

How A Teacher's Gender, Grade, and STEM Discipline Affect Opinions about Pay

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Abstract:

This study investigates American public opinions about teacher salaries compared to other professions, considering factors of gender, grade level, and discipline. A salary sorting activity was used to determine recommendations for five occupations, including various teacher roles. Results revealed teachers were mostly assigned lower salaries than other occupations, with significant differences observed in seven out of eight scenarios. Interestingly, when a male teacher taught a STEM subject at the high school level, respondents recommended a salary equivalent to other professions. This suggests the public may perceive teaching STEM subjects at the high school level, particularly when taught by males, as deserving commensurate compensation. The study highlights the complexity of public perceptions toward teaching and emphasizes the need for a nuanced understanding of the factors influencing opinions about teacher pay. Policymakers and educational reformers should consider these findings to address the perceived value of teaching and attract high-quality educators.

KEYWORDS: Discipline, gender, grade level, public opinions, teacher salaries.

1. Introduction

In the early 1800s, like nearly all occupations in the United States, the teaching profession was dominated by men (LeQuire, 2016). In a drive to allow women to enter the workforce, Catharine Beecher led a mid-nineteenth century call-to-action to train women to become teachers (Goldstein, 2014). Beecher swayed officials to hire women in lieu of men by underscoring that the move was a cost savings strategy for local school boards because a “woman needs support only for herself [yet] a man requires support for himself and a family” (Beecher, 1845, p. 114). Beecher, along with the reformer Horace Mann, also painted a picture of women as missionaries—taking on their teaching roles with a primary objective of promoting morality and veneration for God.

This concept of cost-efficient female teachers who are missionaries of sorts and who require little more than subsistence wages persisted for decades. In 1891, Webb documented teacher wage disparity based on gender and noted that male and female teachers were paid equivalently only in Wyoming—the first state that granted women’s suffrage. As teacher unions took hold in the twentieth century, teacher salaries were standardized within school districts and became based largely on years of experience and education level and not overtly based on gender. Despite this, teaching in the United States is generally regarded as a low paying profession and the esteem attached to it has been in precipitous decline for at least a decade (Kraft & Lyon, 2022).

Though base starting salaries for teachers in unified districts (i.e., containing both elementary and secondary grades) are typically uniform across schools within such districts, across the United States median pay is approximately 4% more for high school teachers as compared to elementary school teachers (U.S. Bureau of Labor Statistics, 2021a, 2021b). The difference in pay is often surmised as being due to generally greater experience of high school teachers, as well as additional money paid to high school teachers for overseeing extracurricular activities and as incentives to teach hard-to-staff subjects such as mathematics and science (Epstein & Miller, 2011).

Although the 4% salary difference between elementary and secondary teachers may seem slight, it is notable that a considerably larger majority of elementary school teachers are women. While the U.S. high school teacher workforce is 64% female, that compares to nearly 90% of elementary school jobs filled by individuals who identify as female (National Center for Education Statistics, 2023). Clearly, this preponderance of women in teaching contributes to the conception of teaching as a feminized profession. What is less clear is the extent to which the position of teaching as a female-dominated field affects opinions about teacher pay.

In addition to gender, the discipline and the grade level may affect beliefs regarding what constitutes appropriate salary levels for teachers (Judson, 2022). For example, Hoss (2004) contended that teaching science and math warrants greater compensation than teaching physical education or English. Public opinion polls also indicate generally favoring paying high school teachers more than elementary teachers (Bialik & Sanders, 2022).

In this investigation, the three variables of teacher role, gender, and grade level were brought together to determine the extent to which these factors affect public opinion about appropriate pay for a teacher.

