Original Research Article

Exploring the Impact of Teacher-to-Average Salary Ratios on Educational Performance and Socioeconomic Indicators Across U.S. States

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ABSTRACT

This study examines how teacher payment affects student academic performance by analyzing state teacher salary ratios together with student performance data and socioeconomic information. The research which covers 50 U.S. states for the 2024–2025 academic year uses Pearson correlation and multiple linear regression and multivariate linear regression methods to study how salary competitiveness affects standardized test results and graduation rates and student absenteeism and student demographics. The initial analysis demonstrates that the salary ratio shows weak statistical connections to math and reading scores which serve as immediate academic measurements. The research found that relative teacher pay positively correlates with high school graduation rates while it negatively impacts state population size and student absenteeism rates. The research results show that salary competitiveness does not directly produce short-term test score improvements but instead functions as an essential element which maintains long-term educational success and student retention and attendance. The study shows that educational policies require effective teacher payment systems which need to be established through understanding the wider socioeconomic contexts.

Keywords: Teacher compensation; academic performance; standardized test scores; educational policy; graduation rates; multiple linear regression

INTRODUCTION

Teachers remain the major driving force that determines how students can attain academic success during their entire educational process and their entire school life (1). Teachers' performance has a direct impact on students who learn important skills as they learn the curriculum and prepare for their future college and working lives. Research that combines psychology and labor economics has shown that excellent teachers can bring major gains to students' standardized test scores and high school graduation rates and college readiness (1-3). States that wish to improve their educational systems must understand how teacher performance gets affected by different factors as teachers connect with students to develop school climates (4-6).

While there is general consensus that teacher quality is a critical determinant of student success (1), the extent to which teacher compensation influences this performance remains heavily debated. Proponents of higher teacher pay argue that competitive salaries improve student outcomes by aiding in the recruitment of top talent, reducing teacher turnover, and reducing financial stress (7, 8). Conversely, opposing perspectives contend that teacher pay alone has a negligible or inconsistent impact on short-term academic achievement, emphasizing

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instead that school resources, structural inequities, and demographic characteristics are more significant drivers of student success (4, 5). This ongoing debate highlights a complex policy challenge: determining whether government intervention through increased teacher compensation directly improves educational standards or merely serves as one piece of a broader socioeconomic puzzle (7-9). This research study will use the data from Kaggle, which is an online source for reliable public data.

The Kaggle dataset provides extensive information which crosses multiple states to show both economic and educational performance of different geographical areas (10). The data includes teacher salaries and state-level average salaries and a derived indicator which calculates the teacher-to-average salary ratio to show how competitive teacher compensation is against the general market rates in the state (11). The dataset contains student performance data which includes math scores and reading scores and graduation rates and student absence rates and demographic and socioeconomic information which shows population size and urbanization percentage (11). The dataset provides four years of statewide performance data which includes Score_yr1 to Score_yr4 for academic trend analysis across multiple years (12). The dataset enables researchers to study how educational outcomes result from combined effects of compensation and socioeconomic factors because of its detailed comprehensive structure (10).

The first objective of this research is to evaluate whether the teacher-to-average salary ratio is linearly associated with key educational and socioeconomic indicators. The research evaluates how salary competitiveness corresponds with standardized test scores and graduation rates and population characteristics and urbanization levels and student absenteeism through Pearson's correlation matrix (11). The first analysis establishes a basic description which shows whether direct relationships exist between compensation and student-related factors.

The second objective requires a multiple linear regression model which uses teacher-to-average salary ratio as its dependent variable while all performance and demographic variables function as its independent variables. The approach identifies salary competitiveness factors which demonstrate significant impact after controlling for other state characteristics. The third objective uses a multivariate joint regression model which treats all four yearly performance scores (Score_yr1–Score_yr4) as simultaneous dependent variables. The model uses teacher- to-average salary ratio as its main predictor together with all educational and socioeconomic indicators except raw salary values and state identifiers (12). Through its joint modeling framework, the research investigates how teacher salary competitiveness in combination with state-level characteristics affects students' academic performance across multiple years.

