Landscape of Teacher Preparation Programs and Teacher Candidates

SUZANNE M. WILSON, University of Connecticut
SHANNON L. KELLEY, University of Connecticut

NATIONAL ACADEMY OF EDUCATION   500 Fifth Street, NW   Washington, DC 20001

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Evaluating and Improving Teacher Preparation Programs

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Suzanne M. Wilson, *University of Connecticut*
Shannon L. Kelley, *University of Connecticut*

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INTRODUCTION

In the 2018-2019 academic year, more than 560,000 prospective teachers attended more than 21,500 teacher preparation programs (TPPs) housed in more than 2,100 institutions in the United States (Irwin et al., 2021). Some will either never complete their program or fail to seek or secure teaching positions, but the majority will, and they will become a substantial part of the future U.S. teacher workforce. But what do we know about these teacher candidates? Who are they? Where do they come from? Why are they attracted to teaching? What factors shape enrollment and completion patterns across the diverse set of programs that constitutes our current system of teacher preparation? The answers to these questions are crucial to efforts designed to enhance the U.S. teacher workforce; local efforts to improve programs; state and national policies concerning teacher quality; and our collective understanding of how teacher supply and demand is both forged by and reflects economic, social, historical, and cultural trends.

The question of who attends TPPs today is particularly pressing given the steady, 10-year decline in enrollments. Partelow (2019) reports that total enrollment in U.S. TPPs has declined by more than 35 percent between 2010 and 2018; the decline in program completers was 28 percent on average. Nine states experienced enrollment declines of greater than 50 percent, among them Oklahoma (80 percent), Michigan (67 percent), and Pennsylvania (62 percent). Delaware, Idaho, Illinois, Indiana, New Mexico, and Rhode Island all had declines of more than 50 percent. Only Massachusetts, Nevada, North Dakota, Utah, Virginia, and Washington, DC, had increases.[2]

This significant decline in the interest of the next generation in teaching as a career is worrisome. While there is disagreement about whether the United States will experience teacher shortages nationally in the coming years (e.g., Carver-Thomas et al., 2020; Cowan et al., 2016; Garcia & Weiss, 2019b; Sutcher et al., 2016), approximately 100,000 new teachers are needed each year (Cowan et al., 2016). The social, health-related, and economic effects of COVID-19 have led to higher levels of teacher stress and substantial cuts in many school budgets (on the heels of those from the Great Recession). Some teachers report that they plan to resign given the challenges of the pandemic (Kini, 2020); those who have left report that it was due to both increased stress and how that stress exacerbated extant pressures that they were already feeling (Diliberti et al., 2021). New teachers had abbreviated or no student teaching experience during state lockdowns (Choate et al., 2021), which could lower new teachers' preparedness and can then lead to high teacher turnover. Add to that the increasing instability of the workforce (Ingersoll et al., 2018, 2021), and it seems reasonable to

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[2] According to Title II reports of data from 2018-2019, however, enrollment numbers had risen to 2009-2010 levels, which may be a harbinger of a shift in this trend or a momentary aberration.

claim that the United States will need a robust pool of new teachers to refresh the workforce.[3]

Ensuring that all U.S. students receive a high-quality education depends on the ability of communities to recruit and retain high-quality teachers. Not only do students directly benefit from those teachers, but high-quality teachers also contribute to their school's professional community, which is foundational to a school's working conditions. Working conditions have been demonstrated to be significantly tied to both teacher and student success (e.g., Bryk & Schneider, 2002; Jackson, 2014; Johnson, 1990, 2006; Johnson et al., 2012; Ladd, 2009, 2011; Leithwood, 2006; Loeb et al., 2012). Having an insufficient number of fully certified, well-prepared teachers also consumes already stretched and limited resources. This restricted pool of strong teacher candidates creates ripple effects that undermine the educational system more generally, especially in Title I districts (e.g., Jacob, 2007; Lankford et al., 2002).

Schools in Title I districts, primarily located in rural and urban areas, have historically encountered greater difficulties in recruiting and retaining teaching staff than those in suburban areas. Discrepancies in access to highly qualified, experienced teachers have direct and lasting impacts on student outcomes. A large-scale study of teacher certification and student achievement in North Carolina found that the positive effects of having a highly qualified, experienced teacher outweighed the effects of race and parent education on student outcomes (Clotfelter et al., 2007). However, in a recent report analyzing students' access to highly qualified teachers, Cardichon et al. (2020) found that schools with higher enrollments of students of color employed uncertified teachers at four times the rate of schools with a greater population of White students. In addition, nearly one in six teachers in schools that primarily serve students of color was classified as a beginning teacher compared to nearly one in 10 teachers in schools that were largely White. And once teachers gain more experience, they are more likely to transition to more privileged and better resourced school communities; West and Chingos (2009) found that schools with high performing students retained nearly one in two highly effective teachers after 4 years, while those in lower performing districts only retained one in four effective teachers after 4 years. A growing body of evidence suggests that teachers seek new positions for numerous reasons, including the quality of administrative support, student characteristics, access to collegial and collaborative relationships with peers, the quality of facilities and access to resources, and the stability of the behavioral and learning environment, among others (Quay, 2011). In the past 20 years, states, universities, and school districts have experimented with a multitude of ways to mitigate these divides, including raising teacher salaries, instituting mentor programs, and developing teacher residencies.

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[3] Using the total number of degrees in education produced between 1984 and 2013 based on the Integrated Postsecondary Education Data System Completion Data, Cowan et al. (2016) assert that teacher production has grown steadily since the mid-1980s, although only half of those teachers are hired (p. 460). That is, between 175,000 and 300,000 teachers were produced between 1984 and 2013, while only 60,000 to 140,000 were hired into teaching positions. This leads the researchers to claim that there are sufficient numbers of teachers being produced. However, other researchers define shortage differently. As Ingersoll et al. (2019) point out, "shortage" is often conceptualized narrowly as an insufficient production and recruitment of a particular group of teachers, or teachers in general, often in comparison to how the population of teachers represents (or does not) the general population of students or the public that they serve. But shortage might be more robustly defined as "any imbalance between labor demand and supply … an inadequate quantity of individuals able and willing to offer their services under given wages and conditions. From this perspective, the problems many schools encounter retaining minority teachers can technically be referred to as a shortage" (p. 32).

TPPs are also a critical point in the teacher pipeline and knowing more about TPP candidates will help us build stronger pipelines into teaching, understand recruitment in more robust ways, and understand more about the forces and factors that shape candidates' interests in teaching as a career and the pathways they follow into the profession. Understanding the characteristics of those enrolled in TPPs is also essential for program evaluation and improvement. Who our students are, their experiences and interests, and their entering knowledge and beliefs can inform program content and pedagogy, clinical experiences, partnerships with schools and other institutions, and staffing.

The purpose of this paper is to describe the current landscape of candidates applying to and enrolling in TPPs, and to summarize what we know about who pursues teacher certification. To this end, we examined (1) the large-scale data available on TPPs; and (2) culled additional data from historians' analyses of the teacher workforce, contemporary large-scale studies of TPPs, papers on local design and program histories, and case studies of particular programs as well as examining information on programmatic innovation in local contexts. Here we summarize efforts—through programs and policies—to recruit new candidates to the teacher workforce.

We begin this paper with a general overview of historical and contemporary characteristics of the U.S. teacher workforce. We then briefly describe the landscape of TPPs, which has experienced significant shifts in the past 30 years. Analyses of entering and graduating candidates have traditionally focused on demographic characteristics: gender, race and ethnicity, age, socioeconomic status (SES), and—increasingly—academic ability. There is also a modest amount of literature on teachers' motivations for their career choice, which helps illuminate what drives individuals toward and away from teaching. Given the need to aggressively attract new teachers, we then describe programs, policies, and practices that have been used to recruit and retain new teachers. The paper concludes with implications for policymakers, educators, teacher educators, and researchers as we face potential teacher shortages in the coming years.

BACKGROUND: THE TEACHER WORKFORCE

We begin with a note of caution: speaking in generalizations about the teacher workforce can be misleading, for teaching in the United States is a localized, situated profession, and averages across the nation obscure important regional differences. The statistics cited earlier about recent shifts in applicants to TPPs serve as one example: Oklahoma can experience an 80 percent decline while North Dakota experiences a 14 percent increase in TPP enrollments. California can report worrisome teacher shortages, while Connecticut can have surpluses. The authors of a recent National Academies of Sciences, Engineering, and Medicine (2020) report, *Changing Expectations for the K-12 Teacher Workforce: Policies, Preservice Education, Professional Development, and the Workplace*, assert that

> there is no national labor market for teachers, for a host of reasons, including the fact that teachers consistently demonstrate the desire to stay near to both the region they grew up in, and where they went to college (e.g., Boyd et al., 2005; Reininger, 2012), as

well as the difficulties any teacher faces in crossing state borders and securing a new state certification without burdensome costs or hurdles. (p. 67)

In one study, Boyd et al. (2005), for example, documented that more than 80 percent of beginning teachers took a job within 40 miles of where they went to high school. This "localness" of the teacher labor force has been observed across contexts and time (e.g., Khalil & Chao, in press; Killeen et al., 2015; Krieg et al., 2016; Mihaly et al., 2013). Not only do teachers attend college and pursue teaching positions close to where they grow up, but teacher policies concerning preparation, licensure, hiring, and evaluation can vary considerably across states, including courses required for preparation, content areas and grade levels for certification/licensure, who participates in and determines how new teachers are hired, and the standards by which they are evaluated, both annually and for promotion to tenure. Teacher preparation is a cornerstone of this broader education system ecology and understanding the distribution of teachers and teacher candidates across the country requires attending to state, regional, and community factors, as well as understanding teacher preparation as part of a pipeline that starts well before one considers teaching as a career and extends into the schools and well beyond any initial preparation.

We also note that several factors complicate efforts to identify prospective teachers. Most notably, teachers enter through multiple pathways: some major in education at institutions of higher education (IHEs) (these individuals are more likely to become elementary school teachers), while some major in IHE disciplinary departments with the intention of becoming teachers (these individuals are more likely to become middle and high school teachers). Some are BA students, while others are MA students. Moreover, teacher preparation is a cross-university obligation (e.g., prospective teachers take liberal arts and sciences classes, disciplinary classes, courses in foundational areas like philosophy and psychology), and IHEs vary in terms of what unit keeps bureaucratic track of prospective teachers. Thus, counting "education majors" is not a precise way to determine which students in an institution are planning to become teachers. An additional complicating factor is that some prospective teachers decide to enter teaching years after their undergraduate study, and they can enter MA programs in education or specific disciplinary departments, or TPPs that lead to certification but not advanced degrees.

In 2017-2018, there were 4 million teachers in the United States—3.3 million full- or part-time, non-charter public school teachers, 205,600 public charter school teachers, and 509,200 private school teachers (McFarland et al., 2019). All three of these populations are higher than they were in 2000; the private school teacher and non-charter public school teacher populations increased in size by the order of 12-13 percent; the number of public charter school teachers in 2017-2018 was more than 1,000 percent higher than in 1999-2000 (17,500) (McFarland et al., 2019).[4] Ingersoll et al. (2018) suggest that the growth in workforce size is due to increased numbers of charter school teachers,

[4] The statistics cited here are drawn from McFarland et al. (2019), which used the National Center for Education Statistics' National Teacher and Principal Survey, which was administered first in 2015-2016, and then again in 2017-2018. Throughout the paper, the articles referenced use a range of databases, which accounts for slight differences in relevant date ranges and reported statistics. We chose to use the broadest swathe of the available literature rather than narrowing our report to analyses that are all based on the same large database.

combined with increases in teachers of English language learners (ELLs), elementary enrichment classes, and special education. Increased requirements for mathematics and the sciences for high school graduation across the United States might also account for workforce expansion.

The modal age of teachers in 1987-1988 was 41; in 2015-2016, it was 55. By 2015-2016, the workforce had not only gotten older, but it had spread out, with multiple peaks in age distribution. Currently, the average age of public school teachers continues to be about 41-42 years old; about 15 percent of teachers are under 30 years of age, and about 30 percent are 50 years old or older (National Academies of Sciences, Engineering, and Medicine, 2020; see Table 1). Traditional public and private school teachers were older than the public charter school teachers in 2017-2018. For instance, the percentage of teachers who were in the 60 and over age category was higher for private school teachers (15 percent) than for traditional public school teachers (8 percent), and for public charter school teachers (6 percent). In contrast, private school and traditional public school teachers had lower percentages of younger teachers. For instance, 14 percent of traditional public school teachers and 16 percent of private school teachers were under 30, compared with 24 percent of public charter school teachers. Today's workforce is also more diverse in terms of its experience. Unlike the teachers who entered teaching in the 1970s and 1980s, today's teachers have many more career options open to them, and long-term careers are less common. This means that more teacher candidates enter the field at mid-career, with an average age in the late 30s and with different experiences and expectations. First-career entrants, who are younger and have less experience, do not necessarily plan on having long careers as teachers, and can approach the career in a more exploratory or tentative way (Johnson & Kardos, 2008).

Scholars have used a handful of characteristics to further describe the diversity of the teacher workforce, including gender, race, ethnicity, SES, academic ability, and teacher motivations. Here, we briefly summarize trends along these lines.

Gender

In the early 1800s, teaching was dominated by men as a way to supplement their incomes or as a "halfway house … [to] … the learned professions" (Hoffman, 2003, p. 28), but by the mid-19th century, the tables had turned, and women dominated the workforce (e.g., Kafka, 2016; Rury, 1989). By 1920, 75-80 percent of teachers were women; this continues to this day (e.g., Kafka, 2016; Rury, 1989). In the 2017-2018 school year, 76.5 percent of teachers were female in traditional public and public charter schools (see Table 1); 74 percent of teachers in private schools were female. The gender distribution differs among elementary and high school teachers; 88.6 percent of elementary school teachers identify as female, while among high school teachers, the percentage of men rises modestly to 40 percent. The dominance of women has affected the profession's image and status in numerous ways: scholars have suggested that public attitudes about women have led, for example, to the emphasis on increasing accountability and bureaucracy, the lack of a clear career trajectory that allows for differentiated roles, and depressed salaries.

