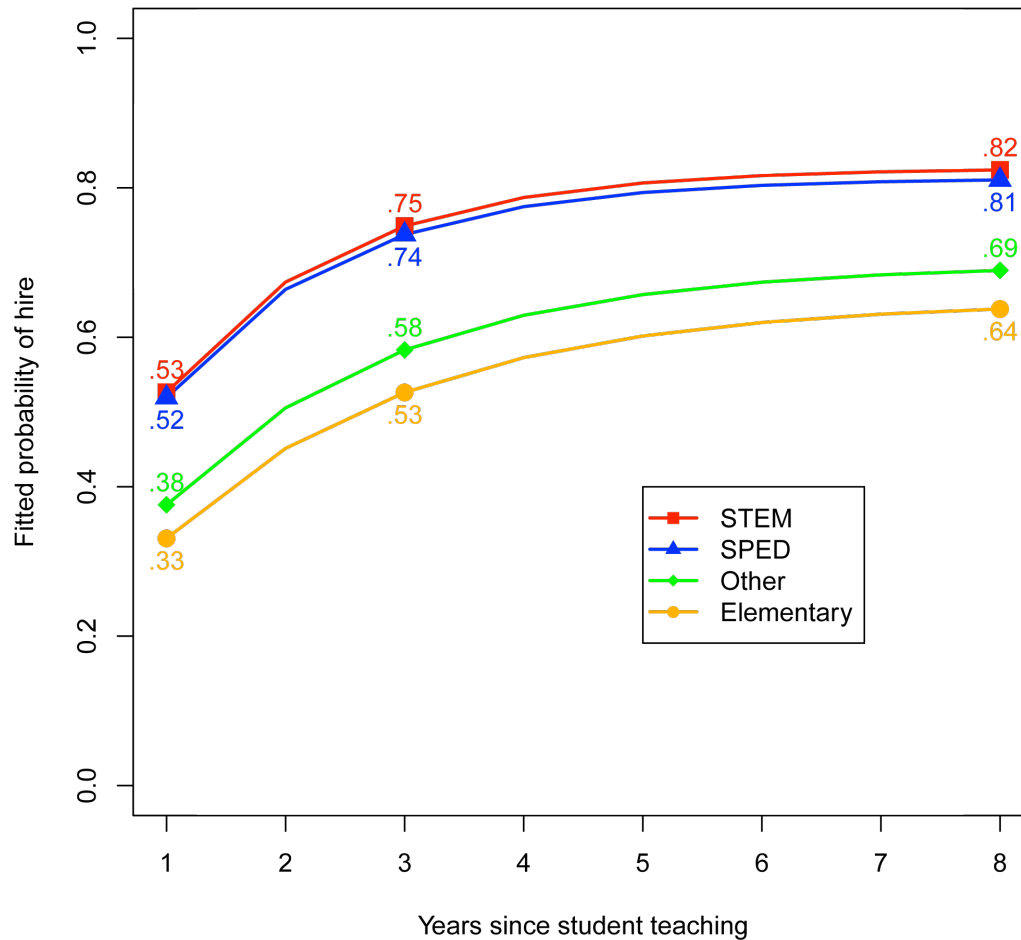
Education Statistics (NCES) to juxtapose trends observed in the teacher labor market with patterns in the broader labor market.

To facilitate an apples-to-apples comparison between individuals, in terms of the likelihood that they are employed in Washington State public schools after receiving a teaching credential, we estimate statistical models that account for differences in the backgrounds of prospective teachers (referred to as “interns”), the colleges where interns did their teacher training, and the schools in which student teaching occurred. This is done in an effort to isolate the impact of “area of training” on the timing and probability of employment from other factors that might be related to training and employment prospects.⁷

Consistent with reports of hiring difficulty, estimates from Washington show vast differences in the probability and timing of employment according to area of training. As **Figure 2** demonstrates, STEM and SPED candidates experience considerably higher predicted probabilities of employment as public school teachers compared to interns who are trained to be elementary educators. For example, our model predicts that the probability of a 30-year-old, white, female intern with average training experiences entering the K-12 workforce within one year of graduation is over 50 percent for STEM and SPED candidates, compared to only 33 percent for an intern with the same characteristics but trained in elementary education. After three years these probabilities are approximately 75 percent for a STEM and SPED intern, compared to just over 50 percent for an intern trained in elementary education. Put another way, the model suggests it takes roughly three years before the probability that an intern trained in elementary education is employed in public schools is equal to the probability that an intern trained in STEM or SPED is employed in his or her first year after graduation.

