



Staffing North Carolina's Classrooms: Evidence Connecting Teacher Preparation to Teacher Outcomes

In this policy brief we examine the distribution, characteristics, performance, and persistence of teachers entering the profession with different forms of preparation. Descriptively, we find that while the UNC system is the largest supplier of teachers to North Carolina public schools, the state's teacher workforce is also comprised of many in-state private university, out-of-state university, and alternative entry teachers. Of these, Teach For America corps members and alternative entry teachers are more likely to hold teaching licenses in the high-need areas of mathematics and science and work in low-performing schools. Regarding teacher value-added and evaluation ratings, we find that UNC system prepared teachers often outperform the state's other large suppliers of teachers but are less effective than preparation categories that supply small percentages of the state's teacher workforce. Teacher retention results show that in-state prepared teachers—both public and private—stay in North Carolina public schools at much higher rates than teachers from all other preparation categories. Overall, we conclude that:

1. The UNC system is a source of effective and persistent teachers for North Carolina public schools.
2. Research evidence on teacher performance and persistence should be connected to policy and hiring decisions. As the state takes action to address teacher shortages, those actions must be aimed at recruiting and retaining more *and* higher quality teachers.

Introduction

Who staffs the classrooms of North Carolina's public schools? While always important, given the connections between teacher performance and student outcomes, this question has assumed greater significance in recent years as in-state colleges of education experience sharp declines in enrollment and school districts struggle to fill teaching vacancies. Since 2010, enrollment in UNC system teacher preparation programs has fallen by more than 30 percent. At the start of the 2015–16 school year, school districts across North Carolina had hundreds of open teaching positions. These recent trends necessitate a deeper understanding of the contributions of in-state universities to the teacher workforce and heighten the

need for policymakers and school districts to access and use research evidence in policy and hiring decisions. Towards these ends, we classified the state's public school teachers into six policy relevant categories¹ that capture the preparation an individual held prior to first entering the teaching profession. With these teacher preparation categories we assess: (1) the distribution of teachers to these preparation groups; (2) the characteristics of teachers and the schools in which they work; (3) the contributions of teachers to student achievement; (4) teachers' evaluation ratings on the state's professional teaching standards; and (5) the persistence of teachers in North Carolina public schools (NCPS).

¹ There is an additional category containing individuals who cannot be classified based on available administrative data. We include these teachers in our analyses but do not report their results in this policy brief.

Background

Using data from the North Carolina Department of Public Instruction (NCDPI) and the UNC General Administration, we classified teachers into one of six policy relevant teacher preparation categories. Three of these categories are for traditional teacher preparation: teachers prepared at the undergraduate, graduate, or licensure only levels by UNC system institutions, North Carolina private and independent colleges and universities, or out-of-state universities. The remaining three categories are for alternative preparation or short-term international teaching programs: Teach For America (TFA), Visiting International Faculty (VIF), and all other alternative entry teachers.

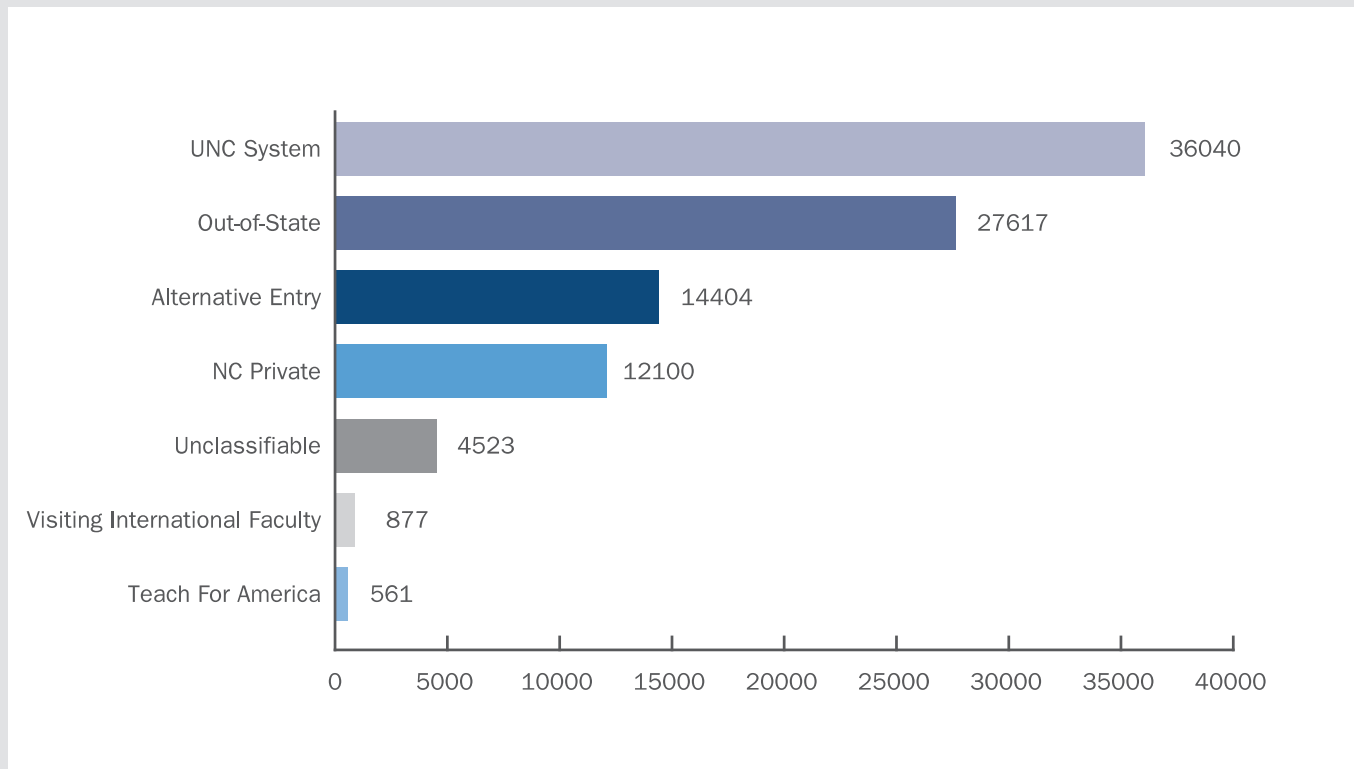
To better isolate the relationships between teacher preparation and key teacher outcomes, we focus on teachers with less than five years of teaching experience and control for a rich set of contextual variables in our value-added and evaluation rating analyses. We assign teachers prepared at UNC system institutions to the reference category and compare their performance and persistence with teachers entering the profession with other forms of preparation. Importantly, in these analyses we stress both the statistical