TABLE 1 Distribution of Teachers in Public and Private Schools, by Selected Teacher Characteristics: 1999-2000, 2011-2012, and 2017-2018[a]

Selected Teacher Characteristic	Public Schools			Private Schools		
	1999-2000	2011-2012	2017-2018	1999-2000	2011-2012	2017-2018
Total Teachers	2,991,000	3,386,000	3,546,000	408,000	465,000	510,000
Male	754,000 (25.1%)	802,000 (23.7%)	834,000 (23.5%)	107,000 (23.9%)	117,000 (25.2%)	133,000 (26.0%)
Female	2,248,000 (74.9%)	2,584,000 (76.3%)	2,712,000 (76.5%)	342,000 (76.1%)	348,000 (74.8%)	377,000 (74.0%)
Race/Ethnicity						
White	2,532,000 (84.3%)	2,773,000 (81.9%)	2,811,000 (79.3%)	402,000 (89.5%)	411,000 (88.3%)	433,000 (85.1%)
Black	228,000 (7.6%)	231,000 (6.8%)	239,000 (6.7%)	17,000 (3.7%)	17,000 (3.6%)	16,000 (3.2%)
Hispanic	169,000 (5.6%)	264,000 (7.8%)	331,000 (9.3%)	21,000 (4.7%)	24,000 (5.2%)	37,000 (7.2%)
Asian	48,000 (1.6%)	61,000 (1.8%)	75,000 (2.1%)	7,000 (1.6%)	9,000 (1.8%)	14,000 (2.7%)
Pacific Islander		5,000 (0.1%)	8,000 (0.2%)	*	‡	‡
American Indian/Alaska Native	26,000 (0.9%)	17,000 (0.5%)	18,000 (0.5%)	2,000 (0.6%)	‡	‡
Two or More Races	*	35,000 (1%)	63,000 (1.8%)	*	4,000 (0.8%)	7,000 (1.3%)
Age						
Under 30	509,000 (17.0%)	518,000 (15.3%)	531,000 (15.0%)	87,000 (19.3%)	78,000 (16.7%)	83,000 (16.2%)
30 to 39	661,000 (22.0%)	979,000 (28.9%)	991,000 (27.9%)	101,000 (22.4%)	112,000 (24.0%)	124,000 (24.4%)
40 to 49	953,000 (31.8%)	849,000 (25.1%)	1,028,000 (29.0%)	131,000 (29.2%)	110,000 (23.8%)	115,000 (22.7%)
50 to 59	786,000 (26.2%)	783,000 (23.1%)	732,000 (20.7%)	106,000 (23.5%)	99,000 (21.3%)	108,000 (21.2%)
60 and Over	93,000 (3.1%)	256,000 (7.6%)	263,000 (7.4%)	25,000 (5.7%)	66,000 (14.2%)	79,000 (15.5%)
Years of Teaching Experience						
Less Than 3	325,000 (10.8%)	244,000 (7.2%)	318,000 (9.0%)	73,000 (16.3%)	52,000 (11.2%)	62,000 (12.1%)
3 to 9	854,000 (28.5%)	1,104,000 (32.6%)	1,003,000 (28.3%)	144,000 (32.0%)	150,000 (32.3%)	152,000 (29.8%)
10 to 20	865,000 (28.8%)	1,265,000 (37.4%)	1,416,000 (39.9%)	137,000 (30.6%)	147,000 (31.6%)	167,000 (32.9%)
More Than 20	958,000 (31.9%)	772,000 (22.8%)	808,000 (22.8%)	95,000 (21.2%)	116,000 (24.9%)	128,000 (25.2%)

TABLE 1 Continued

Selected Teacher Characteristic	Public Schools			Private Schools		
Level of Instruction						
Elementary	1,292,000 (53.3%)	1,726,000 (51.0%)	1,779,000 (50.2%)	261,000 (58.1%)	245,000 (52.8%)	262,000 (51.4%)
Secondary	1,031,000 (46.7%)	1,659,000 (49.0%)	1,766,000 (49.8%)	188,000 (41.9%)	219,000 (47.2%)	247,000 (48.6%)
Number of New Teacher Hires	222,000	173,000	241,000	83,000	68,000	89,000

* Not available.
† Not applicable.
! Interpret data with caution.
‡ Reporting standards not met.
[a] Public school teachers include teachers in public charter schools.
SOURCES: Adapted from McFarland et al., 2019. Copyright 2019 by the National Center for Education Statistics.

Race/Ethnicity

Beyond dominance of women, the other truism that holds for the workforce is the demographic divide between an increasingly diverse student population (53 percent of students identify as people of color) and the predominantly White teaching force. Historically, the United States had a significantly higher proportion of Black teachers. The Black teacher workforce grew from 15,000 in 1890 to 66,000 in 1910, which accounted for 40 percent of all Black professionals (Ladson-Billings, 2005). In fact, by 1950, about half of all Black professionals were teachers (Siddle Walker, 2000). With the *Brown v. Board* decision in 1954, however, tens of thousands of Black teachers lost their jobs, especially in the South (Fine, 2004; Fultz, 2004; Irvine, 1988, 2002; King, 1993a, 1993b), as schools that served Black children were closed and their teachers terminated. Thompson (2020) demonstrates that integrated Southern schools filled many teaching positions that would have been held by African American teachers (had the schools remained segregated) by recruiting less experienced White teachers and White male teachers. While some older Black women teachers migrated North and secured teaching positions, the majority of the displaced teachers were pushed into non-professional occupations. Thompson hypothesizes that these integration-induced layoffs of Black teachers are reflected in the subsequent decrease in African Americans' interest in pursuing teaching as a career; Hudson and Holmes (1994) report a 66 percent decline in the number of Black students majoring in education across the United States between 1975 and 1985. By 1986, Black teachers represented 7 percent of the workforce (Madkins, 2011). There has not been a significant change in that proportion since then. In fact, Black teacher turnover has been exacerbated in large urban areas by mass firings of teachers, mass school closures on the heels of No Child Left Behind, declining school enrollments, and charter school expansions (Carver-Thomas & Darling-Hammond, 2017).

As noted, today's teacher workforce is also predominantly White (79.3 percent in public schools, 85.1 percent in private schools; see Table 1). Charter schools have the highest percentage of Black teachers at 10 percent, 7 percent of traditional public school teachers were Black, and only 3 percent of private school teachers were Black. There is a similar pattern for Hispanic/Latinx teachers: 16 percent in charter schools, 9

percent in traditional public schools, and 7 percent in private schools. The percentage of Asian American teachers is higher for public charter and private school teachers (3 percent each) than for traditional public school teachers (2 percent). The percentages of Pacific Islander, American Indian/Alaska Native teachers, or teachers of two or more races is 2.7 percent for private schools, and 2.1 percent for public schools. The under-representation of teachers of color and Latinx teachers holds across grade and content domains, especially among high school mathematics and science teachers, 91 percent of whom are White.[5] We know very little about the history of Latinx teachers (in part because the category itself includes multiple groups that have been labelled in diverse ways over time), and even less about Indigenous teachers and Asian and Pacific Islander teachers (Kafka, 2016).

These statistics are troubling given the mismatch between the diversity of the U.S. student population and the diversity (or lack thereof) of the teacher workforce. In a recent report, The New Teacher Project (TNTP) (2020) calculated what they called the "teacher preparation diversity gap," or the difference between the percentage of teacher candidates of color currently enrolled in a state's TPPs and the percentage of students of color in that state's K-12 public school system. Forty-eight of the 50 states and Washington, DC, have percentages of White teacher candidates that are higher than the percentage of White public school K-12 students. In 455 programs, more than 90 percent of the teacher candidates enrolled in 2017-2018 were White, despite concerted efforts to increase the diversity of the teacher candidate pool nationwide. Bireda and Chait (2011) reported that in 38 percent of U.S. K-12 schools, there was not a single teacher of color. The diversity of the teacher workforce does not simply matter in reflecting the color of teachers' and students' skin; research has demonstrated the benefits that all students reap from learning from teachers of color (e.g., Clewell et al., 2001; Dee, 2004; Ehrenberg & Brewer, 1995; Farkas et al., 1990; Foster, 1998; Irvine, 1990; King, 2019; Klopfenstein, 2005). Research also has demonstrated that Black teachers can serve as role models and inspirational models for their Black students (e.g., Egalite et al., 2015; Siddle Walker, 2000; Villegas & Irvine, 2010; Villegas & Lucas, 2004), as well as share linguistic and cultural experiences and backgrounds with them (e.g., Foster, 1998; Ladson-Billings, 2000; Villegas & Lucas, 2004). We return to this issue later in the paper.

Socioeconomic Status

In the early part of the 20th century, many teachers came from lower socioeconomic backgrounds—farms, ranches, and villages— or "middling" backgrounds (Rury, 1989). Coffman (1911) reported that the lowest classes were contributing the highest numbers of teachers. Additionally, in the early 1900s, first- and second-generation immigrants were increasingly drawn to teaching (Hoffman, 2003). The GI Bill also increased the chances for children of relatively poor families to pursue teaching careers and studies of teacher candidates in the later part of the 20th century found that entering teacher

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[5] There is variation in the literature as to how students or teachers who are not Caucasian are referred to as a group. This group includes students (or teachers) who are Black/African American; native Hawaiian/Pacific Islander or Asian; Native American/Indian/Alaska Native; Hispanic/Latino; and those of multiple races. "Hispanic/Latino" refers to ethnicity and includes those of all races. The term "students of color" is sometimes used, but Ingersoll et al. (2019) note that more than half of teachers identifying as Hispanic also identify as White. Scholars handle this in various ways. In this paper, we use a range of distinctions, adhering usually to the terminology that was used in the scholarship we are citing.

candidates tended to come from households with a lower combined income than non-education majors (Brookhart & Freeman, 1992).

Yet, teaching attracted men and women from higher socioeconomic backgrounds as well. Until the late 18th century, men from elite backgrounds sometimes saw teaching as a stepping stone to law or ministry. A disproportionate number of women with high SES were traditionally attracted to teaching, given constraints for pursuing other careers. However, as U.S. public schools expanded, an increasing number of teachers came from working class families (Sedlak & Schlossman, 1986).

Academic Ability

There has been much interest in teacher candidates' academic abilities, perhaps because in the 18th and 19th centuries, there were very few requirements for becoming a teacher. At the turn of the 21st century, researchers, using SAT scores as a proxy, claimed that college graduates with higher SAT or ACT scores were less likely to enter teaching over the past 30 years (e.g., Goldhaber & Liu, 2003; Hanushek & Pace, 1995; Henke et al., 2000; Podgursky et al., 2004; Vegas et al., 2001). This resonated with earlier research (e.g., Vance & Schlechty, 1982). Bacolod (2007) found that approximately 50 percent of women in the top quintile of test scores became teachers if they entered the workforce in the mid-1960s, but that percentage dropped to under 20 percent for women entering teaching in the mid-1980s. Other researchers have reported similar results in terms of entering teacher candidates and practicing teachers who leave, with those with higher scores on a range of standardized tests leaving at significantly higher rates (e.g., Corcoran et al., 2004; Murnane et al., 1989, 1991; Podgursky et al., 2004). In their review of 44 published and unpublished studies, however, Brookhart and Freeman (1992) found that, when compared to high school students who were not education majors, teacher candidates reported similar high school grade point averages (GPAs) and academic backgrounds, although secondary teacher candidates intending to teach mathematics and science had more high school coursework in those areas.

While there is some evidence that these historical trends appear to hold, there remains disagreement. Using the National Center for Education Statistics' (NCES's) Baccalaureate and Beyond Survey in 1999-2000 and 2007-2008, Ingersoll et al. (2018) found that undergraduates majoring in education had lower SAT scores than those who were not. Furthermore, within most majors, individuals who became teachers had lower SAT scores than those from the same major who did not pursue teaching as a career. On the other hand, Gitomer (2007) found no decline in SAT scores of teachers from the 1990s to the mid-2000s. Using additional proxies for ability, Ingersoll et al. (2018) examined the selectivity of IHEs attended by prospective teachers. One-tenth of the first-year public school teachers came from the top two Barron levels of selectivity (most competitive and highly competitive); about 25 percent came from the lowest two categories (less competitive, non-competitive); and about two-thirds came from the two middle levels of institutions (very competitive, competitive). The researchers also note that there has been a decrease in the number of males from the top two levels of selectivity since 1980; Ingersoll et al. (2018) did not find the same to be true of females, although there were fluctuations. Other researchers have reported a decline in the number of female teachers coming from higher deciles (Corcoran et al., 2004).

Other analyses of the academic ability of teacher candidates suggest that there was an upward shift in achievement for 2008 college graduates; teacher candidates with and without science, technology, engineering, and mathematics (STEM) majors entering the teacher workforce had higher average SAT scores than their peers who entered other occupations (Goldhaber & Walch, 2013, 2014). The researchers suggest that differences in the labor market more generally might account for this trend, with academically able graduates pursuing the security and stability of teaching in the face of high unemployment rates. These results resonate with those of Master et al. (2018), who found that—using data from 1993 to 2008—U.S. schools are recruiting more academically skilled college graduates into teaching, with increases being especially large in urban areas. Finally, Lankford et al. (2014) found that the academic ability of both individuals certified and those entering teaching has steadily increased since 1999 and that the gains were widespread. This was reflected in a substantial narrowing of the differences in teacher academic ability between White and minority teachers, as well as between high and low poverty schools.

Generalizing about the academic abilities of teachers has always been complicated. As a large workforce, there has always been variation, and that variation has increased as new pathways into teaching have proliferated, particularly in the past several years as the labor market context has shifted and college graduates may be choosing to pursue stable teaching jobs as opposed to riskier alternatives (Goldhaber & Walch, 2014). As economist Susanna Loeb remarked, "The idea that teachers consistently come from the lower third is just wrong" (Barshay, 2015).