⁷ It is important to note that “not hired interns” include interns who were offered a teaching position and declined the offer or accepted a teaching position in another state.

Figure 2. Probabilites of employment for 30-year-old, white, female interns



We next examine whether the trends observed in the Washington teacher labor market are consistent with the broader national labor market. Using nationally representative data from the Baccalaureate and Beyond Longitudinal Survey (B&B) 2008-09, we conduct an analysis similar to the one above. The B&B data allow us to isolate graduates both with and without teaching certificates as well as those hired within and outside the teacher labor market. We find that 73 percent of graduates equipped with STEM certificates are employed one year after graduation compared to 63 percent for individuals with non-STEM certificates. However, when comparing individuals without teaching certificates (those most likely seeking work outside the teaching profession) we find that 72 percent of STEM majors are employed compared to 74 percent of Non-STEM majors. In other words, there is very little difference in the probability of employment outside of teaching for STEM education, whereas there is a significant difference in the public teaching labor market. A likely explanation for the dichotomy between the public

teacher market and the broader labor market is that salaries in the broader labor market adjust to differentially reward graduates with specific types of backgrounds or training.⁸

Trends in Washington State over Time and the Failure to Respond to the Labor Market

The evidence presented in the prior section shows that, if the criterion for picking a specific area of training is the prospect for future employment, one would choose STEM or SPED over other areas in which to specialize. As it turns out, this is not a short-term phenomenon: employment prospects are consistently better across every year of the data.⁹ Interestingly, however, as we describe below, there is little evidence that the production of teachers across different training areas adjusts to the relative needs in those areas. While there is consistent evidence that STEM and SPED teaching candidates experience better employment prospects in teaching (at least as measured by the likelihood that they end up teaching in Washington State), when we look at the production of teachers in Washington State we do not see significant change in outputs over the last couple decades. For instance, over the last twenty years the production of STEM and SPED teachers by Washington State teacher training programs has remained largely static. In fact, despite all the rhetoric about the importance of STEM education, the production of STEM teachers was for many years in the 1980s was substantially higher than it is today.

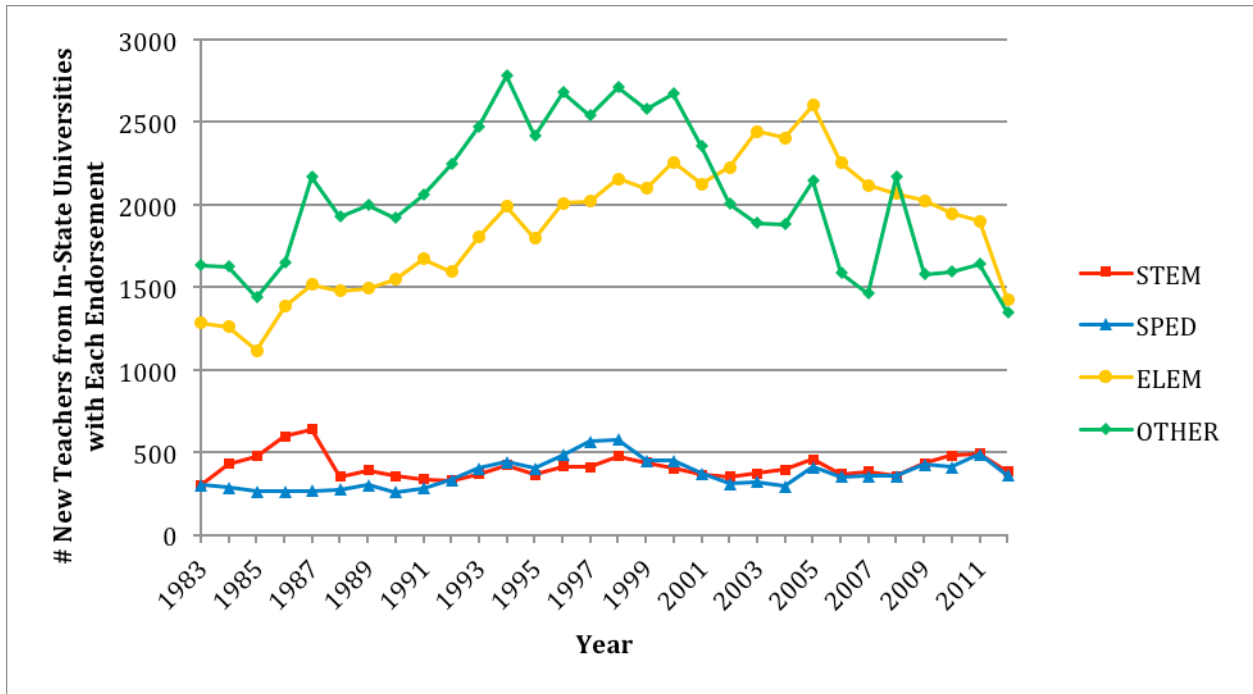
It seems likely that the limited supply of such teachers contributes to staffing problems in Washington State. Moreover, results indicate that over time the State's TTPs are producing considerably fewer teacher candidates in these fields compared to alternative endorsements. Statewide TTI endorsement production in high-need areas has remained relatively constant for approximately 30 years (see **Figure 3**).¹⁰