2. Relevant Literature

Recruiting and retaining a high-caliber teacher workforce is commonsensically a crucial element of developing a quality educational system. Research has in fact demonstrated that providing students highly competent teachers is of greater importance than students merely attending a school with proclaimed rigorous academic standards (Chetty et al., 2014; Hanushek & Rivkin, 2012). The challenges of recruiting and retaining quality teachers are particularly pronounced in low income areas where teachers have greater potential of positively impacting children from underprivileged backgrounds (Liu, 2021). Contemporary policy concerns about the most effective and efficient ways of attracting and maintaining highly qualified teachers have perennially ignited discussions (Jackson, 2012). While some academics dispute whether teacher pay scales are adequately attractive to top graduates (Dolton & Marcenaro-Gutierrez, 2011), others are more interested in closely examining pay-for-performance incentives (Loyalka et al., 2019). The struggle that administrators encounter in filling teacher vacancies alongside the challenges of increasing student enrollments, the need to reduce class size, and the wave of exiting baby-boomer teachers, is palpable. This has prompted several policy initiatives aimed at luring and maintaining teachers. Commonly suggested is the action of raising teacher salaries, especially in areas or subjects with high demand (Aranda-Comer, 2023). However, the implementation gap between imagining and enacting such a seemingly simple idea is considerable.

2.1 Teaching Compared to Other Occupations

While a stockbroker typically works in a city and a farmer in a rural area, teachers are needed and found in all geographic areas. This commonality and prevalence of teachers may undermine and devalue public opinion of the profession. According to U.S. census data, only 17% of college graduates who were not teachers worked in rural areas, compared to 32% of elementary and secondary school teachers (Taylor, 2008). Furthermore, the teacher “pay penalty” reached a new high in 2021 when teachers earned 23.5% less than comparable college graduates (Allegretto, 2022). The widening of this gap occurred simultaneous to teachers increasing their educational accomplishments. Specifically, more public-school teachers in 2020–21 than in 2011–12 had a master's degree (51 vs. 48%), an education specialist degree or certificate (8.4 vs. 7.6%), or a doctorate (1.4 vs. 1.1%) as their highest degree. Moreover, the teaching penalty is considered a major deterrent for prospective teachers, and the relatively lower compensation logically catalyzes some teachers to leave the profession (Liu, 2021).

The impact of remunerations on the allure of a teaching career has been the subject of numerous studies (Han et al., 2017). According to some research, the teaching profession will be more attractive to university graduates if teacher wages become more competitive. For instance, Elfers et al. (2008) demonstrated that boosting teacher wages could make the teaching profession more appealing and increase its competitiveness with other occupations, such as the engineering and technology industry. There is, however, no direct correlation between financial incentive and professional appeal. A variety of motivational factors also influence individuals' decision to become teachers, so it is difficult to assign a price to the proverbial carrot that attracts people to the profession (Brookhart & Freeman, 1992; Han et al., 2017).

2.2 Public Opinion about Teacher Pay

The American public is broadly sympathetic about teacher pay and public opinion polls reflect general support for increasing salaries. Based on their research, Cheng et al. (2019) found that, at first glance, two-thirds of the American public supported raising teacher salaries. However, when survey respondents were provided information about what teachers actually earn, support decreased to less than half of the respondents favoring salary hikes. Differential support between those informed and uninformed about current teacher salaries was a persistent finding in subsequent *Education Next* surveys of public opinion (Henderson et al., 2020; Houston et al., 2023). This phenomenon of discrepant support between the informed and uninformed is a type of perception gap. Sources of this perception gap may include opinions formed primarily on anecdotal evidence or confusion due to variation in teacher salaries affected by experience, locale, and qualifications. As a result, many members of the public believe teachers earn less than they really do. In general, the public guesses that teachers make about 30% less than the actual amount they earn (Cheng et al, 2019; Henderson et al., 2020).

2.3 Teacher Gender

Aside from a general lack of awareness regarding teacher salaries, other factors may influence public opinion. As discussed, there exists a long historical context tying the occupational prestige of teaching with gender. In the nineteenth century, it was promoted that women are better equipped to care for young children since they are nurturing by nature; this concept is still widely held today (Goldstein, 2014). Because women in the United States earn an average of 82% of what men earn (Kochhar, 2023), there is concern that an unconscious pay differential bias may exist toward K-12 teachers that favors both male and secondary grades.