Teachers' Motivations

Research on teachers' motivations to teach—in the United States and around the world—has emphasized the intrinsic and altruistic reasons ever since Lortie's (1975) seminal study, when he proposed five themes or "attractors": an interpersonal theme (i.e., a desire to work with people), a service theme (i.e., an altruistic desire to serve society), a continuation theme (i.e., a fondness for and desire to stay connected with schools), a material benefits theme, and a time compatibility theme (i.e., an attraction to the schedule). In their review, Brookhart and Freeman (1992) found that teacher candidates reported being drawn to teaching for service-oriented goals, for the opportunity to help others, and to work with children. Some researchers report that the reasons for opting into teaching differ across elementary and secondary candidates, with elementary candidates being more child-centered, and secondary teachers being more subject-oriented.

Other research suggests that teacher candidates report coming from families of teachers, or of having a teacher who inspired them to teach or wanting to be a positive role model (e.g., Chin & Young, 2007; Schutz et al., 2001). In contrast to non-education majors, teacher candidates traditionally come from households with lower incomes (Brookhart & Freeman, 1992). Although some teacher candidates from traditionally under-represented communities reported that their families pushed back against their career choices (citing concerns of status and income), others emphasized their position in a family of educators (Su, 1997). Chin and Young (2007) identified 16 percent of their alternatively certified sample as "following in the family tradition." Importantly, this

group had a greater sample of older and African American teachers than others. Jacinto and Gershenson (2021) found that children whose mothers were teachers were more likely to enter teaching than children of nonteachers. The transmission of teaching from mother to child was 50 percent larger for daughters than for sons, although the transmission rates were higher for Hispanic daughters and near zero for Black sons (p. 635).

The motivations that individuals have for entering teaching also appear somewhat stable, with intrinsic rewards seemingly more important than extrinsic ones. Manuel and Hughes (2006) surveyed 79 secondary school teaching candidates in a full-time, 5-year combined teacher certification and undergraduate program; candidates reported their motivations to teach were driven by an interest in working with young people (65 percent), enjoyment of the subject (69 percent), and personal fulfillment (70 percent). Other research reports similar results (Kyriacou & Coulthard, 2000; Richardson & Watt, 2005). As previously noted, Lortie (1975) proposed commitment to service as one of five factors that attracted people to teaching. Survey and case study data from all types of TPPs corroborate this theme, although individuals' orientation toward service often reflected candidates' backgrounds. In Chin and Young's (2007) survey study of 4,239 teachers enrolled in 30 alternative TPPs in California, more than 70 percent of participants noted they primarily chose to become teachers because they viewed it as service to specific communities like their own or wanted to advocate for or work with young people.

Lee et al. (2019) analyzed the admissions essays of 77 applicants to an urban U.S. teacher residency program. The candidates were applying to a program that focused on preparing teachers for Teaching English to Speakers of Other Languages (TESOL) or Teaching Students with Disabilities (TSWD), and the researchers analyzed the essays to explore the candidates' arguments for why they wanted to be teachers in high need schools. All of the candidates were certified by 2014, 42 and 65 percent of the candidates were people of color, respectively, 72 percent were females, and many were residents of the city in which the residency was based. The program had a 93 percent retention rate.

Several themes emerged in the analysis. The applicants saw themselves as teacher activists, using the language of mentor, leader, role model, or "soldier," with goals to work against systems of social injustice. A second theme was that teacher candidates aimed to enable students to also become activists, who would challenge themselves and be engaged citizens. The researchers note that the essays were characterized by tensions in the applicants' beliefs, which at times positioned schools or students in deficit models. A third theme concerned the candidates' beliefs in the role of education to provide all students with learning opportunities and access, including advocating for the marginalized. They saw teaching TESOL and TSWD as a career that allowed them to help students "find their way."

In their scoping review of 70 empirical studies of why people choose teaching around the world, Fray and Gore (2018) found similar themes: some researchers reported that altruistic reasons were the most common factor for choosing teaching, with "service to others" as a central reason why prospective teachers reported pursuing the profession along with making a difference, serving society, and answering a calling. Other researchers found that intrinsic factors like loving the subject matter, enjoying teaching, working with children, and feeling accomplished and satisfied were common self-reported reasons for entering teaching. That said, extrinsic factors also played a role;

the ability to balance professional and personal obligations, flexible working hours, a reliable income, and job security were also motivations.

Several researchers offer a more holistic conception of teacher candidates' motivations. Knell and Castro (2014) interviewed 13 teacher candidates in an urban alternative teacher certification program about their motivations for becoming teachers. The researchers used a "push-pull" framework for exploring the candidates' perspectives, hypothesizing that prospective teachers were influenced to enter teaching by ecological and contextual factors related to life and career and psychological and personal reasons that attracted them to the profession. Push factors provide momentum for making a move; career changers in the study reported both being dissatisfied with working conditions or not being able to secure work, which led them to seek out teaching, a career they perceived to be more stable, flexible, and fulfilling than their previous work. Teaching candidates also identified "pull" factors that corresponded with the psychological or personal push factors that brought them to teaching. These included altruistic and egocentric factors like contributing to society, working with youth, or feeling appreciated in their work (see Figure 1).

Fray and Gore (2018) found that Watt and Richardson's (2007, 2008) FIT-Choice Scale was a popular methodological approach in international research to explain the choice of teaching using multiple factors at once, including social utility (e.g., enhancing social equity), personal utility (e.g., time for family), and positive prior teaching experiences.

In addition, public perceptions of teaching's attractiveness as a career also play a role in attracting or dissuading teacher candidates. Public discourse that positions schools and teachers as a social problem or concerns about the ability of teachers to

Push-in factors: Dissatisfaction with another job, desire for career stability & time flexibility, personal fulfillment

Pull-in factors: Contributing to society, work with youth, and (in some cases) garnering appreciation

Teaching Careers

Pull away factors: Cultural views of teaching, low teaching salaries
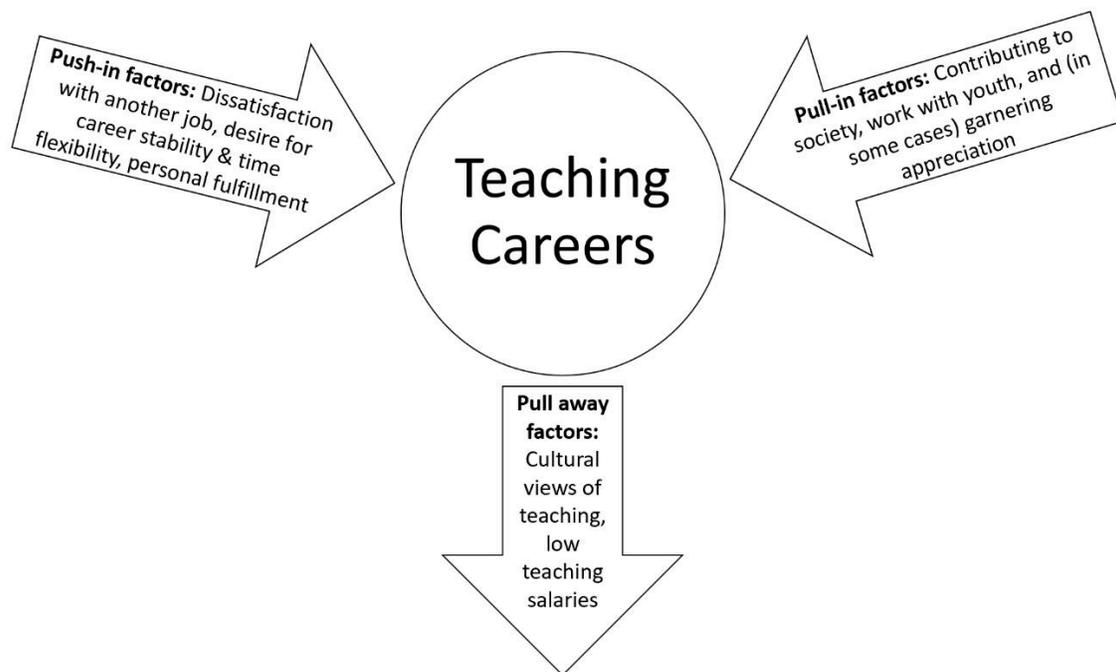
FIGURE 1 Factors that push and pull candidates into teaching.

make a living wage can also dissuade future teachers. In a survey concerning global teacher status (Dolton et al., 2018), Americans saw that teachers are influential, but underpaid. When asked to rank 14 professions in order of respect, U.S. respondents ranked teachers as the sixth lowest, seeing it as most similar to librarians or social workers; U.S. teachers saw their status as being even lower than the general public did. However, four in 10 Americans would encourage their children to become teachers, which was the fifth highest of all countries surveyed. Overall, when determining where teachers are most valued in the 39 countries that participated, the United States ranked 16th, well below many Asian countries, as well as lower than Canada, New Zealand, and the United Kingdom. These findings resonate with Ingersoll et al.'s (2018) description of the status of teaching in U.S. society; they report that teachers rank below high prestige professionals like doctors and lawyers, but above librarians, social workers, plumbers, and public service professions like police and wait staff (see Table 2).

Prior to COVID-19, teachers were already feeling besieged between rising calls for accountability, negative portrayals of teachers' unions, a discourse of reducing teachers to measures of their numerical "value-added" with rankings published in local newspapers (e.g., Anagnostopolous et al., 2021), and serious blows to school finances and working conditions as consequences of the Great Recession. During the pandemic, the press to simultaneously teach online and in-person, with limited material and human resources and little preparation, and mixed messages about whether teachers—like other "front-line" workers—were valued by their schools and communities only served to exacerbate preexisting frayed conditions (e.g., Garcia et al., 2020; Robbins, 2020).

TABLE 2 Relative Prestige of Selected Occupations

Occupation	Score 1972	Score 1989	Occupation	Score 1972	Score 1989
Physicians	82	86	Actors	55	58
Professors	78	74	Librarians	55	54
Lawyers	76	75	Social workers	52	52
Judges	76	71	Athletes	51	65
Physicists	74	73	Police	48	60
Dentists	74	72	Secretaries	46	46
Architects	71	73	Plumbers	41	45
Psychologists	71	69	Carpenters	40	39
Clergy	69	69	Truck drivers	32	30
Chemical engineers	67	73	Cashiers	31	29
Secondary school teachers	63	66	Construction workers	30	34
Registered nurses	62	66	Cooks	26	31
Elementary school teachers	60	64	Wait staff	20	28
PreK-K teachers	60	55	Janitors	16	22

SOURCE: Adapted from Ingersoll et al., 2018.

Teacher Compensation

While teaching salaries consistently rose in the 20th century, teachers' salaries have also consistently failed to keep pace with salaries in other occupations that require comparable training and credentials.[6] This trend continued into the 21st century. Allegretto et al. (2004) demonstrated that teaching is associated with a wage penalty, that is, teachers earn significantly less than comparably experienced workers, a disadvantage that has grown significantly over the past 10 years. Salaries of new college graduates who become teachers are considerably lower than new college graduates who choose other professions (cf., Cataldi et al., 2014). Allegretto and Mishel (2020) report that the teacher wage penalty has grown since the mid-1990s to 22 percent in 2018 and 19.2 percent in 2019.[7] Teacher wage penalties are more than 20 percent in 21 states and in Washington, DC; in no state does the average relative wage for teachers exceed that of other college graduates (see Figure 2).

This lack of pay parity with other college graduates disproportionately affects the recruitment and retention of teacher candidates from historically marginalized communities. Evidence suggests that minority teachers are more likely to graduate with greater student loan debt (Scott-Clayton & Li, 2016) and are more likely to live in cities with higher costs of living (Carver-Thomas & Darling-Hammond, 2017), both of which create financial burdens that play a significant role in whether people begin and continue teaching (see Figure 3).

Historically, there have been important variations in teacher salaries. Men have historically earned more than women, Whites more than their Black peers, secondary teachers more than elementary, and teachers in urban and suburban areas more than their rural counterparts (e.g., Sedlak & Schlossman, 1986). This was especially true for Black teachers in the South, although the general pattern holds for the North and West as well (Kelley & Odden, 1995; Sedlak & Schlossman, 1986). However, given the predominant use of salary schedules for determining teacher salaries currently, Hansen and Quintero (2017) report that overall public teacher salary inequality is relatively low compared to other occupations, with little evidence of inequality along lines of race, ethnicity, or gender (wage inequalities for these variables are less than 1 percent). However, age and education account for more than 20 percent of teacher wage inequalities, and geography (both state and local) are also important. Some states pay teachers more (recall our point that understanding teaching requires attending to regional contexts); in 2017-2018, the national average teacher salary was $60,483, but in New York it was $83,585 and in Mississippi it was $43,107 (McFarland et al., 2019). Meanwhile, the average starting salary for a teacher in the United States is below $40,000 in 63 percent

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[6] Economic rewards go beyond salaries, including tenure, health care, pensions, and opportunities for career advancement. However, these benefits are unequally distributed among teachers for a range of reasons: 15 states do not contribute to Social Security for state employees, many teachers do not stay in teaching long enough to be vested, and pension systems—like certification—do not travel across state lines (Hansen & Quintero, 2017). In recent years, many of these benefits have been eroded with efforts to calculate teachers' value-added, the diminishment of tenure protections, and recession-induced budget cuts like health care and retirement benefits. Given the current economic conditions, many teacher pension systems are "flirting with insolvency" (Hansen & Quintero, 2017).

[7] Allegretto and Mishel (2020) note that the dip in average wage penalty may be the result of teacher strikes in the states with the largest wage penalties, but also that it is too soon to know whether this will be a national trend or one that foreshadows continued decline in these wage penalties.

How underpaid are teachers in your state?

