Appendix E:
Validating the findings on teacher candidates' grades

The protocol to evaluate teacher preparation programs' rigor based on student grades is novel and was created by NCTQ from scratch. Therefore, we tested this new analysis in several ways to identify any possible sources of bias. Features of the institution or the commencement brochure that are unrelated to the teacher preparation program itself should not affect whether an institution has a large GPA differential (the difference between the proportion of teacher candidates earning honors and the proportion of all undergraduate students earning honors at the institution). (We note that this differential is identical to what is termed the "honors differential" in the main body of the report.) This analysis finds that only the minimum GPA required for honors appears to have any bearing on an institution's differential (in that a higher minimum GPA is associated with a smaller differential in honors), and that appears to be limited.

Possible implications of using less precise data

The first issue is whether analyzing institutions with less precise data in their commencement brochures (such as brochures that do not identify students' majors) is sufficiently accurate for evaluating the proportion of teacher candidates earning honors. We evaluated this issue with a random sample of 50 institutions. These institutions produced commencement brochures containing precise data, allowing two calculations: one using precise data on student majors and one excluding information about student majors, that is, using less precise data. The results are shown below. Using a chi-square test, we found that the relationship between scores with precise data and less precise data are statistically significant (p<0.001). No institution that had less than a 10 percentage point differential when rated with more precise data had disparity differential at or above 10 percentage points when rated with less precise data. Four institutions that have a 10 percentage point or greater differential when rated with precise data have a differential of less than 10 percentage points when rated with less precise data. In summary, compared to their ratings with precise data, when rated with less precise data, institutions only performed better, not worse.

Table 1. Comparison of commencement brochures analyzed using precise data and less-precise data

		Precise data	
		< 10 percentage point differential	≥ 10 percentage point differential
Less precise data	< 10 percentage point differential	21	4
	≥ 10 percentage point differential	0	25

These results suggest that institutions for which we have less precise data available are not likely to be evaluated more critically than they would have been had we used precise data for calculations.

Possible implications of the size of the preparation program and institution

Another possible source of bias is the size of the preparation program. For example, a program that produces fewer teacher candidates might give each teacher candidate more individual attention, leading to higher grades. To test this, we used a chi-square test to compare differentials for institutions producing different numbers of teacher candidates. We found no relationship between the size of a preparation program and the size of the GPA differential ($p=0.411$).[1]

Table 2. GPA differentials and teacher candidate production

	< 10 percentage point differential	≥ 10 percentage point differential
0-200	147	204
201-400	41	65
401-600	20	20
601-800	5	4
801-1000	1	0
1001 or more	0	2

1   We recognize that given the small size of some cells a chi-square test is not entirely appropriate. However, consolidating the cells for the larger ranges of production yields the same finding: no statistically significant relationship between GPA differentials and teacher candidate production.

We used Integrated Postsecondary Education Data System (IPEDS) data to determine whether the total enrollment of the institution (including both undergraduate and graduate students) was related to the institution's differential. We again found no statistically significant relationship (p=0.236).

Table 3. Differentials and total institutional enrollment

	< 10 percentage point differential	≥ 10 percentage point differential
0-5,000	83	117
5,001-10,000	38	65
10,001-15,000	24	36
15,001-20,000	17	31
20,001-25,000	15	11
25,001-30,000	10	7
30,001 or more	26	26

## Possible implications of the GPA cutoff to earn honors

The majority of institutions in this analysis (89 percent) award Latin honors based on GPA. The remainder of institutions (11 percent) award honors using a different label (such as graduating "with distinction" or "with high distinction") or a different standard (such as a measure based on class rank). The GPA cutoffs are fairly consistent across schools awarding Latin honors, regardless of whether the institution is evaluated using precise or less precise data. The most frequently occurring requirement for *summa cum laude* is a GPA from 3.9 to 4.0; for *magna cum laude,* a GPA from 3.7 to 3.89; and for *cum laude,* a GPA of 3.5 to 3.69. For the honors analysis, we do not make any distinction between the levels of honors; we place all levels of honors into one group.

Table 4. Distribution of GPA cutoffs for Latin honors

	Summa Cum Laude	Magna Cum Laude	Cum Laude
Range of GPA requirements	3.50 to 4.00	3.25 to 3.99	3.00 to 3.94
Most frequently occuring GPA requirements	3.9 to 4.00	3.70 to 3.89	3.50 to 3.69
Average GPA requirements	3.87 to 4.00	3.69 to 3.86	3.48 to 3.68

While Figure 1 shows wide variation in the proportion of students earning honors at nearly every GPA cutoff, a clear trend emerges: requiring higher minimum GPAs to earn each level of honors reduces the proportion of students who do so.

Fig. 1   Relationship between minimum GPA and percent of student earning honors
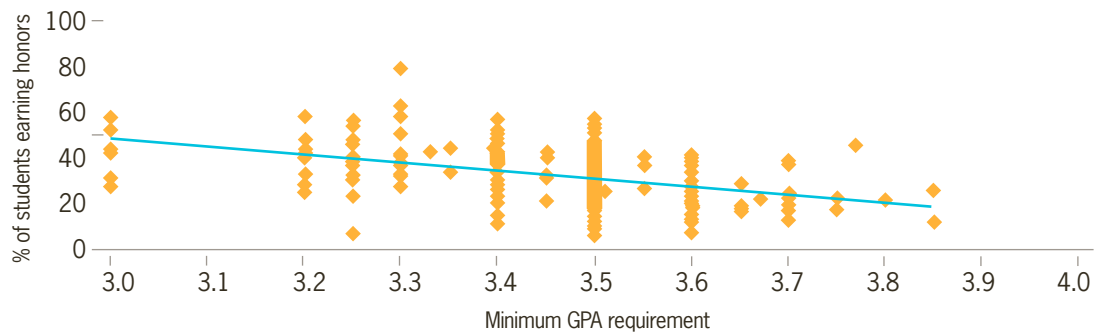
As the minimum GPA to earn honors rises, the proportion of students earning honors decreases.

This relationship may have some bearing on institutions' performance on the standard. Institutions that have less than a 10 percentage point differential in honors have a slightly higher minimum GPA to earn honors (an average of 3.50) than institutions that have a 10 percentage point or greater differential (an average minimum GPA of 3.47). Using T-tests comparing the GPA minimums of programs in these two groups of institutions, we find a statistically significant difference in average minimum GPAs (p=0.003). However, the magnitude of the difference in GPAs is small — only 0.03 GPA points.