In the United States, there is a significant disparity in the gender distribution of K-12 teaching roles, with women occupying a majority of positions. This difference is particularly pronounced in elementary schools, where only 11% of teachers are male, compared to secondary schools where 36% of teachers are male (National Center for Education Statistics, 2023). Though it can easily be argued that basic teaching contracts are gender-neutral, there does exist a wage gap between female and male teachers. In their study, Hansen et al. (2023) found that male teachers annually earn approximately \$2,200 more than female teachers and that supplemental school-based compensation plays a key role in this difference, with male teachers being more likely to be compensated for extra duties.

2.4 Discipline and Grade Level

Other factors possibly affecting opinions about teacher pay are the consideration of grade level and discipline (Judson, 2022). Salary structures can vary significantly between schools and states; however, although there is no one specific reason as to why, elementary teachers do earn slightly less than high school teachers in the United States (Fiorillo, 2020). Spencer (2000) contended salary differences between high school and elementary teachers influences the choice of male teachers to pursue high school teaching, while also perpetuating gender-related disparities in teacher salaries. Regarding the possible effect of discipline on public opinion, prior research indicates there exists moderate support to pay higher salaries (i.e., differential pay) to teachers of hard-to-staff subjects, particularly math and science (Sherratt & Calegari, 2020). In many cases, the justification for differential pay for high school science and math teachers is based on the argument that the individuals who possess the expertise to teach these subjects have career opportunities in other industries (Cavanagh, 2007). It is relevant to point out here that although men assume fewer teaching roles than women, when men take on teaching positions, they tend to teach secondary grades, as well as science and math courses (Hansen & Quintero, 2018).

The factors of gender, grade level, and discipline may all affect opinions regarding appropriate salaries for teachers. Yet, the multicollinearity of these variables makes it challenging to separate and quantify their individual effects on public attitudes. In the following section, we explain the research design we executed in an attempt to evaluate the effects of these variables.

3. Methods

3.1 Salary Sorting Activity

To assess how much Americans believe teachers should be paid relative to similar careers, an online salary sorting activity was designed. The activity prompts respondents to match annual salaries, presented in increments of \$4,000 and ranging from \$60,000 to \$76,000, to five characters each of whom has a specific career. There are eight versions of the salary sorting activity. Respondents were randomly assigned one of those eight versions to complete. All eight versions of the salary sorting activity include the following four male characters with gendered pronouns and job titles.

- Alan – He is a Building Inspector
- Brian – He is a Therapist
- David – He is a Police Officer
- Eric – He is a Restaurant Manager

Additionally, respondents were presented with either Claire or Charles as a fifth character. The Claire/Charles character possessed one of the following four teaching roles: second-grade teacher, sixth-grade math teacher, high school science teacher, and high school English teacher. Figure 1 depicts an example of the salary sorting activity, with the random selection of the middle character being Claire as a high school science teacher.

The occupations of building inspector, therapist, police officer, and restaurant manager were selected based on criteria that the compared occupations should have mean annual salaries similar to that of classroom teachers. Data from the U.S. Bureau of Labor Statistics (2022) indicated the average annual salary for public school teachers in elementary through secondary grades in 2022 was \$68,740, exclusive of special education teachers. The four comparison occupations had mean salaries in 2022 ranging from \$67,130 (restaurant managers) to \$71,860 (therapists). Salaries of the four comparison occupations were therefore very close to that of teachers, with two of the comparison mean salaries slightly below that of teachers (restaurant managers, building inspectors) and two comparison mean salaries slightly above that of teachers (police officers and therapists).