Depending on the state, teachers make between 2.0% and 32.7% less than other comparable college-educated workers
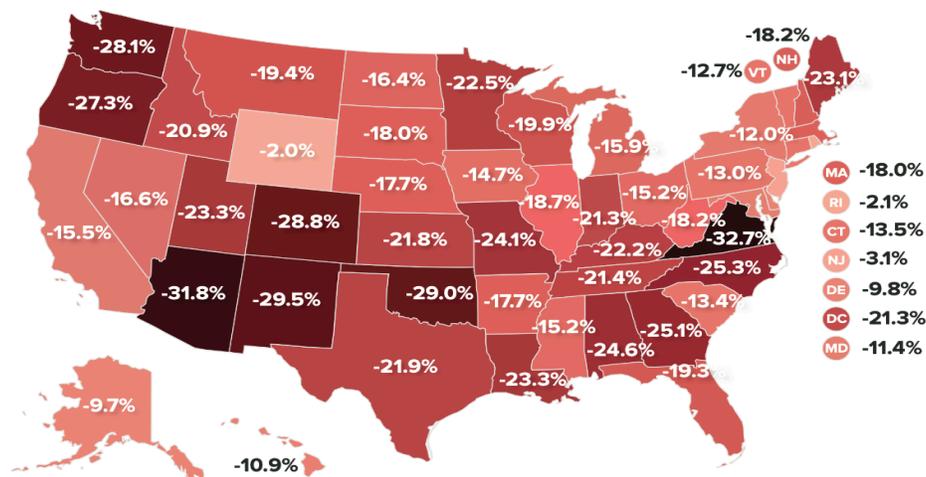
Notes: Figure reports state-specific regression-adjusted teacher weekly wage penalties: how much less, in percentage terms, elementary, middle, and secondary public school teachers earn in weekly wages than their college-educated, nonteaching peers. See Allegretto and Mishel 2019, especially Appendix A, for more details.

Source: Authors' analysis of pooled 2014–2019 Current Population Survey Outgoing Rotation Group data accessed via EPI Current Population Survey Extracts, Version 1.0.2 (EPI 2020).

Economic Policy Institute

FIGURE 2 U.S. teacher wage penalty by state.
SOURCE: Allegretto and Mishel, 2020.

of the nation's school districts. In nearly 300 districts, teachers earn a starting salary below $30,000. Furthermore, schools with more low income and diverse students (and often more novice teachers) spend less money on teacher salaries. Hansen and Quintero (2017) found that wage inequalities among teachers are also associated with state school funding inequalities, and that states with greater wage inequalities have greater pension inequalities. The patterns of regional differences in teacher compensation do not follow the same trends that other inequalities do; the South, for example, which has historically been characterized by racial inequality, has some of the lowest wage inequalities for public school teachers (Hansen & Quintero, 2017).

The comparatively poor compensation for teachers has been intertwined with social and cultural trends of who has been recruited into teaching, including the attraction of the career (historically) to women, people of color, and first-generation college graduates who did not have access to other options. But as opportunities to pursue a broader range of careers increased for all, teaching paid a price.

How might we pithily summarize the highlights of the teacher workforce that currently populates U.S. schools? The teacher workforce represents one of the largest professions in the country. It is problematic to generalize about the traits of the "average" teacher. That said, there are notable trends, among them the prevalence of White
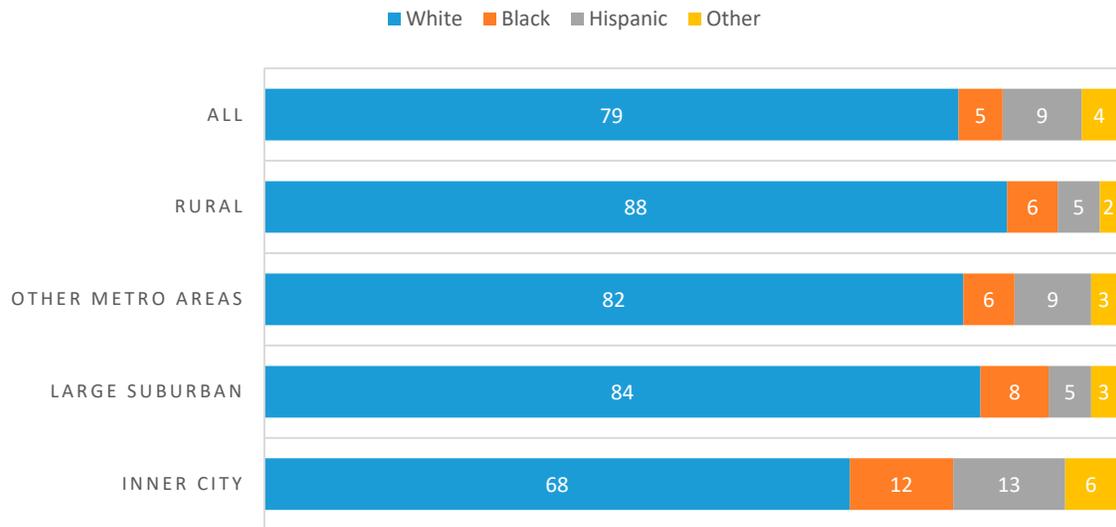
White ■ Black ■ Hispanic ■ Other

	White	Black	Hispanic	Other
ALL	79	5	9	4
RURAL	88	6	5	2
OTHER METRO AREAS	82	6	9	3
LARGE SUBURBAN	84	8	5	3
INNER CITY	68	12	13	6

FIGURE 3 Distribution of the race and ethnicity of the teacher workforce in urban, suburban, and rural settings.
SOURCE: U.S. Department of Education, 2016b, p. 27.

women, and a mixture of push and pull factors that account for teachers' attraction to the profession. Also notable is the demographic divide between the teacher population and the preK-12 student population, and the local character of who teaches in a region's schools. Ingersoll et al. (2018, 2021) summarize the trends in a slightly different way, including ballooning, graying (i.e., older), greening (i.e., less experience), more female-dominated, and more racially and ethnically diverse, with more turnover due to a range of factors, including but not limited to, public perceptions of teaching, low pay relative to comparable professions, and poor working conditions in many urban and rural schools. Against that backdrop, we now turn to our focus: the contemporary landscape of TPPs and who attends those programs.

CONTEMPORARY LANDSCAPE OF TEACHER PREPARATION PROGRAMS AND THEIR PARTICIPANTS

Teacher Preparation Program Landscape

Teacher preparation is often thought of narrowly as what happens inside of a certification program or in an education school. But scholars have demonstrated how teachers are educated across their lifetimes, first as K-12 students and children in their families and communities, and then as nascent professionals who will enter the workforce. Bell et al. (2018) assert that this requires a reconceptualization of the teacher pipeline: "The teacher pipeline should be thought of as a teacher education *system* composed of institutions that provide novices with opportunities" to learn to teach (p. iii, emphasis added). Opportunities can be formal or informal, intentional or not. This "teacher education learning system" includes the K-12 schools that prospective students go to, the community colleges, colleges, and universities that they attend for undergraduate and

graduate study, the workplaces in which they are employed, the K-12 school partners who work with TPPs, the TPPs that they attend, and the K-12 teaching placements that they eventually secure. Beyond the stage of initial entry, which we focus on in this paper, there are also teacher induction programs; professional development programs; and schools, informal and cultural institutions, and industry partners who participate in formal and informal opportunities for teachers to continue learning. Moreover, this teacher education learning system is situated within the broader educational system, whose policies, practices, norms, and values directly and indirectly shape what teachers experience. Also recall the regional character of teacher education: programs and their teacher candidates tend to come from the surrounding geographic area, and programs are imprinted with the traits of the communities within which they operate, as well as the state political and policy contexts that directly and indirectly affect teacher quality and education more generally.

Within this broader system, teacher education programs have never been mono-lithic. This is one reason for the more than 26,000 TPPs housed in more than 2,100 institutions. Many programs clustered at one university share infrastructure, staffing, and program components, but are uniquely identified by state certification domain in terms of grade level (e.g., preK, early elementary, middle, secondary school) or subject-matter area (e.g., science, physics, mathematics, English/language arts). Some programs have histories as experimental approaches within IHEs to target particular challenges: recruiting prospective special education teachers, for example, or teachers of English as a Second Language (ESL or ELLs). One important subgroup of IHEs are the minority serving institutions (MSIs), which include historically Black colleges and universities (HBCUs), Hispanic serving institutions, tribal colleges and universities, and Asian American and Native American/Pacific Islander-serving institutions. In 2012-2013, these institutions produced an oversized portion of prospective teachers of color with new 4-year undergraduate degrees in education in the United States: 54.1 percent of all 4-year undergraduate degrees in education received by Latino/as; 32.8 percent by Black or African Americans; 57.7 percent by Native Hawaiian and other Pacific Islanders; 17.4 percent by Asian Americans; and 11.7 percent by American Indian and Alaskan Natives (Petchauer & Mawhinney, 2017, p. 4; see Figure 4). Given the local nature of the teacher labor force, these institutions have a significant footprint in the regions in which they are located, both rural and urban.

In the past 20 years, increased interest in teacher education, both within the edu-cational establishment and in the broader community, has led to an expansion of the organizations offering teacher preparation. Three broad categories that are used by the U.S. Department of Education (ED) are (1) "traditional" TPPs based at IHEs; (2) alterna-tive TPPs based at IHEs; and (3) alternative TPPs not based at IHEs (this includes school districts, state agencies, nonprofits, and other organizations). Research has clearly demonstrated that there is as much variation within any of these categories as there is across them, making the distinction between traditional and alternative meaningless (Humphrey & Weschler, 2005, 2007; Wilson et al., 2001), and the boundaries between the categories are permeable. In fact, the idea of alternative programs began as anything that was post-baccalaureate (including Master of Arts in Teaching programs). This has led to wide variability in how alternative routes are labelled across states. Some states label all of the post-BA programs as alternative, even when they include traditional
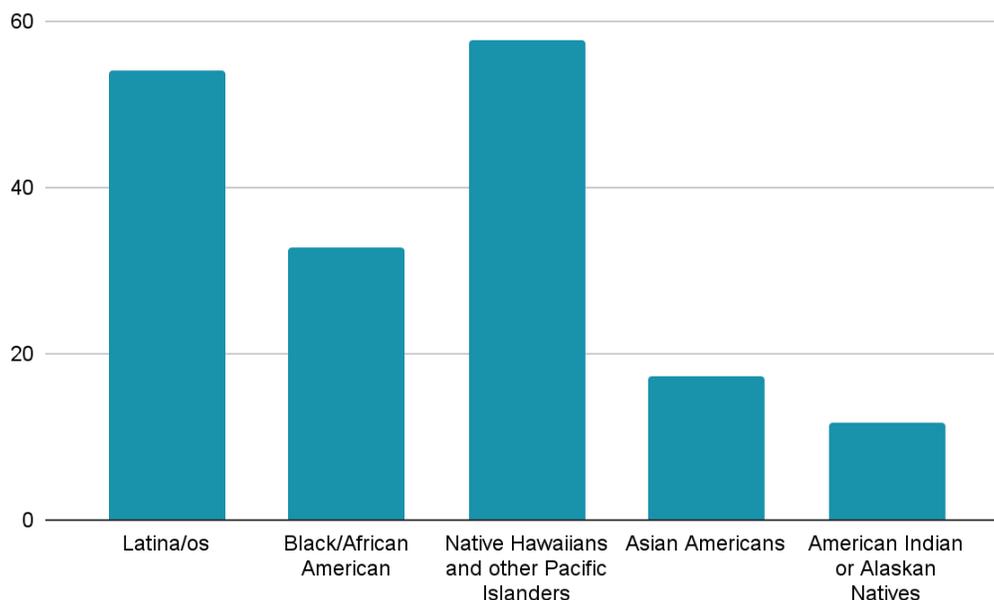
FIGURE 4 New undergraduate 4-year teaching degrees granted by minority serving institutions.

student teaching. And within alternative programs, some offer student teaching of varying lengths while others offer none. Because the idea of "experimental programs" predates current attraction to alternative routes that began in the 1980s and 1990s, there is considerable variation within and across states as to what is identified as alternative or traditional.

Complicating things further are the new Graduate Schools of Education (nGSEs), which are organizations approved by state departments of education as higher education institutions, but are not university-based. There are currently 10 such organizations; initial research on these institutions suggest that there is also considerable variation within the category (Cochran-Smith et al., 2020).

Here we will use language that aligns with ED categories, but with caution given these caveats. Alternative TPPs were established in the 1980s-1990s to recruit promising, often more diverse candidates to teach in hard-to-staff subjects and schools. The No Child Left Behind (NCLB) program and Race to the Top grants acted as accelerants, as did the influx of social entrepreneurs into the educational system (e.g., Wilson, 2014; Wilson & Tamir, 2008; Zeichner et al., 2014). Between 2001 and 2011, alternative programs grew from 70 to 675 (Mader, 2013; Mungal, 2016; U.S. Department of Education, 2015). A central premise of these programs was that the path to teaching was shorter and more accessible (Grossman & Loeb, 2008), but recent research (Boyd et al., 2006; Walsh & Jacobs, 2007) indicates that the requirements for many of the "alternative" programs do not differ significantly from traditional programs. However, the most substantial point of difference is that many alternative routes offer little to no student teaching, and most states allow working as a teacher of record to count for student teaching, even if it involves little supervision or mentoring. So many AC candidates have never had an

opportunity to see a skilled and experienced teacher teach in any continuous way, or to be closely mentored by one. In their review, Walsh and Jacobs (2007) concluded that alternative route programs fell short of their initial promise, and recruited less selective candidates, required more coursework and seat time, and provided significantly less mentoring than imagined by early advocates. More recently, alternative routes began to reach beyond these school of education partnerships and have been based in other organizations.

According to the National Teacher and Principal Survey, 2015-2016, about 18 percent of public school teachers entered teaching through an alternative route to certification program, with 25 percent of public charter school teachers entering through one such path (see Figure 5). In addition, some teachers enter with emergency permits and without credentials; about one-third of first-year teachers enter without complete, not to mention rigorous, preparation.