and practical significance of results. Practical significance is influenced by the magnitude of results—e.g. how much more or less effective is a teacher preparation category—and the size of teacher preparation categories. Teacher preparation categories with more teachers impact outcomes for more schools and students. In the sections below, we provide further details on our research sample and methods.

How are teachers distributed across preparation categories?

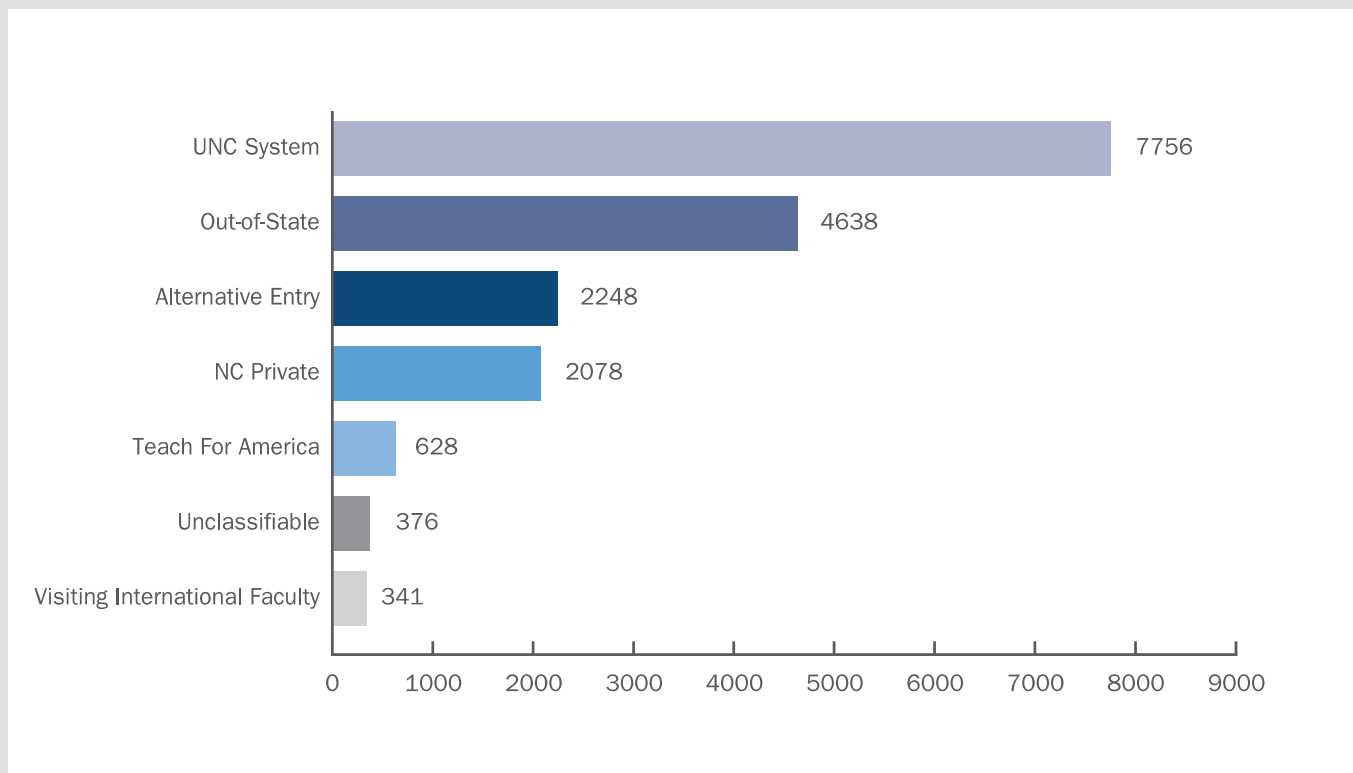
As shown in Figure 1a, the UNC system was the largest source of teachers in NCPS during the 2013–14 school year, comprising 37.5 percent of the teacher workforce. This represents a one percentage point increase compared to values from the 2011–12 school year. Out-of-state prepared, alternative entry, and North Carolina private university prepared teachers comprise 28.7, 15.0, and 12.6 percent of the teacher workforce, respectively. While TFA attracts significant research and policy attention, their corps members accounted for only 0.6 percent of the state’s teachers in 2013–14.