The eight versions of the salary sorting activity allowed for examination of how teacher role, gender, and grade level might affect opinions about teacher salaries compared to other occupations. With the teacher role randomly assigned to be either male or female (Charles or Claire), STEM or not STEM (math and science versus general elementary and English), and varying grade levels (elementary, middle school, high school), the salary sorting activity was designed to provide multiple cross comparisons.

3.2 Recruitment of Respondents

A sample of 1,593 American adults was recruited through a crowd sourcing company. The respondents were required to be in good standing with the crowd sourcing company—meaning, they had favorable ratings from others who had enlisted their services for various online tasks, for which they are nominally paid. Following completion of the activity, respondents were provided with a six-digit code that was used to confirm that they had followed directions, completed the activity, and ensured that payment was received. Approximately 200 respondents completed each of the eight versions of the salary sorting activity. Respondents were able to complete the activity only once.

3.3 Data Analysis

Data were first disaggregated based on the gender and role (grade level and discipline) of the Charles/Claire teacher character. This yielded eight groups of data. For example, the first group of data included salary assignments to the five characters when the teacher was Claire as a second-grade teacher, the second group of data included salary assignments when Charles was a second-grade teacher, and so on.

Two sets of within-group analyses were conducted to evaluate if there were significant differences between the salaries recommended to the teacher as compared to the other four occupations. Analysis of variances (ANOVAs) with post hoc Tukey tests were first applied to determine if significant differences existed among mean salaries of the five occupations and, if so, between which occupations. Following, mean salary data of the non-teaching occupations were aggregated and compared to the teacher's mean salary by applying independent t-test analysis.

Determination of the effect of teacher's gender was evaluated by applying a series of independent t-tests to compare mean salaries of Charles and Claire for each teacher role (second-grade, sixth-grade math, high school science, and high school English).

Finally, ANOVA with post hoc testing was applied to just the eight mean teacher salaries to determine if the American adults comprising our sample assigned a significantly different salary to any of the teacher types.

4. Results

4.1 Teacher vs. Other Occupations Salary Recommendations

Examination of the relative salary rankings provided by the respondents revealed that the teacher role had the lowest mean salary in seven of the eight settings (Table 1). Only when the teacher was male and teaching high-school science was the teacher occupation recommended to have a mean salary higher than at least one of the other four occupations.

Participants were limited to suggesting salaries within a range of \$60,000 to \$76,000. Therefore, the null hypothesis for our salary sorting activity suggests that all five occupations should have a mean salary not statistically different from \$68,000. However, ANOVA results indicated there were statistically significant differences in mean salary rankings (i.e., recommendations) in all eight settings ($p < .05$).

Application of pairwise post hoc Tukey tests were applied to determine where specific significant differences existed between occupations. This led to 80 pairwise comparisons across the eight different settings (i.e., the teacher gender and role varied in eight settings while the other four characters' occupations remained constant). Across the 80 pairs, there were no statistically significant differences in mean salaries among 56 of the comparisons.

Among the significant differences between salaries, the disparity between the teacher's salary and another occupation's salary accounted for 63% of the statistically significant differences (15 of 24 cases). In all of those cases, the teacher's mean recommended salary was significantly lower than other occupations. For example, when respondents saw a list of five occupations in which the teacher was designated as Claire teaching second-grade, the teacher's recommended mean salary of \$66,787 was significantly less than the recommended mean salaries for the building inspector (\$68,493, $p = .001$) and the therapist (\$69,005, $p = .016$). The 15 cases where Claire or Charles were recommended to have a significantly lower salary than at least one other occupation ($p < .05$) represent 75% of the cases where the teacher's mean salary recommendation was compared to another occupation's mean salary recommendation. The following list summarizes the significant differences involving the teacher occupation:

- Claire teaching second-grade: teacher's recommended salary is significantly less than the building inspector ($p = .001$) and the therapist ($p = .016$)
- Charles teaching second-grade: teacher's recommended salary is significantly less than the building inspector ($p = .009$), therapist ($p = .028$), and the police officer ($p = .003$)
- Claire teaching sixth-grade math: teacher's recommended salary is significantly less than the building inspector ($p = .001$), therapist ($p < .001$), and the police officer ($p = .007$)
- Charles teaching sixth-grade math: teacher's recommended salary is significantly less than the therapist ($p < .007$)