The number of teachers who go through an alternative program varies by state and participant demographics (Evans, 2010; Feistritzer et al., 2006; Matsko et al., in press). In large states, more than one-third of newly trained teachers attend alternative preparation programs (Evans, 2010). Teachers prepared through alternative preparation programs also skew older than traditional programs (Humphrey & Weschler, 2007), are more diverse (Kee, 2012; Shen, 1998), and are more likely to be career changers or STEM majors (Kee, 2012). Differences across states in the incoming supply of teachers are shaped by how many teachers are graduating from preparation programs, attrition
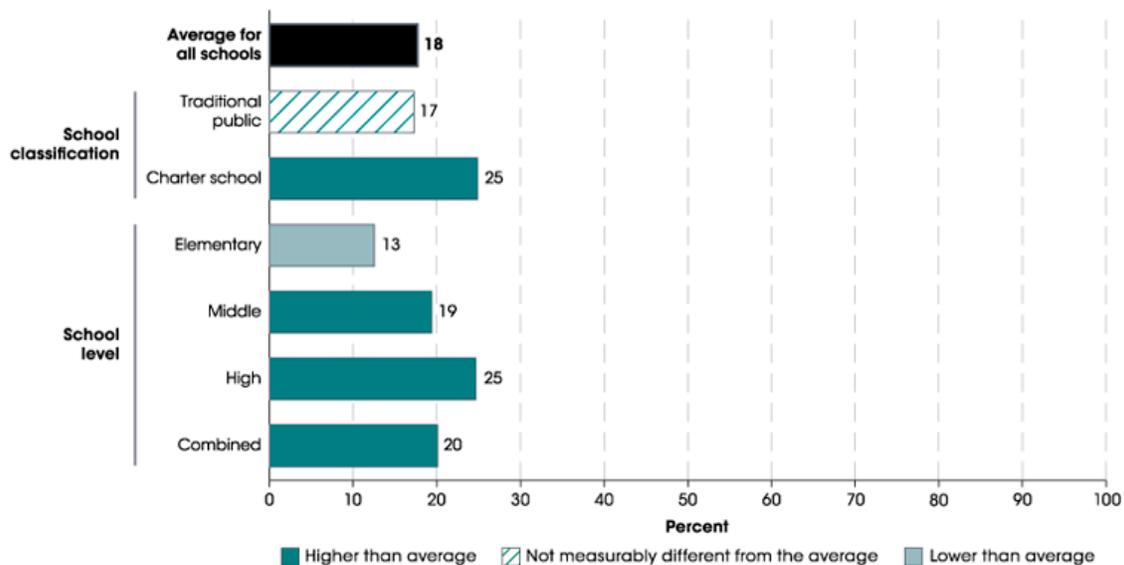
FIGURE 5 Percentage of public elementary and secondary school teachers entering teaching through an alternative route, by school classification and level, 2015-2016.
NOTES: Teachers were asked whether they entered teaching through an alternative route to certification program, which is a program that was designed to expedite the transition of nonteachers to a teaching career (e.g., a state, district, or university alternative route to certification program). Data are based on a head count of full-time and part-time teachers rather than on the number of full-time-equivalent teachers.
SOURCE: Snyder et al., 2019, Table 209.24.

rates of all teachers (but especially early career teachers), relative wages, and incentives/supports to enter teaching.

Researchers at the Center for American Progress (Yin & Partelow, 2020), using 2019 Title II data, reported there were 1,466 traditional program providers that accounted for 75 percent of the teacher candidate enrollment.[8] Alternative programs based at IHEs include BA, credential, and MA programs that were proposed as alternatives to "business-as-usual" programs, programs to service Teach for America corps members and TNTP Teaching Fellows, some UTeach programs, and the like. The count as of 2014 was 473 providers, and in 2019, it was 486 providers, accounting for 9 percent of teacher candidate enrollment. Alternative programs that are not based at IHEs (they may be at cultural institutions, school districts, or charter school organizations) were based at 201 providers in 2014 (U.S. Department of Education, 2016a); that count rose to 219 in 2019, enrolling about 17 percent of teacher candidates in TPPs (see Figure 6). Here, the distinctions begin to break down for the nGSEs, which are IHEs (as determined by their respective states), but are not at universities. This could lead one to label them as alternative IHE-based, or alternative non-IHE-based. One would be hard-pressed to define a program as "traditional," as core to the perceptions of founders across these
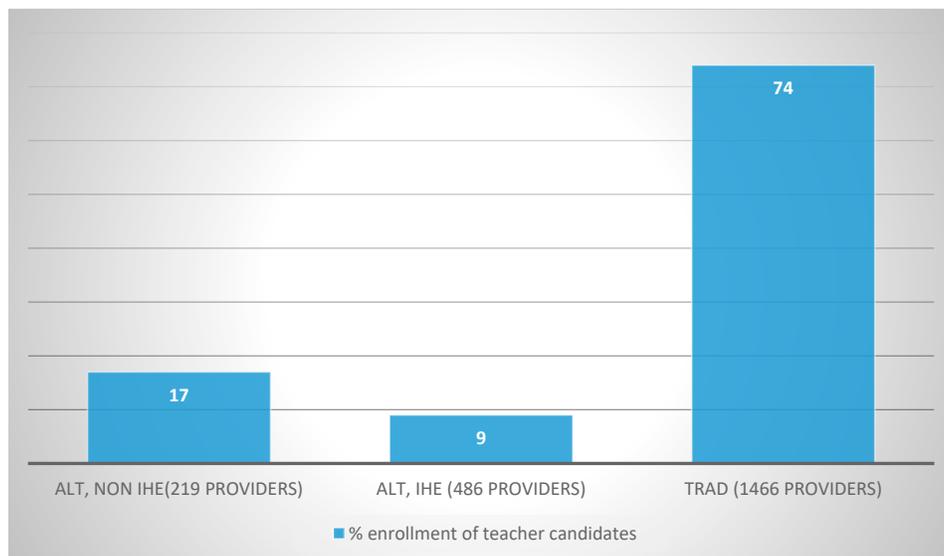
FIGURE 6 Distribution of different pathways into teaching and teacher candidates served.
NOTE: Traditional programs (TRAD) are defined as BA, MA, or credential programs based at institutions of higher education. Alternative programs at institutions of higher education (ALT, IHE) are defined as programs that are labeled by their states as being innovative or nontraditional (how this is determined varies by state). Alternative programs at non-institutions of higher education (ALT, NON IHE) are based in K-12 schools, school districts, or regional education service agencies, as well as cultural institutions.
SOURCE: Yin & Partelow, 2020.

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[8] All Title II data reports were made unavailable during the writing of this paper.

institutions is their rejection of business-as-usual in university-based teacher preparation (Cochran-Smith et al., 2020).

Of the 219 non-IHE-based alternative programs, nonprofit organizations manage 51 of these programs (23.3 percent); schools, districts, and regional education service agencies manage 107 (50 percent); for-profit organizations operate 26 programs (11.9 percent); and the remainder are run by charter schools, associations, and other partners. However, as Yin and Partelow (2020) point out, these percentages obscure significant differences in scale; the for-profit operators enroll more than two-thirds of the teacher candidates in this sector, yet they only operate 12 percent of programs in very few states.

Each TPP offers something slightly different to its participants. Traditional IHE-based teacher education programs increasingly offer integrated BA/MA degree programs allow students to take coursework, complete clinical experiences, and earn an advanced degree at the same institution (U.S. Department of Education, 2016a). Alternative programs vary widely in their offerings; some are geared toward career changers while others emphasize preparation for urban education placements. Teach for America, which places teachers in urban and rural schools, appeals to many participants due to its brief summer institute training period, cohort model, and brief time commitment as classroom teachers (Donaldson & Johnson, 2011; Schneider, 2014). Variability in pathway is not correlated with program quality, although there is evidence that elements of design do matter (e.g., Boyd et al., 2009; Clotfelter et al., 2007). It is beyond the scope of this paper to summarize the extensive research on the effectiveness of various approaches or programs.

Teacher Preparation Program Participants

Securing the legal right to be employed as a public school teacher is both a professional and a bureaucratic process, which is then followed by the process of securing employment. The process includes several steps that can overlap or change in order (see Figure 7).

For alternative routes, steps 2 and 3 are often switched and/or combined: new teachers are hired prior to being recommended for full certification, or they apply for positions within districts that are part of a residency program in order to partially complete a program.

Throughout this process, relevant institutions keep track of the demographic and other characteristics of applicants and teacher candidates who are admitted, attend, and graduate from programs, those who are awarded certification, and those who apply and are hired into teaching positions. But the information is collected by different actors/institutions, using different methods of measurement and storage, and different variables of interest. Data are often not shared across benchmarks as prospective teachers move through the pipeline. And there is no centralized system that does this nationwide (National Academies of Sciences, Engineering, and Medicine, 2020), save for Title II institutional self-reporting on a narrow range of these variables and other information collected by NCES on IHE enrollments. Coming from different data sources and for different purposes, counts do not agree across these sources, and it is difficult to answer basic questions. Recently, concerted effort has gone into creating more robust
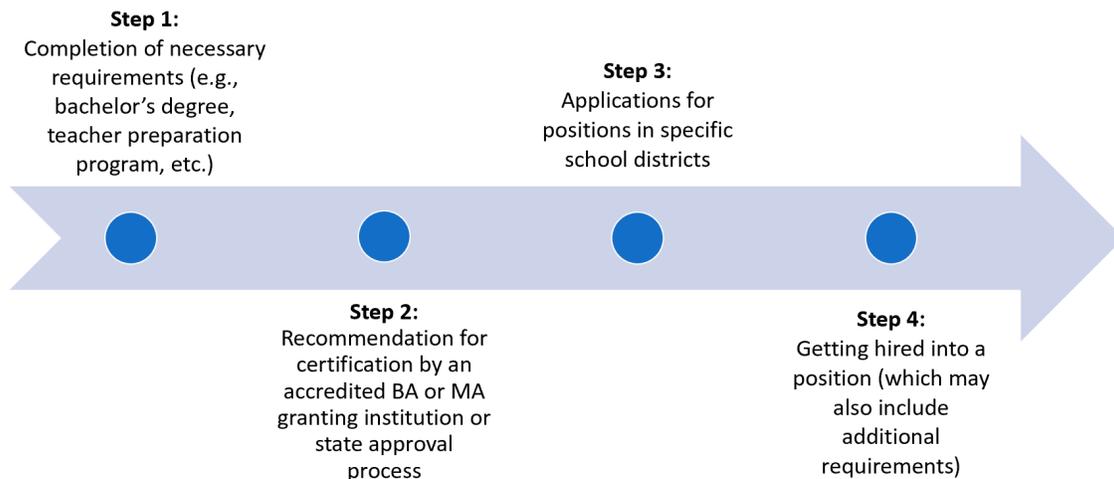
Step 1:
Completion of necessary requirements (e.g., bachelor's degree, teacher preparation program, etc.)

Step 2:
Recommendation for certification by an accredited BA or MA granting institution or state approval process

Step 3:
Applications for positions in specific school districts

Step 4:
Getting hired into a position (which may also include additional requirements)

FIGURE 7 Process of securing a teaching job.

data systems in states so as to be able to track teacher data, including teacher credentials, education, professional development, employment, demographics, and pathways into the profession.

As noted, data sources are differentially available for each of these benchmarks (Goldhaber & Walch, 2013, 2014). Analysts can examine large-scale, national data sets on IHE enrollments and graduation rates among education majors, but identifying prospective teachers who major in or are awarded degrees in disciplinary departments can be complicated. Undergraduates who decide later in their careers to become teachers are missed in these counts. Analysts can also examine state or national databases of practicing teachers, and backward map to their degrees and certification status, but this leaves out the teacher candidates who do not secure jobs. Researchers can also identify particular TPPs and secure data from them concerning applicants, degree candidates, and graduates. In this paper, we drew upon relevant published research that used all of these approaches.

The ED Office of Postsecondary Education (2016a) reported that in academic year 2013-2014, states reported 464,250 individuals enrolled in TPPs, 85 percent of whom were in traditional IHE-based programs, with 9 percent enrolled in alternative non-IHE-based programs and 6 percent enrolled in alternative IHE-based programs (see Figure 8).

