Washington State Institute for Public Policy

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December 2008

REPORT TO THE PROFESSIONAL EDUCATOR STANDARDS BOARD: Differential Pay for Teachers in High-Demand Subject Areas

In 2008, the Washington State Legislature passed ESHB 2687 which directed the Professional Educator Standards Board (PESB) to conduct "a comprehensive analysis of math and science teacher supply and demand…"[1]

Among other tasks, the Legislature directed the PESB, in collaboration with the Washington State Institute for Public Policy (Institute), to "provide information from a study of differential pay for teachers in high-demand subject areas such as mathematics and science, including the design, successes, and limitations of differential pay programs in other states."[2]

Finding. We reviewed the national research literature on whether differential pay for teachers in math, science, or other high-demand teaching fields affects whether new teachers are attracted to the profession, or whether the attrition rate of existing teachers is reduced. Unfortunately, existing research on this specific topic is too thin to draw conclusions. To date, there have been very few attempts to offer differential pay and, as a result, evaluation evidence is sparse.

Lacking this research base, we examined a broader question that can shed some light on the topic of differential pay. We reviewed studies that have analyzed how salary increases—for all teachers—affect the degree to which teachers leave the profession.

We found nine credible studies that have looked at this question. We draw two general findings from this body of research. First, higher teacher salaries do reduce attrition rates; all nine studies demonstrated this effect. Second, the magnitude of the effect can be summarized as: a 10 percent increase in teacher salaries leads to a two-to-three percent decrease in teacher attrition rates.

It is important to note that these findings apply to <u>all</u> teachers, not specifically to those in math, science, or other high-demand fields.

[1] ESHB 2687, Chapter 329, §501 (w), Laws of 2008
[2] Ibid, §501 (w)(iv).

Background

This report summarizes findings on research conducted by the Institute on differential pay for mathematics and science teachers. Broadly speaking, differential pay refers to pay policies by which certain groups of teachers are paid more based on their knowledge and skills in particular subject areas. Calls for subject-area pay incentives have emanated from the shortages faced by most schools for well-trained and adequate numbers of teachers in shortage subject areas, mostly mathematics, science, and special education.

Any research into differential pay policies for teachers recognizes that schools must compete in labor markets for the technical skills associated with mathematics and science training. The rationale for differential pay policies is, therefore, the realization that "individuals with different attributes face different financial opportunity costs to enter the teacher labor market."[3]

The Earnings Gap

Recent research has revealed that there is a difference between what math and science teachers are paid and what professionals in comparable occupations earn. The size of this gap has recently been presented to the Joint Basic Education Task Force by Lori Taylor,[4] who found that, on average, mathematics and science teachers in Washington State earn $54,568 while comparable professionals outside of the teaching profession earn $76,199.[5] Goldhaber (2008) found that teachers with technical

[3] D. Goldhaber, M. DeArmond, A. Liu, & D. Player. (2008). *Returns to skill and teacher wage premiums: What can we learn by comparing the teacher and private sector labor markets?* Seattle: School Finance Redesign Project, Center on Reinventing Public Education, University of Washington, p. 15.
[4] L. Taylor. (2008). *Washington wages: An analysis of educator and comparable non-educator wages in the state of Washington*. [Draft] Report to the Washington State Institute for Public Policy.
[5] The $76,199 estimate from Dr. Taylor assumes a full 12- month work year; if teachers work 11 months in a year, this figure reduces to $69,849, and if teachers work 10 months in a year, the comparable wage estimate reduces further to $63,499.

degrees—particularly in mathematics and science-related fields—begin their careers earning average salaries that are comparable to those of individuals with the same degrees but who have non-teaching careers.[6] He also found, however, that as individuals gain more experience in the labor market, an earnings gap emerges between teacher and non-teacher salaries, which on average can be as high as $27,890 per year after 10 years of employment experience.[7]

Differential Pay Programs: Evidence From Other States

The key goal of this research was to identify the impact of differential pay policies for mathematics and science teachers on the ability of schools to enhance the recruitment and retention of teachers. We briefly document the states in which differential pay programs exist and what the outcomes of the programs are to date.