The research investigates how teacher salary competitiveness affects student achievement indicators through a three-part evaluation method that includes correlation analysis, single- equation regression and multivariate joint modeling (10). The findings aim to clarify misconceptions and resolve inconsistent claims about the role of teacher compensation in educational quality. The study results provide important benefits because they help policymakers and state education departments and district administrators create compensation policies which promote student achievement while decreasing performance disparities between states. The study provides important evidence about teacher quality in American education which supports the ongoing national discussion about effective methods to improve teaching as a profession.

METHODS AND MATERIALS

Data Description

This study creates a complete state-level database through its combination of various official data sources which are accessible to the public. The researchers gathered data exclusively for their research goals and they processed the data from various sources to create equivalent time periods which matched the 2024-2025 academic schedule. The researchers built their final analytical sample from the 50 U.S. states which produced a complete state-level cross- sectional dataset.

The National Center for Education Statistics (NCES) provided teacher salary information which researchers compiled into a publicly available dataset on Kaggle to estimate average public school teacher salaries for the 2024-2025 school year (10). The study collected overall average state salary data from the U.S. Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages annual averages to analyze how teacher pay compared to general market wage levels (12). The researchers developed Salary_Ratio_T_Avg as a relative compensation indicator which represents teacher salary in relation to state average salary. The state variable measures teacher pay competitiveness, with values above

one showing that teachers receive higher compensation than average.

The Academic performance indicators were gathered from national assessment and reporting systems which have received recognition as official standards. The National Assessment of Educational Progress (NAEP) provided state-level mathematics scores while U.S. News and World Report summaries delivered reading scores from NAEP assessments. The NCES Condition of Education indicators provided high school graduation rates which met federal educational reporting requirements (11). The combined variables establish uniform academic performance measurements which apply to all United States States.

The U.S. Census Bureau Population Estimates Program provided population estimates which researchers used to study demographic and contextual aspects of their study (13). The Census urban-rural classification system provided data about state population distribution between rural and urban areas which researchers used to determine the percentage of people living in urban spaces throughout each state (14). Student absenteeism rates were collected from the Return to Learn Tracker which aggregates state-reported attendance data and provides a standardized measure of absenteeism prevalence.

The dataset contains both single-year academic indicators and four educational performance composite scores which include Score_yr1, Score_yr2, Score_yr3, and Score_yr4 to show multi-year educational trends throughout the state. The scores function as tools for tracking progress over time while their design minimizes the impact of temporary performance changes. The complete dataset contains three groups of variables which include teacher salary and total state salary measurements together with the calculated salary ratio and academic performance metrics from mathematics and reading and the graduation rates and the student body size and the urban development status and the student absenteeism percentages and the multi-year educational assessment results. The research team first used state boundaries to create equal measurement standards which they used to check the completeness of all variables before conducting their research analysis.

As shown below, Table 1 presents fundamental descriptive statistics which include all numerical variables through their respective means and medians and standard deviations and minimum and maximum values. The statistics describe how educational and economic and demographic attributes of the 50 states show their central tendency and variability which researchers will use to create models and conduct comparison studies.

Pearson Correlation Analysis

For two continuous variables X and Y, the Pearson coefficient is defined as:

$$r_{XY} = \frac{\sum_{i=1}^{n}(X_i-\bar{X})(Y_i-\bar{Y})}{\sqrt{\left[\sum_{i=1}^{n}(X_i-\bar{X})^2\right]\left[\sum_{i=1}^{n}(Y_i-\bar{Y})^2\right]}} \quad \text{(Eq. 1)}$$

Table 1. *Description and Basic Statistics Associated With Various Educational and Socioeconomic Variables Across 50 U.S. States (n=50).*