Data indicate that teacher candidates at traditional programs are primarily White (73 percent) while those at alternative, non-IHE-based programs are less so (56 percent). King (2019) reports that education is among the least diverse fields at both the BA and MA levels. The demographics of new entrants into the profession parallels these numbers. A majority of education majors and students enrolled in TPPs are White (see Figure 9). In 2012-2013, 25 percent of people enrolled in a traditional TPP based at an IHE were individuals of color (compared to 37 percent of individuals of color enrolled in those IHEs, no matter what their major was) (U.S. Department of Education, 2016b).
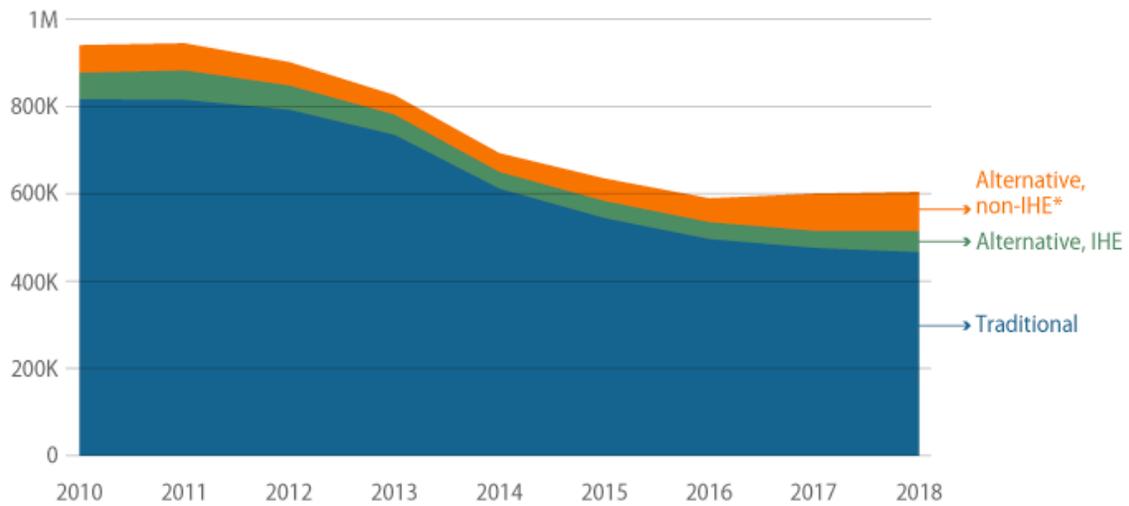
FIGURE 8 Enrollment in teacher preparation by program type, 2010-2018.
SOURCES: Partelow, 2019; the figure was created by the Center for American Progress (www.american progress.org).
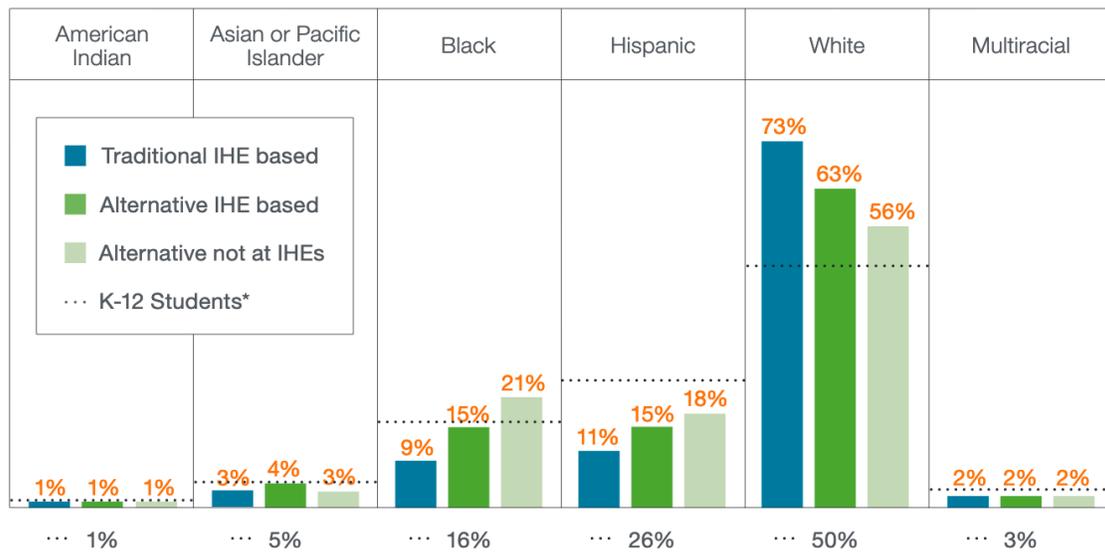

FIGURE 9 Race/ethnicity of TPP enrollees by program type.
SOURCE: U.S. Department of Education, 2016b.

Alternate routes not based at IHEs have 42 percent teacher candidates of color; 35 percent of teacher candidates of color are in alternative routes based at IHEs.[9]

Additionally, context matters. Black enrollees are concentrated in programs located in the Southeast, mid-Atlantic, and Arizona (the University of Phoenix effect). Hispanic enrollees are concentrated in the Southwest, Florida, and New York City. Across the country, 2 percent of teacher candidates are enrolled at HBCUs, but 16 percent of Black teacher candidates are enrolled at HBCUs (U.S. Department of Education, 2016b). Since the late 1980s, fewer candidates from minority groups entered the workforce through traditional non-MSI IHEs (Feistritzer & Haar, 2008; Murnane et al., 1991), but more entered alternative route programs, whether they were based at IHEs or not.

Alternative certification programs are attractive because they make entry more affordable, especially when participants can earn a salary while enrolled in the program; this is especially true for candidates of color who are least able to afford college or graduate school without a salary and carry larger loans. In the meantime, Pell grants have shrunk in value and Perkins loans for graduate school were discontinued. Thus, as resources to complete traditional preservice preparation shrank and student debt grew, opportunities that cost less, in part because they offer less, expanded.

The effects of shrinking resources—in terms of financial support, programs support, and human capital (mentors, collaborating teachers, counselors)—are reflected in what Ingersoll (2004) has referred to as a "leaky bucket." For the purposes of our analysis, the more apt metaphor is a leaky pipeline, with critical points including (a) postsecondary enrollment; (b) enrollment in education programs; (c) postsecondary completion; (d) entering the workforce; and (e) teacher retention (U.S. Department of Education, 2016b; see Figure 10).

For example, using data from 2012-2013 and 2013-2014, the ED (2016b) reported that degree completion rates are lower for Black and Hispanic students. Seventy-three percent of students majoring in education completed their BAs within 6 years, but only 42 percent of Black BA students and 49 percent of Hispanic BA students majoring in education complete their degrees within 6 years. What we know about where candidates go when they leave the pipeline is spotty. While TPPs increasingly collect data on whether their graduates enter teaching and/or how long they stay, fewer track the paths of candidates who drop out, or gather triangulated data on the range of factors that cause participants to drop out. Research and internal data collected by programs point to a host of causes: loan debt, family responsibilities, institutional barriers, a lack of personal connectedness, a lack of strong preparation, and a lack of supports among them. We return to these factors when discussing innovative programs designed to recruit and retain students.

Efforts over the past 20 years to recruit more minority teachers and to employ them at schools with diverse student populations have paid off. Education majors in 2000 were 77 percent White, 11 percent Black, 8 percent Latinx, and 3 percent other; in 2012,

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[9] The predominance of women in teaching is similar to that in nursing. In BA programs, Whites accounted for 73.6 percent of the nursing candidates in 2010, 69.3 percent in 2015, and 64.7 percent in 2019. Black nursing candidates have represented between 10.6 and 12 percent of the BA nursing students between 2010 and 2019. Hispanic nursing candidates represented 6.3 percent of the student population in 2010, 9.8 percent in 2015, and 12.9 percent in 2019. The percentage of Asian, Native Hawaiian, or other Pacific Islanders hovered between 7.4 and 8.1 percent between 2010 and 2019, and American Indian or Alaska Native between 0.5 and 0.7 percent during the same time span (American Association of Colleges of Nursing, 2021).
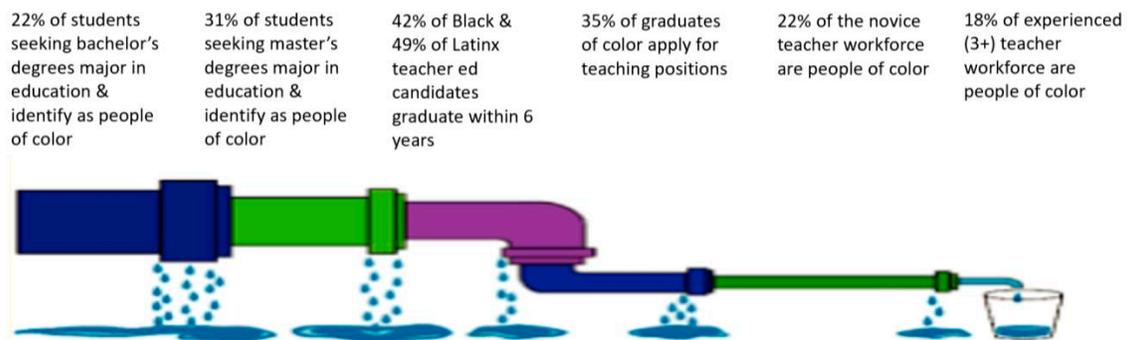
22% of students seeking bachelor's degrees major in education & identify as people of color

31% of students seeking master's degrees major in education & identify as people of color

42% of Black & 49% of Latinx teacher ed candidates graduate within 6 years

35% of graduates of color apply for teaching positions

22% of the novice teacher workforce are people of color

18% of experienced (3+) teacher workforce are people of color

FIGURE 10 The leaky pipeline of teacher workforce diversity.

education majors were 73 percent White, 12 percent Black, 11 percent Latinx, and 4 percent other. There were similar shifts in MA degrees in education between 2000 and 2012. Those numbers were also reflected in the number of employed minority teachers, which almost doubled since the late 1980s—from more than 327,000 in 1987-1988 to more than 666,000 in 2011-2012—growing faster than the number of White teachers and the number of minority students (Ingersoll et al., 2019).[10] That is, in the first decade of the 21st century, the minority workforce grew by 104 percent (compared to the non-minority workforce), and the percentage of minority teachers rose from 12 to 17 percent. McFarland et al.'s (2019) *Conditions of Education* reports that in 2017-2018, there were 734,000 teachers of color in public schools and 74,000 in private schools, which accounted for 20 percent and 14.5 percent of the total teacher population, respectively. Unfortunately, minority teachers also were more likely to depart their schools than non-minority teachers. Working and organizational conditions were strongly correlated with minority teacher departures; schools with more positive working conditions—teacher autonomy, collective faculty decision making, and higher faculty input—had lower levels of minority teacher turnover (Ingersoll et al., 2019).

Research on retention of minority teachers points to the outsized role that working conditions play in influencing teachers' exit decisions. Teachers from minority backgrounds are more likely to graduate from TPPs with greater amounts of student loan debt; in a 2016 Brookings Institution analysis, researchers found that Black students graduated with more than $7,000 more debt than their White peers (Scott-Clayton & Li, 2016). Carver-Thomas and Darling-Hammond (2017) found that teachers of color were disproportionally enrolled in alternative programs. Given these findings and the fact that Black teachers are more than twice as likely to teach in cities with higher costs of living (Carver-Thomas & Darling-Hammond, 2017), it is no surprise that more than 65 percent of Black teachers report dissatisfaction with their salary compared to 50 percent of their White peers and, as a result, are more likely to leave teaching to seek higher paid positions (Ingersoll & Connor, 2009). In addition, studies of minority teacher retention indicate that teachers from historically marginalized communities are more likely to teach in lower-income, lower-resourced schools. Despite the often higher needs in

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[10] The authors used the NCES's nationally representative Schools and Staffing Survey and its supplement, the Teacher Follow-Up Survey, for their analysis.

these school communities, minority teachers in these schools reported that their administrators were often unsupportive when teachers requested assistance and even exacerbated the issues through punitive measures directed at both students and teachers (Stanley, 2021). After controlling for all other factors (salaries, working conditions, and student, teacher, and school characteristics), Carver-Thomas and Darling-Hammond (2017) found that teachers in alternative certification programs were significantly more likely to leave teaching early (see also Carver-Thomas & Darling-Hammond, 2019). As policymakers and districts consider how to recruit and retain more teachers of color, attention to adequate preparation and working conditions is essential. This supports our larger argument that teacher supply and demand is best understood systemically, for while teacher recruitment initiatives may succeed in attracting new candidates to teaching, the culture and conditions of the schools those candidates enter can undo all of that good work.

A recent analysis of data from the 2015-2016 National Postsecondary Student Aid Study illuminates additional aspects of students enrolled in BA or MA programs in education at IHEs (King, 2019). This analysis found that education majors were younger than BA degree students in general, with 65 percent of education majors considered dependents for financial aid purposes, unmarried, and without dependents themselves. However, half of Black BA degree students and 40 percent of Hispanic students were considered independent, either because they were at least 24 years old, married, and/or had children. Twenty percent of Black education students were single parents (King, 2019). Moreover, 45 percent of Hispanic BA education degree students were first-generation college attendees, and 22 percent had parents who did not complete high school. The median family income for White, dependent BA education degree students was more than twice that of Black and Hispanic peers; 20 percent of Black students worked full time while enrolled as education students, while White education students were more likely to work part-time. Black and Hispanic education students were more likely to be enrolled in their BA degree program on a part-time basis than their White counterparts. At the MA level, the researchers found that men made up 25 percent of the education degree candidates, and that White MA degree students had a higher income profile than their Black and Hispanic peers.

Another subpopulation of interest is career changers, adults who did not opt for teaching as their first career. In a survey of teachers in six states, Johnson and the Project on the Next Generation of Teachers (2004) found that between one-third and one-half of teachers had previous professional experience before teaching. Career changers are not a monolith; the group contains significant variation in previous work experiences and motivations to enter teaching. Specifically, the common assumption that career changers are coming from high-status professional ranks (former scientists or lawyers, for example) is erroneous. Some do, but other career changers experience a pay increase when they enter teaching, having been paraprofessionals or held clerical positions (Hammerness & Reininger, 2008).

In contrast to many undergraduate education majors, career changers are more likely to seek preparation in high need areas, including secondary science, mathematics, and ESL (Lerner & Zittleman, 2002). They are also more likely to choose alternative routes into teaching. Kee (2012), for example, examined the NCES's Schools and Staffing Survey 2003-2004 Public School Teacher Questionnaire and found that career

changers were almost five times more likely to choose an alternative certification program over a traditional program. Additionally, studies of career changers suggest that there are a unique set of push-pull factors that influence people to join the teaching workforce beyond the traditional desire to make a difference; these include push factors like the need for work and job dissatisfaction in a previous role, and pull factors like a better schedule to support a family, job security, and a desire for a new career challenge (Anthony & Ord, 2008; Richardson & Watt, 2005). In many cases, career changers report that teaching was not an initial career option because of familial opinions, low wages, and low status (Chambers, 2002). That is, career changers' self-reports suggest that they were pushed away from teaching when initially selecting a career, only to return to it later. For example, in an ethnography of 13 career changers, Crow et al. (1990) examined factors that led participants to switch their career to teaching. The researchers identified three subgroups: "homecomers" or people who were always interested in teaching, the "converted" or people who experienced a major life change before finding the teaching profession, and the "unconverted" or people who were interested in education but not necessarily in a long-term teaching position. Although the teachers interviewed for this study were still at the beginning of their working life with a median age of 29, their previous experiences ranged significantly, from banking and real estate to advertising to college admissions. Friedrichsen et al. (2008) extended these findings in a study of participants in an alternative certification STEM program, identifying participants as "always a teacher," "late deciders," and "career explorers." Within the "always a teacher" group, participants described obstacles to following their initial goal of becoming an educator and came back to public school teaching after experiences in the classroom outside of the country, in higher education, or at private schools. "Late deciders" either decided on education too late as undergraduates or made career changes to meet familial or financial needs; "career explorers" were often recent college graduates who were tentatively interested in teaching, but were not yet fully committed to the profession.