Currently, four states provide pay incentives for teachers willing to teach in hard-to-staff subject areas like mathematics, science, and special education. These states are California, Alaska, Louisiana, and New York. Additionally, some school districts provide supplemental pay for hard-to-staff subject areas, including Houston ($5,000), Los Angeles ($5,000), and New York ($3,400).[8]

By 2006, California was funding two incentive programs that awarded pecuniary benefits to teachers accepting assignments in high-need subjects. These incentives are provided on a graduated basis as a teacher completes subsequent years of teaching. Due to the limited number of evaluations from these programs, findings on their successes and challenges are preliminary. While some success has been observed in terms of teacher retention, incentive pay programs appear to face significant challenges, the most common of these being implementation errors, teacher targeting difficulties, and a lack of well-developed data sets that can be used to evaluate the impact of the program.[9]

Results and Findings

As mentioned, given the lack of specific studies on math and science differential pay, we examined the broader research question on how general teacher pay affects teacher attrition.

Over 30 studies that investigated the role of teacher salary increases in influencing teacher retention were identified. A number of these studies were descriptive in nature, while other more empirical studies were not included in this analysis due to methodological weaknesses. We identified nine studies that were empirically sound and methodologically rigorous and used these studies to generate a summary elasticity measure indicating the extent to which teacher retention (alternatively expressed in terms of teacher attrition) responds to changes in across-the-board increases in teacher salaries.

Most of the studies used national or state-level data sets to conduct their investigations. Though sample sizes, analysis methodologies, and effect size magnitudes varied significantly, the sample compositions were similar in that more women than men were identified as teachers. In recognition of the non-comparability of the raw effect coefficients/magnitudes, we transformed these study findings into a common metric (elasticity) in order to make the results from the nine studies comparable.

Exhibit 1 summarizes the attrition “elasticity” associated with a salary increase from each of the nine studies. An elasticity is a simple statistical measure describing how a percentage change in one variable (teacher salary in this case) is associated with a percentage change in another variable (teacher attrition). A summary of weighted attrition elasticity is presented in the final row.

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[6] D. Goldhaber. (2006) .*Teacher pay reforms: The political implications of recent research*. Washington, DC: Center for American Progress.

[7] In comparison, for individuals with non-technical degrees, the average differential after ten years is estimated to be $18,904. Goldhaber, 2006, p. 8.

[8] Goldhaber, 2006, p. 16.

[9] S. Loeb & L. Miller. (2007). *A review of state teacher policies: What are they, what are their effects, and what are their implications for school finance*. Stanford, CA: Institute for Research on Education Policy & Practice, Stanford University.

Exhibit 1

Salary Increases and Teacher Attrition/Retention

Author	Attrition Elasticity	Sample Size
Imazeki (2005)	-1.4354	8,938
Podgursky (2004)	-0.9546	14,066
Podgursky (2004)	-0.6745	3,245
Ondrich et al. (2008)	-0.5101	4,238
Harris & Adams (2007)	-0.4644	18,786
Podgursky (2004)	-0.3677	4,773
Brewer (1996)	-0.2630	20,160
Strunk & Robinson (2006)	-0.1871	28,885
Kelly (2004)	-0.1440	4,761
Krieg (2004)	-0.0733	2,293
Kirby et al. (1999)	-0.0692	98,951
Podgursky (2004)	-0.0346	48,756
Weighted Average Elasticity	**-0.2372**	

The attrition elasticity of each study in Exhibit 1 indicates that the magnitudes are all negative. This is interpreted to mean that a 10 percent increase in teacher salary has the impact of reducing attrition by a magnitude that ranges from -.346 to -14.35 percent. Averaged across all nine studies, a 10 percent increase in teacher salary corresponds to a reduction in teacher attrition by 2.3 percent. It is important to note that each of the magnitudes represents the responsiveness of average teacher attrition/retention to a general salary increase. They may or may not apply specifically to math or science teachers, but the estimate does provide a general insight into the workings of teacher labor markets.

Citations

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Strunk, K.O., & Robinson, J.P. (2006). Oh won't you stay: A multilevel analysis of the difficulties in retaining qualified teachers. *Peabody Journal of Education*, 81(4), 65-94.

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Document No. 08-12-2201