Variable	Description	mean	median	std	min	max
Salary_Ratio_T_ Avg	Relative compensation Ratio	1.143	1.105	0.208	0.697	1.665
Math_Sco	State average math score	75.72	75.500	3.500	70.00	82.000
Reading_S	State average reading Score	76.12	76.500	3.810	69.00	82.000
Grad_Rate	High school Graduation Rate	86.92	87.000	3.070	82.00	92.000
Pop_Mil	State population in millions	19.29	17.750	9.725	1.100	38.600
Urban_%	Urban population %	77.70	78.000	10.882	60.00	95.000
Absence_%	Student absenteeism %	9.580	9.000	2.313	6.000	13.000
Score_yr1	Multi-year score 1	75.02	75.000	2.352	71.00	79.000
Score_yr2	Multi-year score 2	75.50	76.000	2.517	70.00	81.000
Score_yr3	Multi-year score 3	75.88	76.000	2.537	71.00	80.000
Score_yr4	Multi-year score 4	76.24	76.500	3.068	71.00	82.000

where and are the sample means of *X* and *Y*, respectively. The application uses X to represent Salary_Ratio_T_Avg while Y shows all educational and demographic variables. Pearson correlation requires that variables must be measured using at least interval scale and their connection should follow a linear pattern while extreme outliers must have minimal impact on results. The aggregated state-level indicators meet enough requirements which allow Pearson's rank to function as an acceptable descriptive method. The correlation matrix connects with regression models through its demonstration of which variables have strong relationships with salary competitiveness.

Multiple Linear Regression

To move beyond pairwise associations and identify the joint influence of multiple predictors on salary competitiveness, I estimated a multiple linear regression model with Salary_Ratio_T_Avg as the dependent variable. The model uses educational performance data and demographic indicators as covariates, which enables the assessment of each predictor's effect while maintaining all other variables at their original values. Letting Y_i denote the salary ratio for state i and X_ki the value of predictor k in that state, the model can be written as:

$$\text{Salary\_Ratio\_T\_Avg\_i} = \beta_0 + \beta_1(\text{Math\_Score\_i}) + \beta_2(\text{Reading\_Score\_i}) + \beta_3(\text{Grad\_Rate\_i}) + \beta_4(\text{Pop\_Mil\_i}) + \beta_5(\text{Urban\_\%\_i}) + \beta_6(\text{Absence\_\%\_i}) + \varepsilon\_i \quad \text{(Eq. 2)}$$

where β_0 is the intercept, β_1 to β_6 are regression coefficients, and ε_i is an error term. Estimation proceeded via ordinary least squares (OLS), which minimizes the sum of squared residuals. The classical linear model assumes that the conditional mean of Y_i is linear in the predictors, that observations are independent across states, and that the error terms have constant variance and approximately normal distributions. Under these conditions, the OLS estimators maintain their unbiasedness and efficiency while the standard t-statistics and confidence intervals serve as valid tools for inferential statistics. The regression framework enables us to test the relationship between academic performance, population size, urbanization, and absenteeism with teacher salary competitiveness after we control for all other covariates.

Multivariate Linear Regression

The study investigated the relationship between teacher salary competitiveness and state characteristics to determine their impact on academic performance across multiple years through the application of a multivariate linear regression model which assessed four statewide performance scores. Score_yr1 through Score_yr4, are treated as jointly modeled dependent variables. Let:

$$Y_i = \begin{bmatrix} \text{Score\_yrl}_i \\ \text{Score\_yr2}_i \\ \text{Score\_yr3}_i \\ \text{Score yr4}_i \end{bmatrix}$$

$$X_i = \begin{bmatrix} \text{Salary\_Ratio\_T\_Avg}_i \\ \text{Math\_Score}_i \\ \text{Reading\_Score}_i \\ \text{Grad\_Rate}_i \\ \text{Pop\_Mil}_i \\ \text{Urban\_Pct}_i \\ \text{Absence\_Pct}_i \end{bmatrix}$$

Then: $Y_i = B\_0 + BX\_i + E\_i$ (Eq. 3)

where B_0 is a 4x1 intercept vector, B is a 4x7 matrix of regression coefficients, and E_i is a 4x1 vector of error terms. The model functions as a method to estimate four linear regressions which use identical predictor variables yet permit the outcome equations to have correlated errors. The method acknowledges that states show performance results which depend on their past performance across multiple years and that hidden state-specific variables impact all four assessment results. The multivariate model provides superior estimation results together with the ability to assess Salary_Ratio_T_Avg and other state characteristics as they affect performance changes across time because it operates under univariate linear model conditions which include linearity and state independence and residuals that follow multivariate normal distribution. The estimated coefficients for Score_yr1 through Score_yr4 demonstrate year specific effects while showing how teacher pay affects student performance across multiple years.