⁸ For research examining the effects of market-based pay in the teacher labor market see Clotfelter et al. (2008), Goldhaber (2008), Murnane and Olsen (1990)

⁹ The estimates reported above describe the average probabilities of employment from 1999-2011, while there is variation from year to year, STEM and SPED trained interns are more likely to be hired regardless of the year.

¹⁰ For evidence of inadequate production of teachers in high demand fields see Blank, Langesen, and Petermann, (2007), Blank and Langesen (1999) and Billingsley & McLeskey (2004). Other research suggests that low retention rates for STEM and SPED teachers make it nearly impossible for schools to keep positions filled (Ingersoll & Perda, 2010; Ingersoll, 2003). Empirical evidence for SPED teachers have also reached split and complicated findings (Boe, 2006).

Figure 3. Total in-state production of endorsements by TTIs in Washington

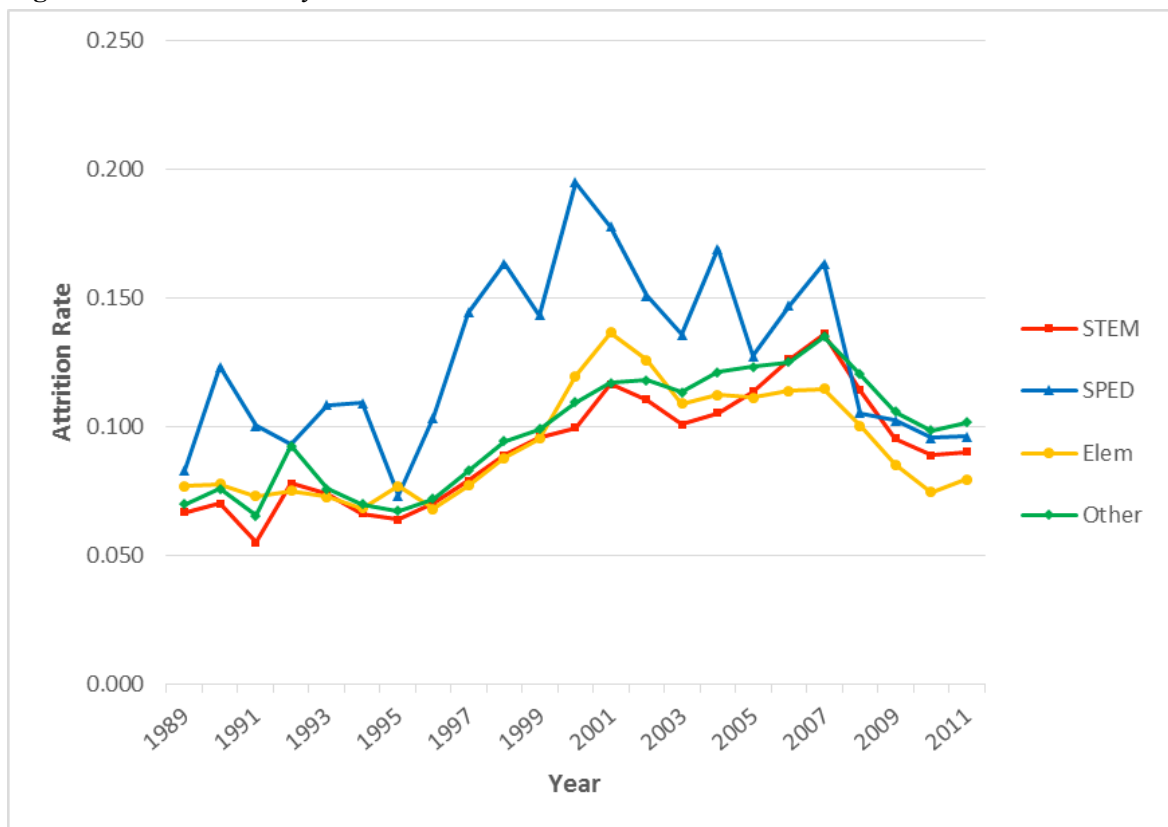


We next investigate whether there are underlying factors affecting the relative teacher shortages in Washington and attempt to determine if there are differences between STEM and SPED shortages. Namely, we assess the degrees to which relative shortages appear to be driven by endorsement production or retention of teachers holding particular endorsements. We estimate the rate at which teachers leave their teaching position (attrition rates) by calculating the number of exiting full-time equivalent (FTE) teachers within endorsement over the total FTE instruction of endorsement. The attrition rates indicate that SPED teachers consistently exit the profession at higher rates than teachers with alternative endorsements (see **Figure 4**).¹¹ While rates of attrition fluctuate from year to year, SPED teachers exited at a minimum rate of 7.3 percent, a maximum of 19.5 percent, and an average rate of 12.7 percent. This is in contrast to the rates observed for endorsements in STEM (min. 5.5 percent; max 13.6 percent; mean 9.2 percent), Elementary (min. 6.8 percent; max 13.7 percent; mean 9.3 percent), and Other (min. 6.6 percent; max 13.5 percent; mean 9.8 percent). Again, this finding largely comports with evidence documented at the national level by the National Center for Education Statistics (NCES). For instance, results from the NCES Teacher Follow-up Survey 2007-08, indicate that SPED teachers exited the profession at higher rates (12.3 percent) than any other assignment field, and

¹¹ Attrition rates were calculated using S275 data from OSPI. Individuals who appeared in the S275 as teachers in year t, but not in year t+1, were counted as exiting FTE. FTE greater than one was set equal to one. Attrition rates do not account for teachers endorsed in subject X but who teach in subject Y. For example, a teacher endorsed in math who teaches a course in history is considered a math teacher.

these rates were more than double those observed for teachers with elementary assignments (5.6 percent) (Keigher, 2010). Furthermore, findings from NCES for each of the Teacher Follow-up Surveys ¹² indicate that while attrition rates do fluctuate from year to year, STEM teachers do not exit the profession at markedly higher rates compared to other endorsement areas.¹³

Figure 4. Attrition rate by endorsement



Lastly we generate net production estimates by subtracting FTE units of attrition from the number of endorsements produced annually within the state. A value of zero is suggestive of a rate of production equal to attrition. These estimates indicate that for a period of more than five years for SPED and more than 10 years for STEM, in-state production of endorsements have not kept up with the number of teachers exiting those fields (see **Figure 5**). Meanwhile, over this same period, in-state production of endorsements other than SPED and STEM have exceeded the number of teachers exiting with these endorsements. For example, from 1995 to 2010, the number of exiting elementary endorsements totaled 21,796, while 34,571 were produced,