Figure 1a: Teacher Preparation Categories in the 2013–14 School Year



Note: In the 2013-14 school year there were 96,122 individuals paid as teachers in NCPS. This figure displays the teacher preparation categories arranged from largest (top) to smallest (bottom).

Figure 1b: Teacher Preparation Categories Among First-Year Teachers (2011-12 to 2013-14)



Note: From the 2011-12 through 2013-14 academic years, North Carolina hired 18,065 first-year teachers. This figure displays the teacher preparation categories arranged from largest (top) to smallest (bottom).

To look closely at newly hired teachers in NCPS, Figure 1b displays the distribution of first-year teachers across the teacher preparation categories for the 2011-12 through 2013-14 academic years. Overall, this distribution follows a pattern similar to that of Figure 1a, with 42.9 percent of the first-year teachers coming from the UNC system, followed by out-of-state prepared, alternative entry, and North Carolina private university prepared teachers at 25.7, 12.4, and 11.5 percent, respectively. Teach For America corps members comprise 3.5 percent of the beginning teacher workforce.

What are the characteristics of teachers and the schools in which they work?

Across teacher preparation categories, Table 1 displays select individual and school characteristics for teachers with less than five years of experience in the 2013-14 academic year. Over 80 percent of the UNC system graduates are female, 17 percent are racial or ethnic minorities, and the average age is 28.5 years. These demographic measures

are generally comparable to the values of North Carolina private university and out-of-state prepared teachers. Sharper distinctions are evident for TFA, VIF, and alternative entry teachers—these preparation categories bring in more male (alternative entry) and minority teachers. Regarding teaching licenses, Table 1 shows that a much lower percentage of TFA corps members and alternative entry teachers hold elementary grades licenses; conversely, a higher percentage of these teachers hold licenses in mathematics and sciences. Additionally, a higher percentage of alternative entry and out-of-state prepared teachers are licensed to instruct exceptional children.

For school characteristics, the bottom panel of Table 1 shows that over half of UNC system graduates work in elementary schools, nearly 20 percent teach in middle schools, and more than 25 percent teach in high schools. These values are comparable to those of North Carolina private university and out-of-state prepared teachers. Teach For America corps members are more evenly distributed across the three school levels, VIF teachers are concentrated in elementary schools, and nearly half of alternative entry teachers work in high schools.

Table 1: Individual Teacher and School Characteristics

	UNC System	NC Private	Out-of-State	Teach For America	Visiting International Faculty	Alternative Entry
Individual Characteristics						
Female	81.21	85.30	80.04	80.72	83.08	68.77
Minority	17.12	10.90	13.62	24.76	84.29	40.46
Age	28.54	29.88	31.02	25.21	36.22	33.10
Select Licensure Areas						
Elementary	49.62	61.03	53.40	22.83	57.83	7.33
Reading/English	18.39	13.33	21.89	20.19	26.74	16.45
Social Studies	12.36	9.77	14.26	14.15	2.41	8.70
Math	11.69	10.80	12.49	21.70	5.78	14.10
Science	7.94	5.78	9.55	19.62	3.13	17.46
Exceptional Children	10.22	12.21	16.12	9.25	2.17	16.78
School Characteristics						
School Level						
Elementary	55.47	61.03	54.28	32.26	69.40	19.93
Middle	17.98	16.39	22.72	28.49	13.49	29.35
High	25.95	22.19	22.31	38.30	17.11	49.38
Free and Reduced-Price Lunch	62.40	62.74	61.09	83.19	64.92	65.07
Minority	52.38	50.91	57.48	86.83	63.47	61.74
Performance Composite	53.62	54.35	54.07	37.67	52.97	47.31

Note: This table displays individual and school characteristics for teachers with less than five years of experience in the 2013-14 school year.

Regarding school demographics and performance, UNC system, North Carolina private university, and out-of-state prepared teachers work in schools with comparable values for the free and reduced-price lunch, racial/ethnic minority, and performance composite measures. Teach For America corps members and alternative entry teachers work in lower performing schools with more minority students; TFA corps members also work in schools with higher concentrations of students who qualify for free and reduced-price lunch.