RESULTS AND DISCUSSION

Correlation Analysis

The Pearson correlation results demonstrate that Salary_Ratio_T_Avg shows weak to moderate linear relationships with most educational outcome variables which establishes that teacher salary competitiveness cannot explain statewide student performance. The relationship between Salary_Ratio_T_Avg and stan-

dardized achievement measures shows extremely small results with math scores showing r = −0.024 and p = 0.871 and reading scores showing r = 0.017 and p = 0.908. The near-zero correlations show that relative teacher pay has no significant linear connection with average state test performance while the data supports the idea that salary competitiveness does not lead to immediate academic improvements shown by standardized tests.

The research reveals additional significant relationships between Salary_Ratio_T_Avg and various socioeconomic and contextual variables. The salary ratio shows a strong negative relationship with state population size which has a correlation coefficient of -0.337 and a p-value of 0.017. The research shows that populous states experience higher living costs because their private sector wages create challenges for public education systems to provide teachers with competitive salaries. The research shows that Salary_Ratio_T_Avg has a moderate negative relationship with student absenteeism which approaches statistical significance at r = -0.260 and p = 0.068. The research indicates that schools with better teacher salaries experience lower absenteeism rates through improved school climate and instructional continuity and teacher-student engagement although the relationship does not reach established significance levels.

The wider correlation pattern demonstrates that demographic elements together with structural components shape educational results. Math and reading scores show strong positive correlation because students who perform well in one subject also show similar progress in other subjects (r = 0.887, p < 0.001). Urbanization shows moderate positive correlation with both achievement measures because urban states experience better educational outcomes through increased access to educational materials and better educational systems and more skilled workers (r ≈ 0.40, p = 0.004). The relationship between absenteeism and population size shows positive correlation (r = 0.312, p = 0.028) while the relationship between absenteeism and graduation rates shows negative correlation (r = −0.206) which demonstrates that absenteeism functions as a major link between socioeconomic factors and academic achievement.

Table 2. *Pearson Correlation Matrix Analysis Results Between Salary Ratios, Academic Performance, and Socioeconomic Variables (n=50).*

	Salary_ Ratio_T_Avg	Math_ Score	Reading_Score	Grad_Rate	Pop_Mil	Urban_%	Absence_%
Correlation Coefficient							
Salary_Ratio _T_Avg	1.000	-0.024	0.017	0.153	-0.337	0.051	-0.260
Math_Score	-0.024	1.000	0.887	0.074	0.243	0.405	0.136
Reading_Score	0.017	0.887	1.000	0.085	0.268	0.402	0.105
Grad_Rate	0.153	0.074	0.085	1.000	0.032	0.106	-0.206
Pop_Mil	-0.337	0.243	0.268	0.032	1.000	-0.064	0.312
Urban_%	0.051	0.405	0.402	0.106	-0.064	1.000	-0.072
Absence_%	-0.260	0.136	0.105	-0.206	0.312	-0.072	1.000
p-values							
Salary_Ratio_T_Avg	1.000	-0.024	0.017	0.153	-0.337	0.051	-0.260
Math_Score	0.871	0.000	0.000	0.610	0.089	0.004	0.345
Reading_Score	0.908	0.000	0.000	0.559	0.060	0.004	0.466
Grad_Rate	0.290	0.610	0.559	0.000	0.826	0.466	0.151
Pop_Mil	0.017	0.089	0.060	0.826	0.000	0.661	0.028
Urban_%	0.726	0.004	0.004	0.466	0.661	0.000	0.617
Absence_%	0.068	0.345	0.466	0.151	0.028	0.617	0.000

The correlation findings indicate that teacher salary competitiveness does not produce a direct impact on standardized academic outcomes. The relationship between teacher salary competitiveness and standardized academic outcomes exists in connection to different factors which include population size and student attendance. The results show that teacher salary policies will not lead to instant test score improvements when they exist as the only focus of educational initiatives. Educator salary competitiveness operates as a fundamental component that determines educational standards because it affects both teacher retention rates and school stability and student attendance behavior. The research proceeds to perform regression and multivariate analyses which assess the impact of salary competitiveness after controlling for all demographic and socioeconomic variables.