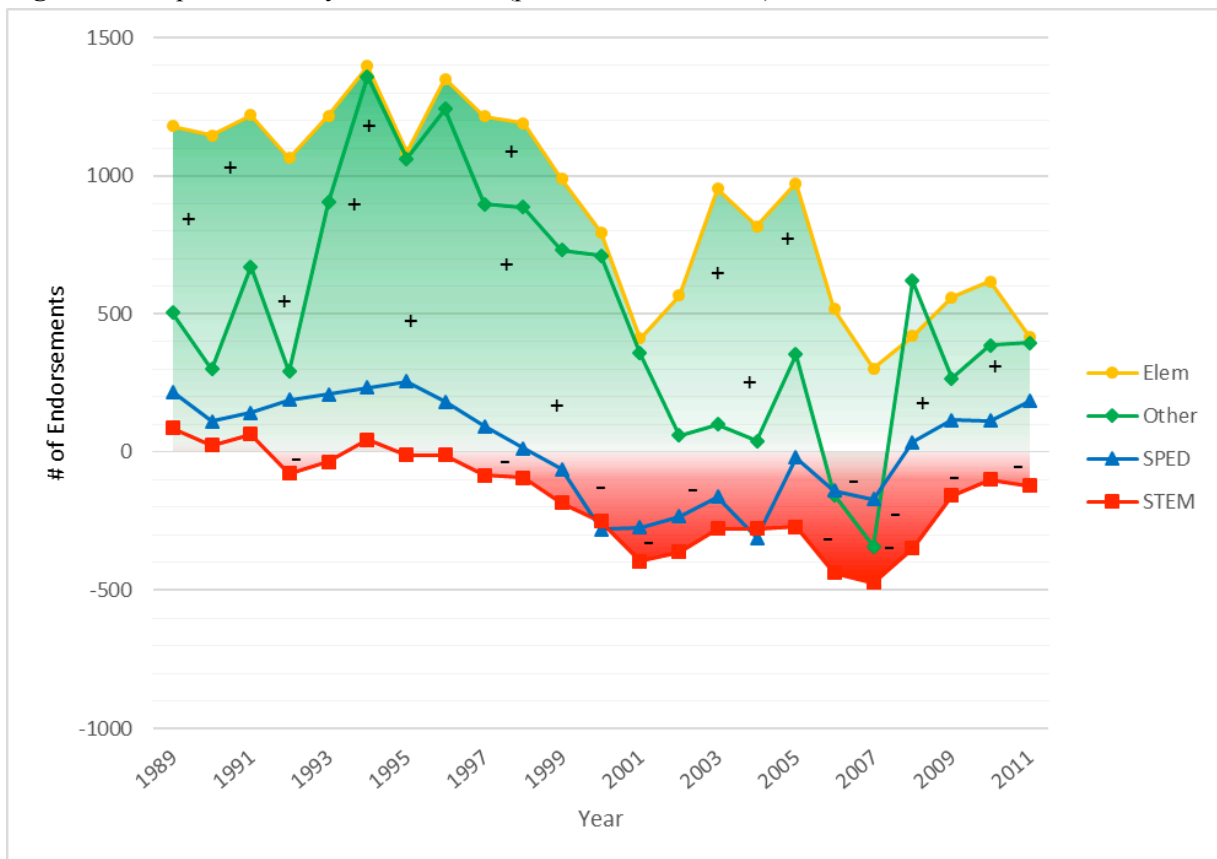
¹² Teacher Follow-up surveys were conducted in the following years: 1988-89, 1991-92, 1994-95, 2000-01, 2004-05, 2008-09.

¹³ See Hampden-Thompson, Herring, & Kienzi, 2008; Keigher, 2010; Whitener, Gruber, Lynch, Tingos, & Fodelier, 1997

equating to a potential net gain of 12,775. Contrastingly, during this same period, 10,184 STEM endorsements exited the profession, while only 6,465 were produced, leading to an estimated net loss of -3,719.¹⁴

Taken together, the evidence presented in **Figures 4 and 5** suggests both recruitment and retention problems drive relative teacher shortages. However, the degrees to which these factors contribute to relative shortages varies by endorsement area. Disproportionately higher rates of attrition for SPED endorsements indicate that retention is likely a significant source for the inadequate pool of qualified SPED teachers. Meanwhile, a decade’s worth of underproduction of STEM endorsements is likely contributing to the relative shortage of teachers in these fields.

Figure 5. Net production by endorsement (production – attrition)



¹⁴ These totals were calculated using S275 data from OSPI and Washington teacher training program data from PESB. Only in-state production was counted. These results compare the production and attrition of endorsements over time and do not account for changes in course enrollment.

Why the Problem Exists and How it Might Be Addressed

The results presented in this paper suggest a mismatch between the kinds of credentials in demand and those being produced by Washington teacher preparation programs. There is evidence that production outputs in high-need areas have been both static and insufficient to keep up with annual levels of attrition. It raises the question: why do we not see a policy response?

