

**SCHOOLEXPLORE: A STATISTICALLY RIGOROUS ALTERNATIVE TO NICHE'S
HIGH SCHOOL RANKINGS USING THE CRITIC METHOD**

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Abstract

This paper introduces a transparent, evidence-based framework for evaluating American high schools, designed to address the methodological limitations of existing systems, especially the dominant Niche ranking, which relies heavily on crowdsourced data. Using independently verified sources and official school statistics, the methodology incorporates a broad range of indicators, including course offerings, college matriculations, standardized testing, and faculty quality. Objective weights for each indicator were determined using the CRITIC (CRiteria Importance Through Intercriteria Correlation) method, which considers both the variability and independence of each indicator. Final scores are calculated using percentile ranks to increase interpretability and reduce the influence of outliers. The results were largely consistent with established perceptions of school quality, with the top four schools being Phillips Exeter Academy, Phillips Academy Andover, Groton School, and the Lawrenceville School. This approach offers a statistically rigorous alternative to rankings based on crowdsourced data.

SchoolExplore: A Statistically Rigorous Alternative to Niche's Rankings

I. Introduction

Accurate evaluations of secondary school performance are essential for families, educators, and policymakers, yet the marketplace for rankings is effectively monopolized by a single source, Niche, whose rankings have significant influence at both the local and national levels. More than 50% of Niche's formula is based on crowdsourced sources such as user reviews and self-reported test scores. Dependence on unverified data, despite the availability of verified data, can introduce considerable inaccuracy and leave important dimensions of quality unmeasured.

This paper proposes an alternative, evidence-based ranking that emphasizes data integrity, methodological transparency, and statistical rigor. All indicators were collected from independently verifiable sources, such as the National Center for Education Statistics (NCES), or collected from official school sources under standardized definitions. Key indicators such as student-to-teacher ratios, average test scores, and college matriculation statistics were compiled from official school sources or government databases rather than user submissions. Additional indicators neglected by Niche, such as national reputation, course offerings, faculty quality, and campus facilities, were considered to provide a more comprehensive portrait of educational quality.

Indicator weights were derived fully objectively using the CRITIC (CRiteria Importance Through Intercriteria Correlation) method, which assigns weights based on each indicator's informational content (variance) and its independence from other indicators (low correlation). Prior to weighting, all raw scores were direction-adjusted so that larger values uniformly indicate better outcomes (for example, student-teacher ratios are reciprocated). After weights were determined, raw scores were converted to percentile ranks to ensure scale comparability and to

reduce the influence of outliers. The results were largely consistent with established perceptions of school quality, with the top five schools being Phillips Exeter Academy, Phillips Academy Andover, Groton School, the Lawrenceville School, and Choate Rosemary Hall.

II. Methods

Raw data was collected across sixteen indicators representing various factors of institutional quality. However, one indicator was excluded from the ranking due to concerns regarding data quality. Therefore, there were fifteen usable indicators of institutional quality. To standardize interpretability across variables, reciprocal transformations were applied where lower values indicated stronger performance, therefore ensuring that higher values consistently indicated stronger performance. In rare cases of missing or incomplete data, median imputation was used when required, and the data was simply excluded when not required.

We used the CRITIC (CRiteria Importance Through Intercriteria Correlation) method to assign objective weights to indicators, originally proposed by Diakoulaki, Mavrotas, and Papayannakis (1995) in their foundational work *Determining objective weights in multiple criteria problems: The CRITIC method*. This approach determines weights for indicators based on both each indicator's variability and its correlation with other variables, prioritizing indicators that are both informative and minimally redundant. This method offers several advantages over more commonly used approaches such as Principal Component Analysis (PCA), the entropy weight method (EWM), and standard deviation (SD) weighting. Unlike PCA, which relies on linear combinations of variables, the CRITIC method accounts for both the variability of each indicator and its intercorrelations, allowing for a more interpretable weighting scheme.

One indicator (percentage of faculty with doctoral degrees) was calculated exclusively for institutions that had reported 100% of their faculty holding advanced degrees. As only two out of the eighty institutions in the dataset met this criterion,¹ the applicability of this indicator was severely limited. To prevent distortion of weights, this indicator was excluded entirely from the CRITIC weighting process and was used solely as a tiebreaker in the faculty quality category among institutions reporting 100% of faculty with advanced degrees.

CRITIC weights were calculated using the pre-processed, directionally aligned raw data. Weights were calculated to the nearest 0.1%. Each raw score was then converted to the average of two types of percentile ranks—(1) percentage of institutions outscored and (2) percentage of institutions tied or outscored—to enable scale-independent comparison. Following this, variables were grouped into six categories: National Reputation, Course Offerings, Campus Facilities, College Matriculations, Standardized Testing, Individualized Attention, and Faculty Quality. Within each category, individual indicators were weighted proportionally to their calculated CRITIC weights. Category-level weights were derived by summing the calculated CRITIC weights of all constituent indicators. For consistency and increased interpretability, category subscores were normalized to a maximum value of 100 points and rounded to the nearest tenth.

Final scores were calculated by aggregating weighted category subscores, where each category's contribution was scaled by its total CRITIC weight and normalized to a maximum value of 100 points. Any ties were broken by exact scores prior to rounding to the nearest tenth, which had no ties. All categories and their weightings are shown in Table 1 below.