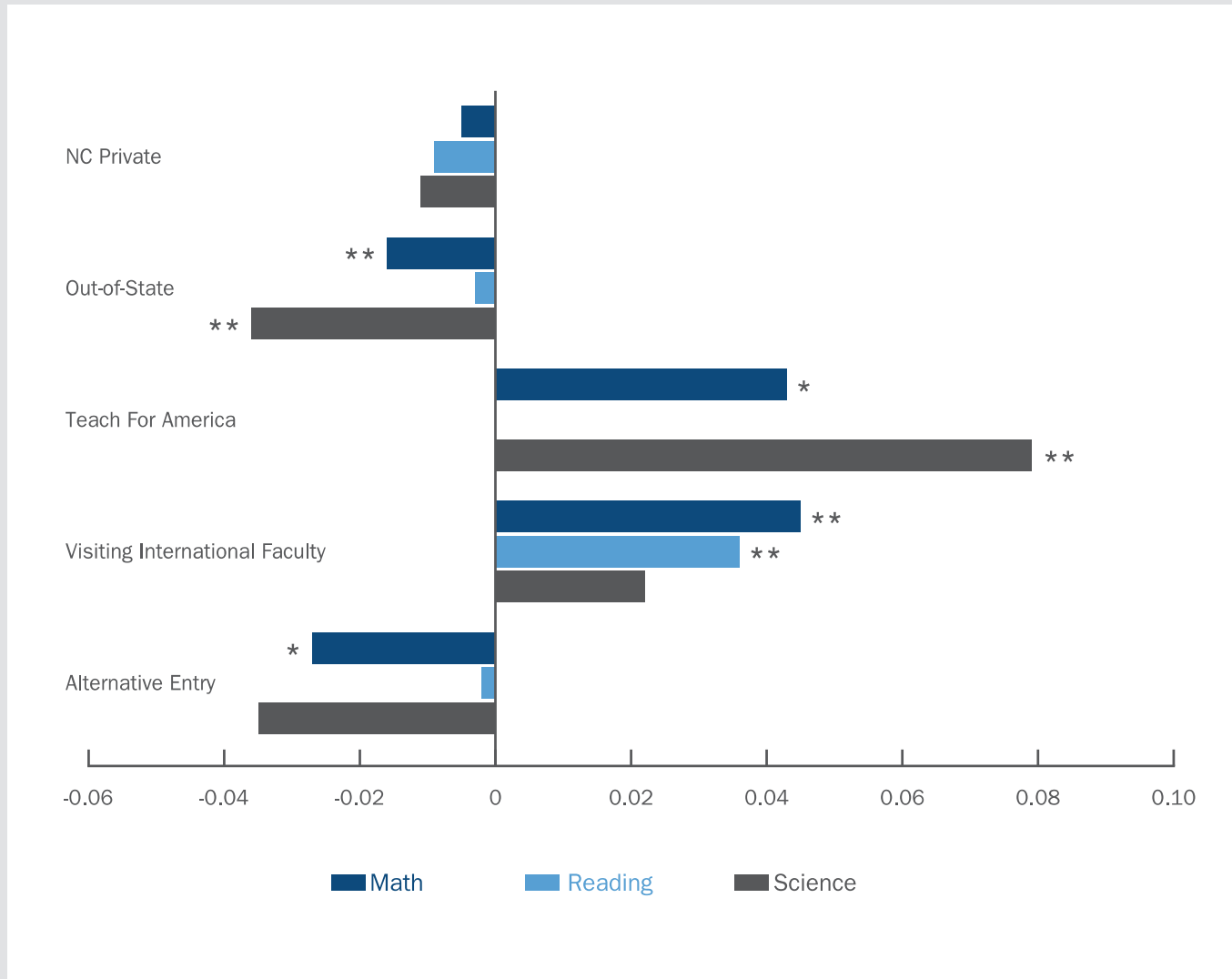
Does student achievement differ by teacher preparation category?

To assess teachers' contributions to student achievement, we used data from the 2009-10 through 2013-14 school years to estimate value-added models across nine grade-level/subject-areas. In elementary and middle school grades we examined teacher effectiveness on the state's End-of-Grade exams in mathematics, reading, and science

(5th and 8th grades), while in high school, we examined teacher effectiveness on the state's End-of-Course exams in algebra I, English I/II, and biology. Our preferred estimation approach compares teacher effectiveness statewide using a multi-level model with controls for student, classroom, teacher, and school characteristics. We also implemented models comparing the effectiveness of teachers prepared by UNC system institutions with that of other teachers working in the same schools.

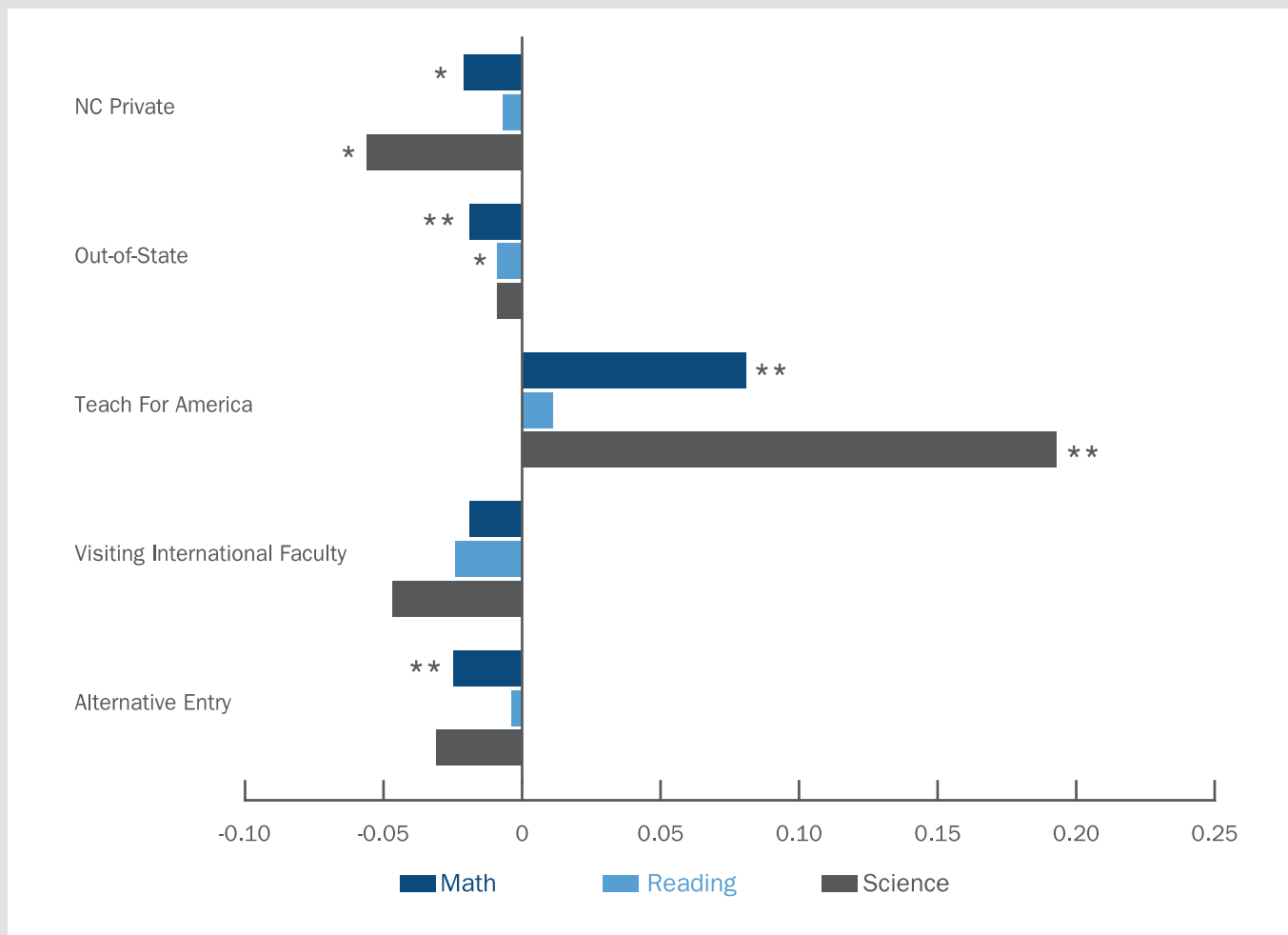
Figures 2a-c show that UNC system prepared teachers are often more effective, on average, than teachers from preparation categories that supply a large percentage of the state's teacher workforce. Specifically, UNC system prepared teachers are more effective than (1) out-of-state prepared teachers in elementary grades mathematics and science and middle grades mathematics and reading; (2) alternative entry teachers in elementary and middle grades mathematics; and (3) teachers from North Carolina private universities in middle grades mathematics and science.