Analysts have long argued that the widespread use of the single salary schedule in the teacher labor market results in negative outcomes for both districts and students because of the varying opportunity costs for teachers with different types of background characteristics and training. Therefore, one of the most straightforward approaches available to district policymakers would be to offer differential economic incentives to teachers in high-need areas.¹⁵ Differential pay could have a twofold effect in the teacher labor market. In the short-term, higher compensation would expectedly lead to greater retention of teachers in high need fields, but could also increase the pool of prospective teaching candidates and bolster TTI enrollment in these areas (Clotfelter et al., 2008). This approach, however, has previously been judged to be somewhat untenable for districts because implementation can be stifled in collective bargaining negotiations between administrators and teachers (Guthrie & Zusman, 1982). Even when administrators do have flexibility to implement differentiated pay strategies, evidence suggests that they are not terribly adept at effectively aligning compensation policies with particular staffing needs.¹⁶

In Washington, the law regulating salary schedules¹⁷ provides opportunity for districts to explore different forms of compensation, but innovative compensation strategies are the exception rather than the norm. Goldhaber, DeArmond, and DeBurgomaster (2010) report that, “Although teacher salaries in Washington State are technically negotiated at the local level, the state’s allocation method creates a *de facto* constraint on local salary variation.” Indeed, in 283 of 295 school districts in the Washington, salaries are largely derived from the State’s salary allocation model (SAM), and the remaining 12 districts utilize salary schedules that mirror the SAM.¹⁸ This is because, while Washington law allows for districts to exceed state allocation minimums, districts can do so only by “separate contract” and must finance these contracts through the use of local, not state dollars (Goldhaber et al., 2010). As a result, Washington teacher salaries are essentially the product of three variables: degree level, academic credit hours, and years of experience. This means that a STEM teacher is paid the same as an elementary teacher with the same experience and degree level even though the STEM teacher likely has significantly better job prospects outside the teaching field (Walsh, forthcoming). However, neither the state’s salary schedule nor the individual district collective bargaining agreements acknowledge or reflect the reality of these varying opportunity costs.

¹⁵See Eide, Goldhaber, & Brewer, 2004; Ingersoll & Perda, 2009; Kershaw & McKean, 1962.

¹⁶ See Grissom & Strunk, 2012; Kolbe & Strunk, 2012; Strunk & Zeehandelaar, 2013.

¹⁷ RCW 28A.400.200(4) for full code listing visit <http://apps.leg.wa.gov/rcw/default.aspx?cite=28A.400.200>

¹⁸ Third Engrossed Substitute Senate Bill 5034, Sec. 503 (June 2013)

After reviewing 295 collective bargaining agreements, we were only able to identify two districts utilizing additional forms of compensation to recruit and retain teachers in high need areas. The Tacoma School District offers a bonus to newly-hired certificated teachers and an additional bonus to teachers who sign contracts for teaching assignments in the district's hard-to-fill positions.¹⁹ And the Bethel School District provides teachers in self-contained special education classrooms a \$500 stipend. It remains puzzling as to why more districts do not report offering financial incentives considering the strategy is hardly novel and relative shortages in specific fields are not, as we indicated above, a new phenomenon (National Commission on Excellence in Education, 1983; Rumberger, 1987). Moreover, it is important to consider that salaries are just one form of compensation, and it is possible administrators could devise alternative ways to differentially reward teachers in high-need areas. For instance, they could offer teachers in these subject-areas preferable working conditions, such as smaller class sizes, access to supplemental technology, or additional planning time.²⁰

In addition to district level policy solutions, there are also a number of intervention strategies available to state and federal policymakers. Some states have explored the use of incentive programs, offering money and loan-forgiveness to prospective teachers in key areas. Clotfelter et al. (2008) reports a differential pay program offered in North Carolina curbed teacher turnover in math and science courses within difficult-to-staff schools by a mean rate of 17 percent. The state of Georgia also recently implemented a salary-bonus program for certificated teachers in math and science, which allows starting teachers in these subjects to advance several steps on the state's salary schedule.

Darling-Hammond and Sykes (2003) suggest additional strategies at both the state and federal level for increasing the supply of teachers in high-need areas. Rather than devising individual qualification and certification requirements, Darling-Hammond and Sykes (2003) recommend that states collaborate to create regional if not national credentialing guidelines so that inter-state barriers to teacher mobility are mitigated. As it is now, many states mandate additional or redundant requirements for teachers transferring from other states. At the federal level, there are a number of incentive programs aimed at improving teacher recruitment and retention.²¹ However, Darling-Hammond and Sykes (2003) recommend that all of the current "small-scale fellowships, scholarships and loan forgiveness programs" be consolidated into a sustained program directed at the nation's most pertinent teaching needs; with substantial funding set aside to target teacher shortage areas.