- Claire teaching high school science: teacher's recommended salary is significantly less than the therapist ($p < .001$) and the police officer ($p = .030$)
- Charles teaching high school science: teacher's recommended salary is NOT significantly different than any of the other occupations
- Claire teaching high school English: teacher's recommended salary is significantly less than the therapist ($p < .015$) and the police officer ($p = .009$)
- Charles teaching high school English: teacher's recommended salary is significantly less than the therapist ($p < .023$) and the police officer ($p = .004$)

The only setting in which the suggested teacher salary was statistically equivalent to all the other occupations was when the teacher was set to be a male high school science teacher. In that setting, the statistically significant differences lay with the restaurant manager's suggested salary being significantly lower than those of the building inspector, therapist, or police officer, ($F(7, 1,000) = 4.147, p = .002$).

Application of dependent t-tests to compare the aggregated salaries of the non-teaching occupations to the teacher salaries yielded results that paralleled the aforementioned ANOVA analysis. In seven of the eight situations, the teacher's mean salary was significantly less than the average salary of the other four occupations ($p < .05$). Only when the teacher was described to be Charles, a male science teacher, did respondents suggest a salary that was statistically the same as the other four occupations.

4.2 Effect of Teacher Gender and Discipline

In comparison of male and female teachers (i.e., Charles compared to Claire), no statistically significant differences were found between their recommended salaries. In all four settings (second-grade, sixth-grade math, high school science, and high school English), respondents recommended statistically equivalent salaries for Charles and Claire. These results are summarized in Table 2.

Although no significant differences were found between the mean salaries of the eight different types of teachers, an interesting pattern was observed. The two highest mean teacher salaries were for the male STEM teaching roles—Charles teaching sixth-grade math and Charles teaching high school science. It is important to note that all eight of the teacher salaries were statistically equivalent; however, though we do not wish to over-interpret the pattern found, the fact that the elementary and female teaching roles were generally recommended slightly lower salaries aligns with other research related to gender pay gaps (e.g., Aragão, 2023).

5. Discussion

Our discussion of this study and its findings begin with a return to considering the framing of this study. It is important to point out that respondents were not asked how much money they believe teachers should be paid. Instead, they were presented with an activity in which they indicated what they believed was the most appropriate ranking of salaries, from \$60,000 to \$76,000, among five occupations. The nature of this activity is different from typical opinion polls that ask people if they believe teachers deserve to be paid higher salaries. In those cases, the majority of the American public indicate they believe K-12 teachers are insufficiently paid (Bonn, 2019). However, some research indicates teachers are perhaps paid more than the public supposes. For example, Henderson et al.'s study (2020), found that 72% of survey respondents favored increasing teacher salaries when they were unaware of how much teachers are paid; however, that proportion decreased to 56% when informed about teacher salaries before completing the survey. This consideration, that average teacher salaries are higher than often expected, is raised as one possibility to explain why the respondents in this study so consistently indicated teachers should be assigned lower salaries than other occupations. It is possible that the respondents were surprised to see teachers in the same category with police officers, managers, therapists, and building inspectors. Yet, the data from the U.S. Bureau of Labor Statistics (2022) does place the salary of teachers solidly among these other professions.

The jobs listed on our study's online activity were selected because their average salaries were near those of teachers and because the job titles were considered to easily evoke images of the occupations. At the same time, we yield that the duties and responsibilities of the occupations were left to the respondents to conceive. This is a limitation of the research design, but the consistency of the findings across the eight settings cannot be ignored. Teachers were assigned the lowest average salaries in seven of the eight scenarios. Additionally, the difference between the teacher salary and one or more of the other occupations was statistically significant ($p < .05$) in seven of eight settings.