Figure 2a: Teacher Value-Added in Elementary Grades



Note: This figure illustrates adjusted-average student achievement for NC private, out-of-state, TFA, VIF, and alternative entry teachers in reference to UNC system institution prepared teachers. * and ** at the end of a horizontal bar indicate statistically significant differences at the 0.05 and 0.01 levels, respectively.

Figure 2b: Teacher Value-Added in Middle Grades



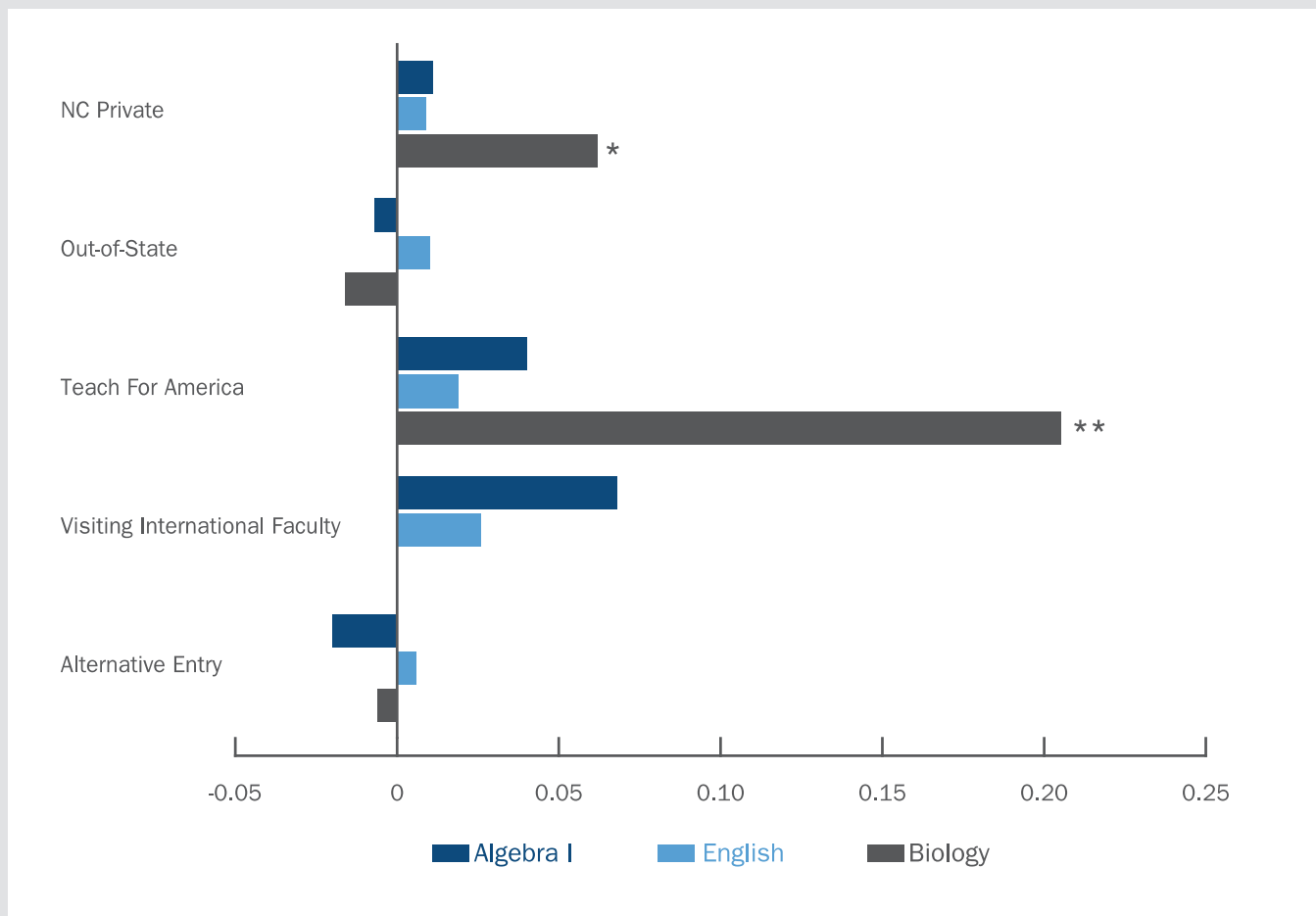
Note: This figure illustrates adjusted-average student achievement for NC private, out-of-state, TFA, VIF, and alternative entry teachers in reference to UNC system institution prepared teachers. * and ** at the end of a horizontal bar indicate statistically significant differences at the 0.05 and 0.01 levels, respectively.