Multi-Linear Regression Results

The results from the multiple linear regression analysis which appears in Table 3 demonstrates how educational and socioeconomic factors together affect the teacher-to-average salary ratio. The model shows only a small ability to explain how salary competitiveness varies among states because it has an R^2 value of 0.173 and an adjusted R^2 value of 0.058. The statistics demonstrate that math scores and reading scores and graduation rates and population size and urbanization and absenteeism all together explain only a small portion of the teacher salary ratio variations. The model shows limited ability to explain teacher compensation competitiveness because additional structural factors which include state fiscal policies and cost-of-living differences and labor union strength and education funding formulas exist but remain unmeasured. The regression framework shows connections between educational indicators and salary but the results show that salary competitiveness depends on economic and institutional factors.

The teacher-to-average salary ratio depends on population size because it serves as the only predictor that shows statistical significance. The population coefficient (Pop_Mil) demonstrates a negative relationship which reaches statistical significance at the 5 percent threshold (β=-0.007, p=0.036), showing that states with larger populations pay teachers lower salaries which fall behind market rates. The finding supports the previous correlation analysis which showed that salary competitiveness decreases as population size increases. The explanation for this phenomenon arises from the fact that states with high populations tend to establish labor markets which contain various industries that pay workers more rapidly than public sector salaries do, resulting in decreased teacher wage competitiveness. Educational systems in larger states encounter major budget constraints and increased living expenses, which impede their ability to keep teacher salaries equal to those of other professions.

The academic performance variables show their coefficients for math scores and reading scores and graduation rates as having small effects which researchers found to be not statistically significant. The salary ratio shows no significant relationship with the urbanization and absenteeism variables when analyzed through the multivariate framework. States with stronger academic outcomes and different urban structures show no pattern of higher teacher compensation according to these results. The regression analysis shows that teacher salary competitiveness depends more on state structural characteristics than on immediate student performance metrics. The research results show that teacher pay affects

Table 3. *Multi-Linear Regression Results Predicting Teacher Salary Competitiveness (Salary_Ratio_T_Avg) Using Educational and Socioeconomic Factors (n=50).*

term	coef	std_err	t_value	p_value	ci_lower	ci_upper	VIF
Intercept	0.295	1.041	0.283	0.778	-1.805	2.395	
Math_Score	-0.008	0.018	-0.439	0.663	-0.045	0.029	2188.92
Reading_Score	0.013	0.017	0.796	0.430	-0.020	0.047	1977.54
Grad_Rate	0.009	0.010	0.890	0.379	-0.011	0.028	334.93
Pop_Mil	-0.007	0.003	-2.166	0.036	-0.014	0.000	5.903
Urban_%	-0.001	0.003	-0.240	0.811	-0.007	0.005	66.42
Absence_ %	-0.013	0.014	-0.929	0.358	-0.040	0.015	20.72

educational quality through indirect pathways which include teacher recruitment and retention and school stability instead of producing immediate improvements in standardized academic performance.

Multivariate Linear Regression Results for Various Years of Scores

The multivariate linear regression results presented in Tables 4 and 5 show that the included predictors can explain only a small part of statewide educational performance across the four yearly score measures. The Score_yr1 through Score_yr4 models produce R^2 values that fall between 0.102 and 0.206 while their adjusted R^2 values stay near zero and Score_yr1 shows a slight negative value. All four models show F-tests that lack statistical significance, which demonstrates that the combined predictor set fails to account for state-level yearly performance score differences. The research results show that teacher salary competitiveness and academic indicators and demographic controls provide useful information to predict statewide educational performance but these factors alone do not create accurate predictive models. The model fit shows a slight improvement from Score_yr1 to Score_yr4, but the growth remains small because the included variables only show a fraction of the factors that determine

Table 4. *Multivariate Linear Regression Results Analyzing the Impact of Variables on Multi-Year Scores (n=50).*