As mentioned, across paired comparisons that contrasted Charles or Claire's recommended mean teacher salary to another occupation's recommended mean salary, in three-fourths of the cases, respondents suggested the teacher receive a salary that was significantly lower than the compared occupation ($p < .05$). For the remaining one-fourth of the cases, the respondents recommended the teacher salary to be statistically equivalent to that of the compared occupation. A simple takeaway might be that, when using income as a metric, the public does not hold teachers in as high of a regard as the selected occupations.

This is contrasted with the assumption that Charles and Claire, as teachers, possess college degrees, although not all of the compared occupations necessarily require a college degree. Although the training and education requirements for police officers, building inspectors, and restaurant managers vary and do not necessarily require a college degree, those occupations were often recommended to have higher salaries than teachers. The respondents may have considered that teachers do not work all twelve months of the year, i.e., that they "get summers off," as one of the possible grounds for assigning teachers lower salaries, even though teaching is incredibly demanding (Himmele, 2016). The possible reasons underpinning the lower mean salary recommendations requires further investigation.

However, the findings of this study are not limited to a general story that the public does not value teaching as highly as commensurate occupations. This study revealed a striking and potentially important finding when the teacher role was a male teaching a STEM subject in a high school. Charles, as a high school science teacher, was the only setting in which the public did not recommend the teacher to have the lowest salary of the group. This was also the only environment in which the teacher was recommended to be paid statistically equivalent to all of the other occupations. This finding implies that the public perceives teaching STEM subjects at the high school level, particularly when taught by a male teacher, as being on par with other commensurate occupations in terms of the deserved compensation.

Alongside prior research, our study's results highlight the complex nature of public perception regarding the value of teaching and the influence of various factors such as gender, subject matter, and grade level. These findings could have implications for policy-making and educational reform, as they suggest the need for an improved understanding of how different variables impact the public's perception of teaching and its perceived value compared to other professions.

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Table 1

Mean recommended salaries in U.S. dollars for all occupations

	Building Inspector	Therapist	Teacher	Police Officer	Restaurant Manager	<i>n</i>	<i>p</i>
<u>Female/Claire</u>							
2 nd grade ¹	68492.89	69004.74	66786.73	68113.74	67601.90	211	.001
6 th gr math ¹	68653.47	68970.30	66534.65	68415.84	67425.74	202	<.001
HS science ¹	67770.83	69395.83	66729.17	68395.83	67708.33	192	<.001
HS English ¹	68309.28	68762.89	66969.07	68845.36	67113.40	194	.001
<u>Male/Charles</u>							
2 nd grade ¹	68225.64	69230.77	66564.10	68615.38	67364.10	195	<.001
6 th gr math ¹	67658.29	69145.73	67256.28	68582.91	67356.78	199	.002
HS science ²	68417.91	68736.32	67502.49	68517.41	66825.87	201	.002
HS English ¹	67656.57	68606.06	66909.09	68888.89	67939.39	198	.004

¹Recommended mean salary of teacher significantly less than at least one other occupation

²Recommended mean salary of teacher is statistically equivalent to all other occupations

Table 2

Mean recommended salaries of teachers, based on gender

	Charles/ male	Claire / female	<i>p</i>
2 nd grade	66,564.10	66,786.73	.672
6 th gr math	67,256.28	66,534.65	.181
HS science	67,502.49	66,729.17	.166
HS English	66,909.09	66,969.07	.909

How much money do you think these people should earn relative to each other? Everyone has 8 years of experience at their job.

Match (slide) annual salaries on the left to the people on the right to indicate what you think are appropriate relative salaries. Only one salary per box.

Salary \$60,000 \$64,000 \$68,000 \$72,000 \$76,000	Alan – He is a Building Inspector	Brian – He is a Therapist	Claire – She is a High School Science Teacher
	David – He is a Police Officer	Eric – He is a Restaurant Manager	

Figure 1. Example of salary sorting activity.