Comparing within schools, UNC system prepared teachers also outperform alternative entry teachers in elementary grades science and high school algebra I. Only in high school biology do teachers prepared at North Carolina private universities outperform UNC system institution graduates. Conversely, UNC system prepared teachers are often less effective, on average, than teachers from preparation categories that supply small percentages of the state’s teacher workforce. Teach For America corps members are more effective in elementary and middle grades mathematics and science and high school biology and VIF teachers are more effective in elementary grades mathematics and reading.

In addition to the main value-added results, which detail impacts on all students, we estimated models limited to students qualifying for free or reduced-price school meals.² Overall, the summary results in Table 2 are very similar to the main results in Figures 2a-c. Teachers prepared at UNC system institutions are often more effective with students qualifying for free or reduced-price school meals than teachers from out-of-state, North Carolina private universities, or those entering teaching alternatively. Teach For America corps members and VIF teachers are often more effective than UNC system prepared teachers with these high-poverty students.

² We also estimated sets of value-added models limited to (1) racial and ethnic minority students and (2) low-performing students (those whose prior year test scores were more than 1 standard deviation below the statewide mean).

Figure 2c: Teacher Value-Added in High School Grades



Note: This figure illustrates adjusted-average student achievement for NC private, out-of-state, TFA, VIF, and alternative entry teachers in reference to UNC system institution prepared teachers. * and ** at the end of a horizontal bar indicate statistically significant differences at the 0.05 and 0.01 levels, respectively.

Table 2: Teacher Value-Added with Students Qualifying for Free and Reduced-Price School Meals

Preparation Category	More Effective with Students Qualifying for Free and Reduced-Price School Meals than UNC System Teachers	Less Effective with Students Qualifying for Free and Reduced-Price School Meals than UNC System Teachers
NC Private	HS biology	MS math, MS reading, and 8 th grade science
Out-of-State	---	ES math, 5 th grade science, MS math, and MS reading
Teach For America	ES math, 5 th grade science, MS math, 8 th grade science, HS algebra, and HS biology	---
Visiting International Faculty	ES math and ES reading	---
Alternative Entry	---	ES math, MS math, and HS algebra

Note: This table details the subject areas in which teachers from different preparation categories are significantly more or less effective with students qualifying for free or reduced-price school meals than teachers from UNC system institutions. Dashed lines indicate that there are no statistically significant differences. ES=elementary school grades; MS=middle school grades; HS=high school grades.

Do evaluation ratings differ by teacher preparation category?

In the North Carolina Educator Evaluation System (NCEES), principals use classroom observations and other teaching artifacts to rate teachers as either *not demonstrated*, *developing*, *proficient*, *accomplished*, or *distinguished* on five teaching standards—Leadership, Classroom Environment, Content Knowledge, Facilitating Student Learning, and Reflecting on Practice. In this analysis, we use these ratings to assess whether teachers prepared by UNC system institutions have higher levels of instructional practice quality, as judged by school principals, than peers prepared outside the UNC system. Compared to value-added, these evaluation ratings entail two important advantages: they are available for a larger percentage of the teacher workforce—approximately 90 percent of teachers have an evaluation rating—and they measure teaching proficiency in specific teaching practices.

For evaluation rating models across all school levels, Table 3 shows that UNC system graduates earn significantly higher evaluation ratings than out-of-state prepared and alternative entry teachers on all five standards. They also earn

significantly higher evaluation ratings than North Carolina private university prepared teachers in two standards—Content Knowledge and Facilitating Student Learning. Conversely, TFA corps members earn significantly higher evaluation ratings than UNC system prepared teachers across all five standards while VIF teachers earn higher ratings on two standards—Classroom Environment and Content Knowledge.