¹⁹ The Tacoma School District offers a \$1,000 bonus for the first two years a teacher is assigned to hard-to-fill positions. Hard-to-fill positions are based on school and/or subject area as determined in collaboration between the district and the union
<http://www.tacoma.k12.wa.us/information/departments/hr/bargaining%20agreements/final%20tea-certificated-2011-2014-cba.pdf>

²⁰ See Goldhaber et al. (2010), for research on teacher attitudes towards traditional and alternative forms of compensation, and Player (2010) for more information on non-monetary compensation in the teacher labor market.

²¹ Examples of such initiatives include: Federal Grants, 100Kin10, TEACH grant, and the Presidential Teaching Fellows program.

Finally, teacher training programs could play an important role in addressing the need for teachers in shortage areas. More generally, TTIs could enhance the way they communicate the bright employment prospects in teaching to students, citing, for example, the improved likelihood and timing of obtaining teaching positions for individuals trained in particular specialty areas. There is also likely room for TTIs to improve how they relay information to students regarding the myriad federal subsidy and incentive programs available to teachers. Though it may require collaboration with the state regulatory body, the Public Educator Standards Board (PESB), TTIs could also consider reducing the cost and difficulty for individuals to obtain certification in STEM, SPED or other high-need fields. For instance, the University of California system offers the California Teach program, which provides “every STEM student in the university with an opportunity to complete the STEM major and pedagogical training in a 4-year program” (National Research Council, 2007). The California Teach program streamlines the certification process and offers students who complete the program a \$5,000 scholarship.²²

With considerable attention paid to the need for STEM teachers it seems odd that, collectively, TTIs have not adjusted to increase production of STEM certified graduates. The unresponsiveness we observe by Washington TTIs might be a result of TTIs’ position/status within Universities and an underlying lack of adequate incentives to alter existing practices. For instance, there is evidence that engineering and science degrees are more expensive for higher education institutions to produce (Ehrenberg, 2012), therefore it is possible that the increased cost to educate students in STEM-related subjects deters education programs from bolstering enrollment in these areas. Furthermore, some researchers have suggested that many university education programs face pressure from institutional leadership to maintain budget surpluses to help fund other elements/programs within the university (Howard, Hitz, & Baker, 1998). The extent to which university finances play a role is inconclusive, but Howard et al. (1998), find that a review of programmatic expenditures indicates that on average education programs spend noticeably less per student when compared to other programs.

Conclusions

The issues that Washington State faces in developing a stronger STEM and SPED teacher pipeline are hardly unique, as most, if not all, states struggle in these areas. Yet Washington appears to lag behind other states as a site of K-12 innovation. This is somewhat perplexing considering the state relies heavily on a highly educated workforce with particular reliance on STEM trained professions. For instance, Washington’s technology-based industries comprise the

²² A similar program, the UTeach program at the University of Texas, Austin, has greatly improved its production of STEM certified graduates by streamlining the certification process (integrating “in-depth content education and subject-specific education in pedagogy”), offering a variety of scholarship opportunities, and providing ongoing support to teachers in the classroom (see <http://uteach-institute.org/about>)

largest share of employment, business, and labor income in the state's economy (Beyers & Lindahl, 2012). While Washington's economy is often characterized as vibrant and innovative, the state has done little towards experimenting with incentive programs to attract teachers in high-need fields.

A review of the most current collective bargaining agreements reveals little has changed regarding pay scale policy. As of February 2014, two school districts, Tacoma and Bethel, have implemented compensation strategies aimed at attracting educators in high-need fields. However, Tacoma is the only school district with an adaptive policy, in that it can alter which high-need, hard-to-staff positions receive bonuses in response to changes in the supply and demand for teachers. While there are promising steps being made at both the district and state level, an actual concerted policy response to the problem of relative shortages in the teacher labor market has yet to materialize.²³

Empirical evidence suggests that opportunity costs exist between teachers with different backgrounds and training, particularly those trained in STEM.²⁴ As a state, Washington would benefit from an enhanced ability to recruit and retain teachers in all subjects and in all schools. One of the most effective strategies would be implementation of a compensation policy that can adapt to the dynamics of the labor market.

²³ The Seattle School District is exploring differential pay as a recruitment and retention strategy for priority fields and Senate Bill SB-5278 which calls for bonuses to math, science and special education teachers was reintroduced in the January 2014 legislative session.

²⁴ See Murnane & Olsen, 1990; Rumberger, 1987; Walsh, forthcoming.

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