To be effective, TPPs must build on candidates' existing professional skills and knowledge base and support their transition to the distinct organizational structure of schools. Because some preparation needs of second career teachers are distinct from undergraduates, a number of programs are designed to serve this population, including TNTP and Troops to Teachers. Such programs boast the additional value that many of these teacher candidates bring to schools, including substantial management experience and content area expertise. Despite the potential value-added of career changers to schools, some research suggests that schools fail to effectively capitalize on second career teachers' knowledge and experience (Haggard et al., 2006).

Waning Interest in Teaching as a Career

As noted earlier, the United States is experiencing yet another episode of dramatic decline in TPP enrollment (see Figure 11), even as preK-12 public school student enrollments have risen by 28 percent, from 39.4 million to 50.6 million, between 1985 and 2019 (Hussar et al., 2020; McFarland et al., 2019).

Using the Higher Education Act (HEA) Title II data reported from 2010-2018, Partelow (2019) showed that total enrollment in U.S. TPPs had declined by more than 35
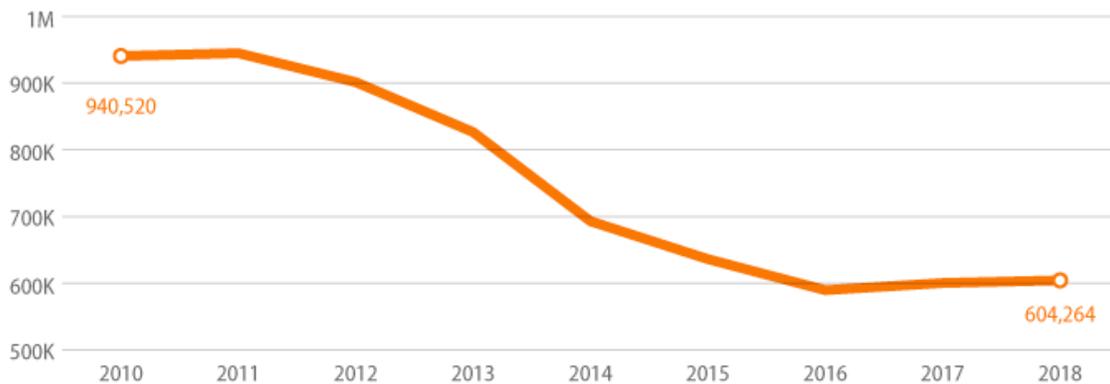
FIGURE 11 Teacher preparation program enrollments, 2010-2018.
SOURCES: Partelow, 2019; the figure was created by the Center for American Progress (www.american progress.org).

percent; the decline in completers was 28 percent on average. Seventy-seven percent of enrollment was in traditional, IHE-based TPPs. These programs have experienced declines of 43 percent on average; alternative, IHE-based programs have also experienced declines in enrollment, on the order of 19 percent. Non-IHE alternative programs have the largest enrollment growth (42 percent increase).[11]

Distributed unevenly across the states, the steepest losses in teacher candidate enrollment have been among Native Hawaiians, Pacific Islanders, American Indians, and Alaska Natives, followed by candidates who were White. Twenty-five percent fewer Black or Latinx candidates enrolled in programs; Asians also enrolled at lower rates. Given the dominance of White candidates in the teacher labor pool, all declines among potential teachers of color represent significant setbacks in moving toward a more diverse teaching force. However, 13 states had increases in the enrollment of Black teacher candidates between 2010 and 2018, including Arizona, Hawaii, Maine, Massachusetts, Minnesota, Nevada, North Carolina, South Dakota, Texas, Utah, Vermont, and Washington. Twenty-eight states had increases in Latinx candidates, although in 17 of those states, the change was no greater than 17 students. The exception was Arizona, which had an enrollment increase in Latinx teacher candidates of more than 3,000. A similar decline is seen in program completion (see Table 3).

This steady decline of interest could be due to broader economic or social conditions, as well as more education-specific factors. For instance, between 2009 and 2014, 70 percent of teaching candidates in Oregon did not secure teaching positions, and teacher salaries were cut. This was a function of the Great Recessions that caused huge cuts in school budgets between 2008 and about 2013-2014. Salaries were frozen and working conditions deteriorated. For example, between 2008 and 2013, teacher layoffs

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[11] These statistics are skewed, in part, by Texas Teachers of Tomorrow, a for-profit, non-IHE-based alternative program that has grown fivefold since 2017 (Partelow, 2019). The program now enrolls nearly 50,000 students in a self-paced, online-only program that costs between $2,700 and $5,400 to complete. In addition to its affordability and flexibility, the Texas Teachers of Tomorrow website boasts connections with school districts and the opportunity to begin teaching while completing the program. Despite high enrollments, the program reports that just 6,022 people graduated from the program in 2018, suggesting that a large percentage of enrollees never finished the program. Because the program is for profit, little is known beyond the program costs and enrollment numbers, leaving in question its efficacy.

TABLE 3 Teacher Preparation Program Completers, 2007-2008 and 2015-2016

	Traditional	Alternative, Not IHE-Based	Alternative, IHE-Based	All Programs
2007-2008	180,574	24,609	18,679	223,862
2015-2016	139,443	20.028	12,689	172,150
Percentage Change	–23%	–19%	–32%	–23%

SOURCES: Data from 2016 Title II collection, U.S. Department of Education Office of Postsecondary Education; see AACTE, 2018, p. 30.

in New York due to the recession led to the elimination of many teaching positions and a depressed job market (U.S. Department of Education, 2015). It was not until tax revenues began to improve around 2015 and thereafter that demand for teachers went up, along with wages in some (but not all) states. At the same time, there has been a rise in teacher and school accountability and surveillance, including teacher value-added evaluation systems, the elimination of teacher tenure in some states, and increases in state takeover of poorly performing schools.

The Learning Policy Institute (LPI) (2018) has created an interactive graphic that captures some of this complexity. One dimension focuses on teaching attractiveness ratings, which combine measures of compensation (e.g., starting salaries, wage competitiveness), teacher qualifications (e.g., how many unlicensed teachers are employed in a state, percentage of inexperienced teachers), teacher turnover (e.g., percentage of teachers who left the profession, left a school, or have plans to leave the profession), and working conditions (e.g., school collegiality, classroom autonomy, testing-related job security, and administrative support). A second dimension is a teacher equity rating, which combines the ratio of uncertified teachers in high- versus low-minority schools, the ratio of inexperienced teachers in high- versus low-minority schools, and the percentage of teachers of color in the state. Users can use this dashboard to see portraits of different states. Connecticut, for example, received the ratings shown in Figure 12.

To summarize, it is again the variability across geographic regions, organizations, and populations that is most striking, making generalizations difficult. Today's teacher preparation learning system is characterized by increasing variation, both within and across particular categories (IHE-based, for example, versus non-IHE-based). There has also been an increase in the diversity of teacher candidates, but the pipelines they travel from undergraduate study to securing jobs in schools are leaky (some analysts would say "broken"), and diversity shrinks at every juncture. Alternative programs are, on average, better at attracting a more diverse pool of teacher candidates: there is more diversity in age and experience, more diversity in race and ethnicity, and more men in alternative programs (although there is as much variation within these categories as across). Black and Latinx teacher candidates are more likely to work full time, and White teacher candidates part-time; Latinx teacher candidates have increased in number significantly, and many are first-generation college graduates. These trends further reflect the localization of teacher preparation in their significant variation across state and program type. Enrollment differences are especially notable when considering non-IHE-based alternative programs, which have increased by 42 percent. In the next section, we move from the statistics on teacher candidate diversity to a discussion of

This map highlights a number of key factors that reflect and influence teacher supply and attrition and signal whether states are likely to have an adequate supply of qualified teachers to fill their classrooms. Based on these data - which treat compensation, teacher turnover, working conditions, and qualifications - each states is assigned a "teaching attractiveness rating," indicating how supportive it appears to be of teacher recruitment and retention and a "teacher equity rating", indicating the extent to which students, in particular students of color, are assigned uncertified or inexperienced teachers. Ratings are on a 1-5 scale, with 1 (the lightest color) being the least desirable and 5 (the darkest color) being the most desirable.
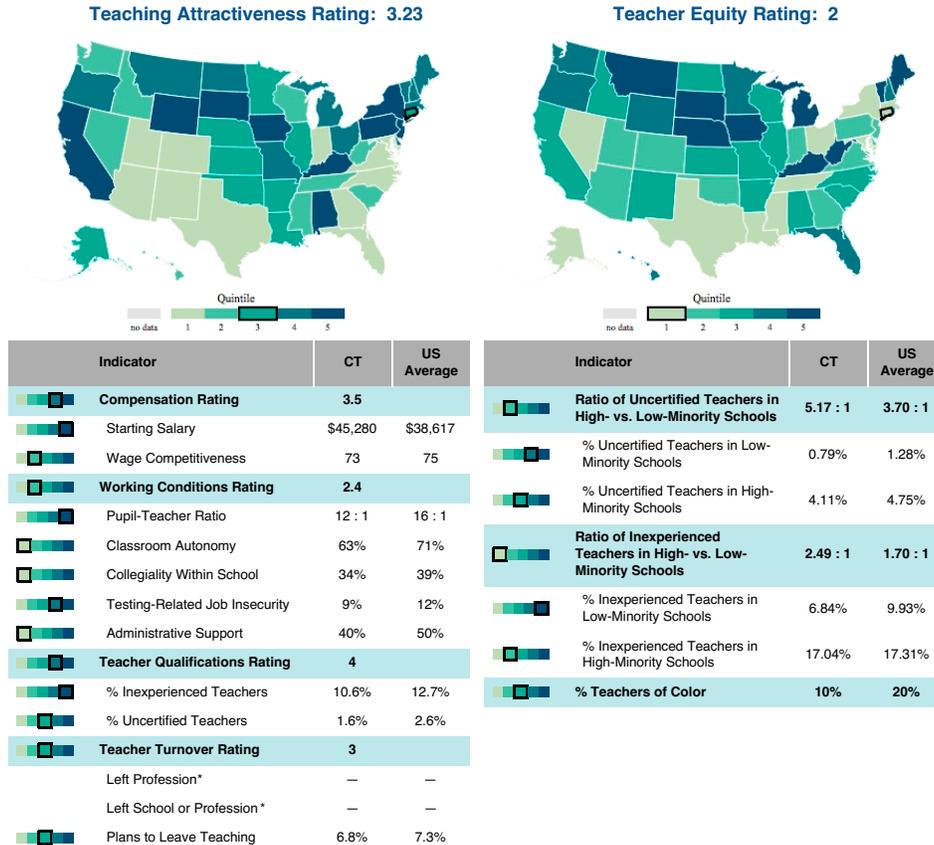

Teaching Attractiveness Rating: 3.23

Teacher Equity Rating: 2

Indicator	CT	US Average
Compensation Rating	3.5	
Starting Salary	$45,280	$38,617
Wage Competitiveness	73	75
Working Conditions Rating	2.4	
Pupil-Teacher Ratio	12 : 1	16 : 1
Classroom Autonomy	63%	71%
Collegiality Within School	34%	39%
Testing-Related Job Insecurity	9%	12%
Administrative Support	40%	50%
Teacher Qualifications Rating	4	
% Inexperienced Teachers	10.6%	12.7%
% Uncertified Teachers	1.6%	2.6%
Teacher Turnover Rating	3	
Left Profession*	—	—
Left School or Profession*	—	—
Plans to Leave Teaching	6.8%	7.3%

Indicator	CT	US Average
Ratio of Uncertified Teachers in High- vs. Low-Minority Schools	5.17 : 1	3.70 : 1
% Uncertified Teachers in Low-Minority Schools	0.79%	1.28%
% Uncertified Teachers in High-Minority Schools	4.11%	4.75%
Ratio of Inexperienced Teachers in High- vs. Low-Minority Schools	2.49 : 1	1.70 : 1
% Inexperienced Teachers in Low-Minority Schools	6.84%	9.93%
% Inexperienced Teachers in High-Minority Schools	17.04%	17.31%
% Teachers of Color	**10%**	**20%**

FIGURE 12 Connecticut teaching attractiveness and equity ratings.
SOURCE: Learning Policy Institute. See https://learningpolicyinstitute.org/product/understanding-teacher-shortages-interactive?utm_source=newsletter&utm_medium=email&utm_content=National%20Interactive%20Map&utm_campaign=UA-67199435-1.

programs, practices within those programs, and policies that have been designed to proactively secure a qualified and diverse teacher workforce for the schools.

PROGRAMS AND POLICIES TO REPLENISH AND EXPAND THE TEACHER WORKFORCE PROGRAMS

As noted earlier, efforts to increase interest in teaching as a profession have a long history in the United States. "Traditional" TPPs have experimented with alternative strategies for attracting new prospective teachers, as well as responding to local demands from policymakers, industry, the public, and researchers to experiment and

explore models of teacher preparation. As waves of reform arose over time, IHEs created new programs or altered existing ones to better suit current market, political, or intellectual demands. For example, in the 1950s-1960s, the Ford Foundation invested in Master of Arts in Teaching (MAT) programs at 70 IHEs to recruit elite undergraduates and graduate students into the profession, influenced by forces similar to those that led to Sputnik-catalyzed curricular reforms (e.g., Rudolph, 2002; Wilson, 2003).