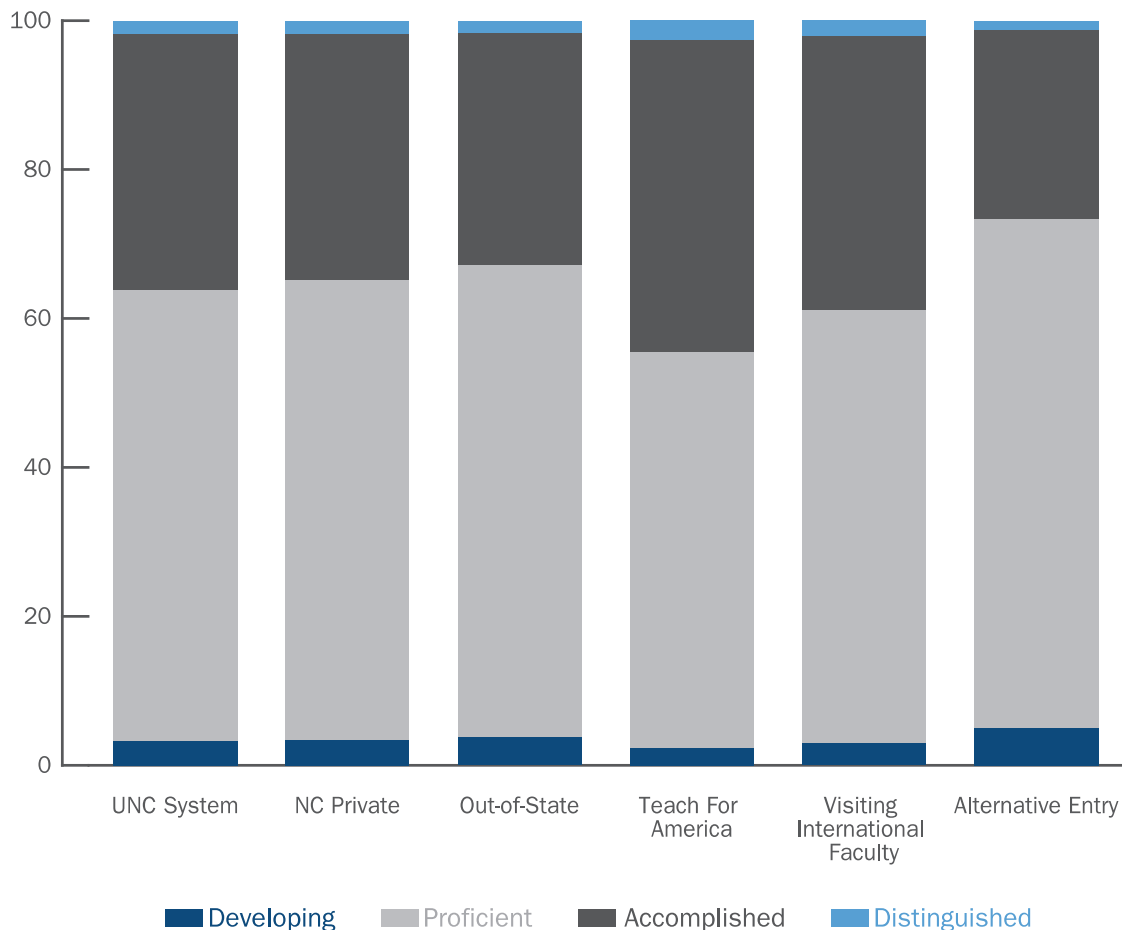
To better convey the magnitude of these evaluation rating differences, Figure 3 displays predicted probabilities of earning a rating of *developing*, *proficient*, *accomplished*, or *distinguished* for Standard 4—Facilitating Student Learning. Despite the statistically significant differences shown in Table 3, the predicted probabilities for UNC system, North Carolina private university, and out-of-state prepared teachers are fairly comparable—36.2, 34.9, and 32.3 percent of teachers in these categories earn evaluation ratings in the top two categories, respectively. Teach For America corps members have the most desirable distribution, with 44.5 percent of teachers earning ratings of *accomplished* or *distinguished*, while only 26.6 percent of alternative entry teachers are rated in the top two categories.

Table 3: Evaluation Rating Results—All School Levels

Preparation Categories	Leadership	Classroom Environment	Content Knowledge	Facilitating Student Learning	Reflecting on Practice
NC Private	1.014	0.952	0.928*	0.944*	0.975
Out-of-State	0.866**	0.912**	0.879**	0.859**	0.903**
Teach For America	1.392**	1.204*	1.347**	1.417**	1.550**
Visiting International Faculty	0.890	1.342**	1.347**	1.120	1.041
Alternative Entry	0.675**	0.773**	0.724**	0.639**	0.721**
Count	63,403	59,403	59,373	63,401	59,370

Note: Cells in this table present odds ratios for earning higher evaluation ratings in reference to UNC system prepared teachers. Odds ratios above ‘1’ indicate higher evaluation ratings; odds ratios below ‘1’ indicate lower evaluation ratings. * and ** indicate statistical significance at the 0.05 and 0.01 levels, respectively.

Figure 3: Predicted Teacher Evaluation Ratings—Facilitating Student Learning Standard