Table 1 (below): Categories and their respective CRITIC-derived weightings.

¹ The institutions reporting 100% of their faculty holding advanced degrees were the North Carolina School of Science and Mathematics and Regis High School. Both schools were included in the final ranking.

Category	Weighting
National Reputation	28.0%
Campus and Resources	15.3%
Standardized Testing	14.7%
College Matriculations	14.1%
Course Offerings	13.9%
Individualized Attention	7.2%
Faculty Quality	6.8%

III. Results

A total of eighty institutions were initially evaluated. Final rankings were determined by ordering institutions according to their final scores, and the top 50 were published. The ranking results and final scores are shown in Table 2 below. Full results are available online.

Table 2 (below): Results of the overall ranking.

Rank	Institution	Total Score
1	Phillips Exeter Academy	100.0
2	Phillips Academy Andover	97.6
3	Groton School	95.9
4	The Lawrenceville School	90.0
5	Choate Rosemary Hall	86.6
6	Stanford Online High School	84.0

7	Thomas Jefferson High School for Science and Technology	81.1
8	Deerfield Academy	78.6
9	The Brearley School	78.1
10	The Hotchkiss School	77.6
11	North Carolina School of Science and Mathematics	75.8
12	Milton Academy	75.8
13	The Dalton School	75.1
14	Harvard-Westlake School	72.7
15	St. Paul's School	71.8
16	Lakeside School	71.8
17	The Davidson Academy of Nevada	71.0
18	Hopkins School	71.0
19	Trinity School	70.5
20	Stuyvesant High School	69.1
21	The Nueva School	69.0
22	Princeton International School of Mathematics and Science	68.7
23	Noble and Greenough School	67.8
24	Regis High School	67.7
25	The Bronx High School of Science	67.5
26	Horace Mann School	67.0
27	Commonwealth School	66.4
28	The Spence School	66.0
29	The Webb Schools	65.7

30	Middlesex School	64.7
31	St. Mark's School of Texas	64.2
32	St. John's School	62.2
33	South Carolina Governor's School for Science and Mathematics	61.4
34	The College Preparatory School	60.6
35	The Loomis Chaffee School	56.4
36	Massachusetts Academy of Mathematics and Science	56.2
37	The Chapin School	56.1
38	Castilleja School	55.9
39	The Thacher School	55.7
40	The Madeira School	52.9
41	The Peddie School	52.7
42	The Pingry School	52.0
43	Riverdale Country School	51.8
44	Sidwell Friends School	51.6
45	BASIS Independent McLean	50.6
46	The Bishop's School	50.2
47	St. Mark's School of Southborough	48.9
48	Crystal Springs Uplands School	48.8
49	Cate School	47.7
50	Rye Country Day School	47.6

Full results, including category subscores and raw scores for selected indicators, are available online at <https://schoolexplore.wyattbaek.xyz/>, where the ranking is hosted.

IV. Discussion

The ranking was largely consistent with established perceptions of school quality, with the top three schools being Phillips Exeter Academy, Phillips Academy Andover and Groton School, reflecting their long-standing reputations for academic rigor and selectivity. This convergence suggests that the CRITIC weighting process, combined with percentile-based scoring, accounts for many of the same constructs that drive traditional assessments of school quality.

Handling sparse indicators. Excluding the PhD faculty indicator from weighting and reserving it as a tiebreaker for the faculty quality category was effective: only three institutions met the 100% faculty with advanced degrees threshold, so its inclusion in CRITIC would have suppressed variance and distorted weights. Future versions could model sparse variables with Bayesian priors or hierarchical pooling rather than omitting them.

Imputation strategy. Median imputation for isolated missing values preserved sample size without significantly influencing variance estimates. A future version might incorporate multiple-imputation techniques or missing-at-random diagnostics to evaluate robustness.

Generalizability. The current dataset comprises seventy elite institutions. Extending the ranking to a broader spectrum of institutions will require additional variables (e.g., accountability scores or socioeconomic context) and may require region-specific weighting adjustments. Moreover, longitudinal performance trends, such as graduation rates, value-added test score growth, and subject proficiency rates could increase the model's predictive validity.

V. Conclusion

This paper demonstrates that a ranking methodology grounded in independently verified data and objective weighting yields intuitive results that are largely consistent with established views of quality. By combining CRITIC-derived weights with percentile scoring, SchoolExplore offers an evidence-based, statistically rigorous alternative Niche's rankings.

Key advantages of SchoolExplore include:

1. **Data integrity:** reliance on government databases and standardized official statistics collected directly from schools rather than user-generated content.
2. **Objective weighting:** CRITIC balances information richness against redundancy, avoiding *ad hoc*, biased, or subjective weight assignments.
3. **Scale neutrality:** percentile transformation ensures comparability across heterogeneous indicators and reduces the influence of outliers.

While the model's scope is currently limited to an elite subset of American high schools, its design allows for straightforward expansion and constant refinement. Future work may incorporate longitudinal outcomes, extend coverage to non-elite or international institutions, and explore alternative weighting techniques (e.g., analytic hierarchy process) as cross-validation.

References

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