Dependent Variable	Predictor	Coef	Std Err	t-value	p-value	CI Lower	CI Upper	VIF
Score_yr1	Intercept	61.311	12.40	4.941	0	36.21	86.3	—
	Salary_Ratio_T_ Avg	0.71	1.815	0.31	0.698	-2.953	4.32	38.3
	Math_Score	-0.01	0.216	-0.044	0.965	-0.446	0.42	2196.4
	Reading_Score	-0.051	0.2	-0.26	0.799	-0.456	0.35	2007.9
	Grad_Rate	0.193	0.117	1.647	0.107	-0.043	0.42	360.00
	Pop_Mil	-0.006	0.041	-0.148	0.884	-0.08	0.07	6.60
	Urban_%	0.02	0.036	0.548	0.587	-0.05	0.09	66.54
	Absence_%	-0.064	0.164	-0.391	0.698	-0.394	0.26	21.1
Score_yr2	Intercept	66.3	12.90	5.122	0	40.06	92.164	
	Salary_Ratio_T_ Avg	0.373	1.888	0.198	0.844	-3.438	4.184	38.30
	Math_Score	-0.102	0.225	-0.453	0.653	-0.556	0.352	2196.4
	Reading_Score	0.081	0.209	0.39	0.698	-0.34	0.502	2007.95
	Grad_Rate	0.178	0.122	1.467	0.15	-0.06	0.424	360.00
	Pop_Mil	-0.005	0.043	-0.106	0.916	-0.09	0.08	6.60
	Urban_%	-0.031	0.037	-0.848	0.402	-0.10	0.04	66.54
	Absence_%	-0.259	0.17	-1.52	0.13	-0.60	0.08	21.10
Score_yr3	Intercept	58.52	12.61	4.63	0	33.05	83.9	
	Salary_Ratio_T_ Avg	0.202	1.846	0.10	0.914	-3.524	3.97	38.30
	Math_Score	-0.092	0.22	-0.41	0.679	-0.536	0.35	2196.44
	Reading_Score	0.119	0.204	0.58	0.563	-0.292	0.5	2007.97
	Grad_Rate	0.246	0.119	2.07	0.04	0.007	0.48	360.06
	Pop_Mil	-0.011	0.042	-0.27	0.787	-0.096	0.07	6.60
	Urban_%	-0.049	0.036	-1.35	0.18	-0.122	0.02	66.50
	Absence_%	-0.246	0.166	-1.48	0.146	-0.582	0.9	21.1

Continued Table 4. *Multivariate Linear Regression Results Analyzing the Impact of Variables on Multi-Year Scores (n=50).*

Dependent Variable	Predictor	Coef	Std Err	t-value	p-value	CI Lower	CI Upper	VIF
Score_yr4	Intercept	57.22	15.23	3.75	0.001	26.49	87.9	—
	Salary_Ratio_T_ Avg	-0.435	2.227	-0.19	0.846	-4.929	4.05	38.30
	Math_Score	-0.145	0.265	-0.545	0.589	-0.68	0.39	2196.4
	Reading_Score	0.144	0.246	0.585	0.562	-0.353	0.6	2007.1
	Grad_Rate	0.31	0.14	2.16 2	0.03	0.021	0.59	360.1
	Pop_Mil	-0.03	0.05	-0.06	0.94	-0.105	0.09	6.605
	Urban_Pct	-0.06	0.04	-1.28	0.20	-0.144	0.03	66.54
	Absence_Pct	-0.31	0.20	-1.55	0.12	-0.718	0.09	21.1

Table 5. *Multivariate Linear Regression Model Performance Results (n=50).*

Dependent Variable	Obs.	R^2	Adj R^2	F-stat	p-value	AIC	BIC	RMSE	MAE
Score_yr1	50	0.102	-0.048	0.681	0.687	237.021	252.31	2.20	1.88
Score_yr2	50	0.15	0.01	1.07	0.398	240.97	256.25	2.29	1.91
Score_yr3	50	0.20	0.06	1.51	0.189	238.70	254.04	2.24	1.82
Score_yr4	50	0.20	0.07	1.55	0.176	257.46	272.76	2.70	2.2

multiyear educational results.