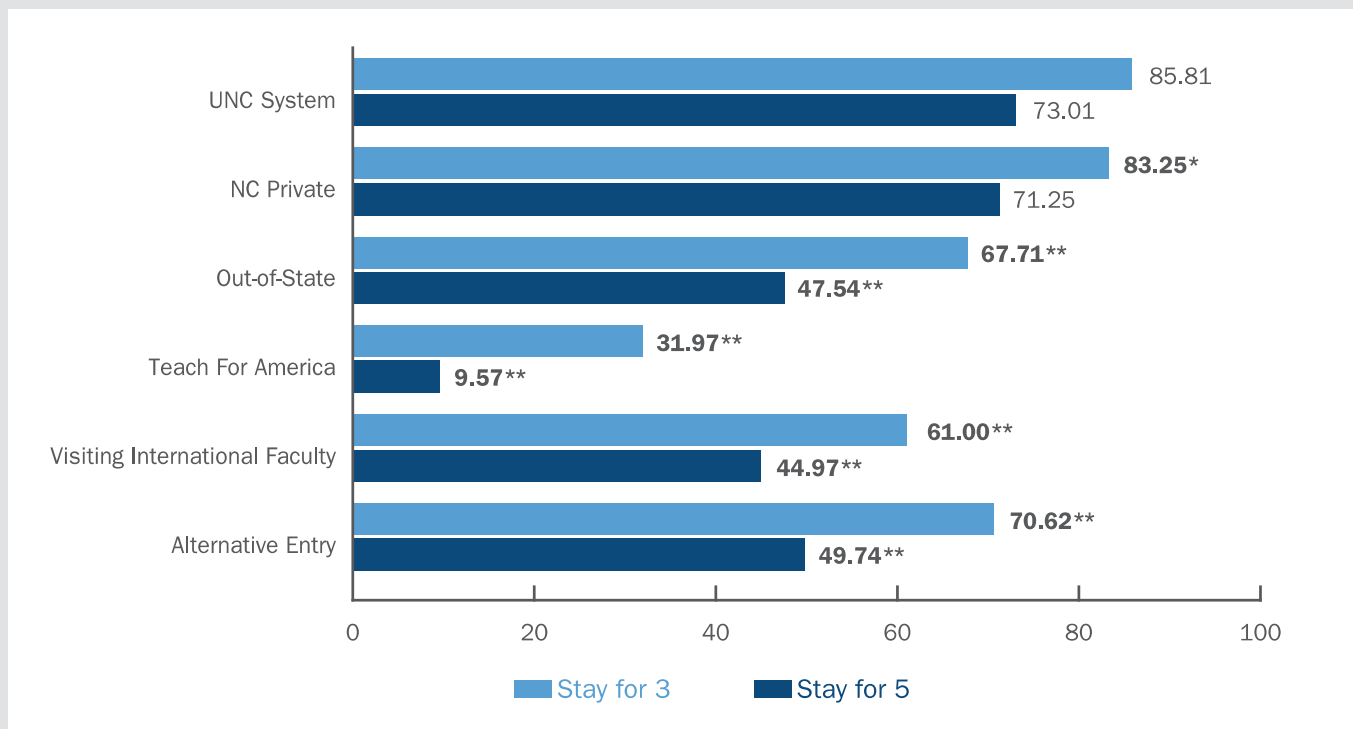
Note: This figure displays predicted probabilities of rating at developing, proficient, accomplished, or distinguished on the Facilitating Student Learning evaluation standard.

How long do teachers from these preparation categories persist in NCPS?

Beyond performance, teacher retention is a key concern in North Carolina, especially given recent increases in teacher attrition. Therefore, we identified three cohorts of first-year teachers—in the 2008–09, 2009–10, and 2010–11 school years—and tracked the percentage of these teachers that return for a 3rd and a 5th year of teaching in NCPS.

Figure 4 shows that teachers prepared at UNC system institutions return to teaching in NCPS at significantly higher rates—85.81 and 73.01 percent return for a 3rd and 5th year of teaching—than their counterparts from other preparation categories. Specifically, those prepared at North Carolina private universities have comparable retention rates, while out-of-state prepared and alternative entry teachers (other large suppliers of teachers to NCPS) have much lower retention rates. Less than half of the out-of-state prepared and alternative entry teachers in this sample returned for a fifth year of teaching in North Carolina. Given their two year teaching commitments, TFA corps members have the lowest three and five-year retention rates.

Figure 4: Teacher Retention in NC Public Schools



Note: For three cohorts of first-year teachers (2008-09, 2009-10, and 2010-11) this figure displays the percentage of teachers, by preparation category, that return for a 3rd and 5th year of teaching in NCPS. * and ** indicate statistically significant differences between the reference group, UNC system prepared teachers, and another teacher preparation category at the 0.05 and 0.01 levels, respectively.

Discussion

In this policy brief we examined the distribution, characteristics, performance, and persistence of teachers entering the profession with different forms of preparation. Overall, we found that teachers prepared at UNC system institutions have higher value-added estimates and earn higher evaluation ratings than teachers from other large preparation categories—out-of-state, alternative entry, and North Carolina private university. Many of these results are not large in magnitude but they take on practical significance since these teachers impact outcomes for hundreds of thousands of students statewide. On average, UNC system prepared teachers have lower value-added and evaluation ratings than TFA corps members and VIF teachers. These results are important to recognize—particularly if promising practices of TFA and VIF can be effectively scaled—however, teachers from these groups make up less than two percent of the state’s teacher workforce. Furthermore, retention analyses show that TFA corps members and VIF teachers have high levels of attrition from NCPS, while teachers prepared at North Carolina public and private universities have the highest rates of retention—approximately 84 and 72 percent return for a third and fifth year of teaching, respectively.

So what do these findings mean for North Carolina and efforts to staff the state’s classrooms? First, state policymakers, university officials, and school district personnel must find ways to encourage more people to teach in North Carolina. Even with effective policy responses, however, these teacher supply challenges are likely to persist, as it takes time for programs and reforms to impact the teacher pipeline. In the short-term, the state may need to more heavily rely on alternative entry, out-of-state prepared, and long-term substitute teachers; given their performance and persistence outcomes, this would not be preferable for North Carolina’s schools and students. Second, research evidence on teacher performance and persistence should be connected to policy and hiring decisions. This policy brief demonstrates that considerations of teacher quantity should not be separate from teacher quality. Therefore, as the state takes action to address teacher shortages, those actions must be aimed at recruiting and retaining more *and* higher quality teachers.

For more research on this topic

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Study Authors: Kevin C. Bastian | Qi W. Xing

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