The teacher-to-average salary ratio shows no actual statistical relationship with performance outcomes during any of the four yearly models. The score coefficients display different values which range from 0.710 to 0.373 and then change to -0.435 for Score_ yr4, yet all p-values remain above standard thresholds for statistical significance. The current results match previous research findings which established that teacher salary competitiveness does not create a direct connection to state-level academic performance. The four yearly regressions show that math scores and reading scores and population and urbanization and absenteeism show no statistical significance. The only variable that shows a significant positive relationship to graduation rate occurs during the two later years with Significance for Score_yr3 (β=0.246, p=0.044) and Score_yr4 (β=0.310, p=0.036). The result shows that states maintain higher graduation rates which lead to enhanced educational performance across all composite measures during subsequent years after adjusting for salary competitiveness along with additional contextual elements. The multivariate results show that graduation rate serves as a more reliable predictor for educational performance across multiple years, whereas the earlier multiple linear regression identified population size as the single critical factor that affected teacher salary competitiveness.

CONCLUSIONS

The researchers studied teacher salary competitiveness which they measured through the teacher-to-average salary ratio to find its relationship with educational outcomes and socioeconomic development across different U.S. states. Research shows that teacher quality acts as the main factor which determines whether students achieve academic success. The research question studies how academic results respond to changes in teacher pay which requires separate study for academic research and public policy development.

The three different statistical methods which researchers used in the study showed that teacher salary competitiveness does not produce any significant effect on state-level standardized academic performance results. The correlation analysis showed near-zero associations between the salary ratio and math and reading scores while the multiple linear regression

indicated that population size was the only significant predictor of salary competitiveness with larger states tending to have less competitive teacher salaries relative to their broader labor markets. The multivariate models which forecasted four yearly performance scores showed that salary ratio lacked any statistical importance during all studied years while graduation rate emerged as the only significant positive predictor in the later two years. Teacher salary competitiveness shows more indirect impact on educational results through its role in shaping educational conditions which include school stability and student persistence and long-term system support.

The implications of these findings are important for both educational practice and public policy. From a practical perspective, the results indicate that policies focused exclusively on raising teacher salaries may not, by themselves, produce immediate improvements in statewide test performance. However, this should not be interpreted as evidence that teacher pay is unimportant. Rather, competitive compensation may contribute indirectly by improving teacher recruitment, retention, morale, and instructional continuity, which in turn may support long-term student success. The positive association between graduation rates and later-year performance scores suggests that broader measures of student persistence and school completion may better capture the educational benefits of strong institutional conditions than do one-time standardized test indicators. For policymakers, the findings imply that teacher compensation reform should be embedded within a broader strategy that also addresses attendance, school climate, graduation support, and structural inequalities across states. In other words, salary policy may be most effective when paired with investments in student support systems, resource equity, and long-term educational planning rather than treated as a standalone lever for academic improvement.

The research study has specific constraints which need to be recognized. The analysis examined state-level data which resulted in restricted sample sizes that prevented researchers from observing essential state-level differences between regions and counties and districts and cities. The educational systems display high diversity because state average data hides actual teacher salary differences which depend on local economic conditions and resource distribution and student achievement results.

The dataset contains multiyear performance data but its cross-sectional structure prevents researchers from establishing causal relationships or modeling time-based changes. The existence of strong multicollinearity between math scores and reading scores and graduation rates creates unstable coefficient estimates which decrease the reliability of statistical results. The analysis excluded unmeasured factors which include state funding formulas, unionization housing costs, teacher working conditions and local labor-market variations that affect salary competitiveness and educational results. Research needs to advance by examining geographic areas which include counties and districts and metropolitan regions since these areas will provide larger sample sizes which enable better examination of local differences. Longitudinal panel datasets provide researchers with tools to study time-based developments while establishing stronger causal relationships. Future studies should use dimension-reduction methods and hierarchical modeling together with different methods for selecting variables to solve issues of multicollinearity which will enable researchers to identify how teacher pay affects student academic results.

CONFLICT OF INTEREST

The author declares that there are no conflicts of interest related to this work.

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