In the 1990s, calls to create "alternatives" to "traditional" programs—accompanied by research that attempted to determine which approach led to the preparation of more effective teachers—led to the increased differentiation that we have discussed earlier. Research in the late 1990s and early 2000s demonstrated that alternative programs often recruited a more diverse prospective teacher pool across geographic regions and content domains (e.g., Boyd et al., 2008; Madkins, 2011; Wilson et al., 2001). For example, Bardelli and Ronfeldt (2020), in their analysis of the pipeline for teachers in high need areas in Tennessee from 2010 to 2016, found that alternative TPPs were more likely to graduate teacher candidates with certification in special education, bilingual education, and STEM fields, and that those candidates were more likely to be male, older, Hispanic, Asian, or identify as "other" race or ethnicity. The researchers also found significant variation across the different certification areas. Program candidates who sought STEM certification were more likely to be males who were Asian or Pacific Islander, and those seeking ELL certification were more likely to be female, Hispanic, and have higher GPAs. Candidates seeking special education certification were more likely to be female, Black-non-Hispanic, or identify as "other" race or ethnicity. The authors did not study the alternative programs, and so could not link program features to this increased diversity. Furthermore, between 2010 and 2016 there were myriad efforts to increase the supply of teachers in high need areas at the state, district, school, and TPP levels, making it nearly impossible to disentangle the effects of these contemporaneous movements that had direct and indirect effects on teacher supply and demand.

TPPs like the ones studied by Bardelli and Ronfeldt (2020)—whether they are IHE-based or not, alternative or traditional—are increasingly designed to actively recruit teacher candidates, most likely due to the decrease in enrollments and the increase in market competition. Most choose a focal population to recruit that is related to their program focus. Here we lay out a range of illustrative examples of different kinds of programs that are designed to recruit and/or retain teacher candidates, including innovative IHE-based for America, and grow-your-own programs (also referred to as pipeline programs).

Programs Designed to Enhance the Teacher Workforce

Efforts to empirically assess what types of TPPs produce more or less effective teachers have proven to be challenging, partly due to the variations in the content of different programs. It is beyond the scope of this paper to synthesize the sprawling literature on this topic. That said, our argument—that understanding the recruitment, preparation, and retention of a high-quality teacher workforce requires a longitudinal and systemic view—suggests that efforts to truncate, shorten, or undercut the quality of core junctures in the teacher pipeline—programs that have abbreviated clinical experiences, for example, or programs that do not provide quality time with mentors—likely weaken

the pipeline. For example, Gray and Taie (2015) found that the percentage of beginning teachers from 2007-2008 through 2011-2012 who remained teaching was larger among those who were assigned a first-year mentor than among those not assigned a first-year mentor. This resonates with other research that has demonstrated the importance of mentors and high-quality induction programs (e.g., Garcia & Weiss, 2019a; Guarino et al., 2006; Ingersoll & Strong, 2011). Our own reading of the literature on TPP effectiveness leads us to believe that shortcuts that compromise significant material, human, and social resources in the professional preparation of teachers, no matter where the TPP is based, have unintended consequences that weaken a new teacher's capacity to continue to grow as a professional and to succeed.

University-Based Programs: Innovative Recruitment and
Retention Within Institutions of Higher Education

One unfortunate consequence of the language of alternative versus traditional TPPs is that it fails to acknowledge the considerable variation within those categories. As we note above, IHE-based TPPs have been the site for considerable experimentation and innovation for years, often in response to social, cultural, or market forces. Four years after President Kennedy created the Peace Corps, President Johnson and Congress passed the Education Professions Development Act, which created the National Teacher Corps. As a domestic version of the Peace Corps dedicated to preparing well-intentioned young people to work in under-resourced schools, Teacher Corps programs were intended to improve elementary and secondary teaching in predominantly low-income areas. They involved college professors teaching prospective teachers to work with students in urban settings. Mentors supported the interns, often in cohorts, as they worked on school-based and community projects while earning master's degrees. Evaluations of both the Ford Foundation programs mentioned earlier and the Teacher Corps demonstrated that they were each successful at recruiting bright, change-oriented undergraduates with backgrounds in the disciplines (as opposed to education) (Sykes, 1984).

Although the 2,000+ IHEs that offer TPPs vary in terms of their responses to policies intended to shape teacher recruitment and retention, many IHEs house multiple programs within one institution, and often, one or another of those programs started as a within-institution "alternative route." Over time, the innovations are absorbed into the institutional fabric and become part of the institution's status quo. For example, as the need to more proactively recruit diverse teachers heightened around 2000, Michigan State University, building on its experience with an earlier Detroit-based pipeline program funded by The Eli and Edythe Broad Foundation, created both an urban educators program and a global educators program to recruit undergraduates who were interested in issues of urban and international/global education. Those programs are now part of the institution's TPPs.

These innovations unfold in large and small, public and private institutions. Alverno College, a small Catholic liberal arts school located in Milwaukee, Wisconsin, offers undergraduate programs for women and post-baccalaureate programs for men and women (Darling-Hammond & Oakes, 2021). The college enrolls approximately 150 teacher candidates in programs that result in certification in early childhood, elemen-

tary, secondary, bilingual, music, art, special education, and adult education (Zeichner, 2000). Education majors make up approximately 14 percent of the total college enrollment at Alverno (Zeichner, 2000). Two-thirds of teacher candidates at Alverno are from the Milwaukee area; roughly half of all students identify as first-generation college students and/or as students of color. The students at Alverno are typically older than traditional undergraduates; one study found that the average age of enrollees was between 26 and 28 years old (Zeichner, 2000). To meet students' needs (many students work and have families), Alverno offers flexible programming, including a part-time BS degree for working paraprofessionals aiming to become full-time classroom teachers (Alverno College, 2020).

Alverno has been recognized for graduating high-quality teacher candidates since the 1970s. At that time, the president, Sister Joel Read, challenged the faculty to develop a TPP that was centered on developing teacher candidates' classroom abilities to boost local student achievement (Darling-Hammond & Oakes, 2021). The resulting program is "ability-based," with the content of classes and assessment based on teacher candidates' capacity to engage in the skills, practices, and mindsets they need to be successful in the classroom (Darling-Hammond & Oakes, 2021). The curriculum at Alverno emphasizes four core teaching skills: conceptualization, diagnosis, coordination, and integrative interaction (Darling-Hammond & Oakes, 2021; Diez et al., 2010). During their time at Alverno, students participate in four field experiences that are directly aligned to their coursework and complete 1 full year of student teaching (Diez et al., 2010). In these experiences, students write lesson plans, directly teach and assess students in small and large groups, and receive feedback from a faculty member. There are no traditional grades at Alverno; instead, teacher candidates complete regular performance assessments in the college and K-12 setting and receive narrative summaries that reflect the progress they are making toward achieving key teaching knowledge and skills (Zeichner, 2000). Diez et al. (2010) reported that this feedback results in teacher candidates who are self-reflective and engaged in continuous growth as educators.

Beginning in the 1980s, Alverno College made a concerted effort to recruit, retain, and graduate a student demographic that more accurately reflected the community in which the school is situated (Fecher, 1991). In just 10 years, Alverno College raised the total enrollment of students of color by 15 percent. They attribute this increase to shifting the institutional norms around supporting first-generation college students who were largely working and older. This included hiring a recruiter to specifically work with the Black, Latinx, Asian, and Native American communities in Milwaukee, offering pre-college programs to expose students to college life, providing space for students to complete their admissions applications, and offering students free or low cost remedial classes (Fecher, 1991). These initiatives are bolstered by the expeditionary learning model at Alverno, which ensures that students who may not have experienced success in traditional K-12 settings have an opportunity to engage in authentic, supported learning (Diez et al., 2010).

Montclair State University, a large public university, offers another unique example of innovative recruitment and retention efforts (see Box 1).

Before turning to another example of innovation, urban education MA programs, we note that both Alverno and Montclair State used a multi-pronged approach in program design, including instructional innovations (e.g., ability-based curriculum, expe-

BOX 1
Montclair State University Teacher Retention and Recruitment Efforts

Since Montclair State University's inception as a normal school in 1908, the institution has expanded into a research university; today, it enrolls approximately 16,000 undergraduates and 4,000 graduate students in 10 degree-granting schools (Montclair State University, n.d.-a, n.d.-b). Montclair serves a relatively diverse student body; about 28 percent of students are racial minorities, and 27 percent come from low-income families. From 2002 to 2007, the minority graduation rate improved from 40.9 percent to 54.9 percent and the graduation rate gap between minority and non-minority students also narrowed considerably from 21.9 to 8.5 percentage points. The school boasts a long history of high-quality teacher education programs and annually graduates approximately 700 teachers, nearly half of whom go on to teach in the surrounding New Jersey public schools (Darling-Hammond & Oakes, 2021). Montclair State's teacher education programs are highly valued at the institution and have benefited from financial and programmatic support from university leadership. The teacher education program has increased substantially and now includes multiple pathways to teacher certification, including undergraduate and graduate degrees, post-baccalaureate programs, and two residency programs (Darling-Hammond & Oakes, 2021).

All teacher education programs at Montclair State are housed in the College of Education and Human Services while programming for the various pathways—including curricula, clinical placements, and university-school partnerships—is managed by the Center of Pedagogy (Robinson et al., 2003). The numerous teacher education programs are united by a common vision, called "The Portrait of a Teacher," which is used for admission, assessment, and curriculum creation (Jacobowitz & Michelli, 2018). This shared vision is used to evaluate teacher candidates, faculty, and cooperating teachers. Teacher candidates are coached and evaluated against this normative vision, which emphasizes expert knowledge, continuous learning, universal design, collaboration, and critical dispositions for teaching success (Darling-Hammond & Oakes, 2021; Jacobowitz & Michelli, 2018). The program features a partnership with 31 local school districts through the Montclair State University Network for Educational Renewal, including regular professional development and training for cooperating teachers and supervisors, who are called clinical faculty (Jacobowitz & Michelli, 2018).

After a program review in the mid-1990s revealed significant discrepancies between the demographics of New Jersey's teachers and its students, Montclair State created the Teacher Education Advocacy Center (the Center) (Robinson et al., 2003). The Center, supported through university and grant funding, focused on the recruitment and retention of teacher candidates of color. The Center is staffed by a faculty member with release time, two counselors/advisors, and one program assistant. The counselor/advisors engage in two primary activities: recruitment and support for students of color. This includes recruitment efforts at local schools and in local community organizations, including churches and civic organizations, and early and sustained connection with matriculating students who are interested in teaching (Robinson et al., 2003). Critically, the Center advocates for students of color both before and during enrollment at the university. For example, when the state of New Jersey raised the minimum grade point average (GPA) for admission to teacher education programs, the Center argued for the creation of a supplemental admission application for students with lower GPAs. This process, which includes personal interviews and commitments from the matriculating students, led to the successful graduation of more than 20 students from under-represented backgrounds who would have otherwise never been offered program admission (Robinson et al., 2003).

The Center has also partnered with local schools to generate interest in teaching careers. The Center has supported the creation of Future Educators of America, now Educators Rising, clubs in 16 local area schools, which promise full college scholarships to the highest achieving participants and employment in the district following the students' graduation, most of whom are

BOX 1 Continued

from racially and linguistically minoritized communities. The local schools provide mentor teachers while the Center provides mentor training and student travel to the organization's national conference. Montclair State has also partnered with Newark Public Schools to create teacher preparatory academies; high school students interested in becoming teachers can enroll as a "Red Hawk Rising" student and earn college credit in anticipation of Montclair State admission. Other supports include workshops that offer specific guidance on navigating bureaucratic, organizational, and university processes, as well as workshops on teacher certification assessments. A freshman cohort learning community—20 students who live and take classes together—eases the transition to college and the Minority Teacher Candidates Organization offers teacher candidates opportunities to have a voice on campus.

Montclair State's coordinated efforts have created exemplary outcomes for its graduates. In surveys from 2,200 alumni, 90 percent reported feeling prepared to teach and more than 85 percent reported feeling especially prepared to engage in culturally relevant practices (Darling-Hammond & Oakes, 2021). The program staff attribute these successes to a commitment to recruitment and retention of under-represented teacher candidates, ongoing support from the university, innovation in programming, and collaboration and communication among many different university offices (Darling-Hammond & Oakes, 2021).

ditionary learning, specially designed and structured clinical experiences, innovative assessments); precollege programs (including support for candidates applying to the programs, teacher preparatory academies, and Future Educators of America/Educators Rising clubs); financial resources (e.g., low cost remedial courses, full college scholarships); and institutional strategies (e.g., school/district partnerships, freshman cohort learning communities, the Minority Teacher Candidates Organization, reaching out to civic and church-related organizations). They also identified dedicated staff (counselors, recruiters, advisors), and provided professional development for cooperating teachers. These approaches overlap with those used in other programs, which we explore below.

Urban Education MA Programs: Preparing New
Teachers for Successful Careers in Urban Schools

Another approach to proactive recruitment and support used by many IHEs is the creation of urban education master's degrees, which have become more prevalent across the United States in the past 20 years. TPPs have long been aware of the demographic divide between the teacher candidates enrolled in their programs and the students who they will likely teach, as well as teacher candidates' desire to stay close to home. Thus, encouraging prospective teachers to teach in urban settings—farther from their home base—and equipping them with the skills to be successful in urban placements have been goals of many TPPs.

The Multicultural Urban Secondary English (MUSE) program at the University of California, Berkeley, is one such example. Through MUSE's 2-year MA program, teacher candidates earn a California single-subject English credential and an MA degree in education. Three program characteristics are central: (a) merging theoretical and practical coursework within the context of local schools and communities, (b) emphasizing a

throughline of social justice and culturally relevant pedagogy, and (c) providing guidance throughout enrollees' careers.

Participants in MA urban TPPs are often young, more diverse, and bring previous experience with working or living in urban settings (Freedman & Appleman, 2009; Quartz et al., 2009; Taylor & Frankenburg, 2009). In a review of an urban education program in the Northeast, Taylor and Frankenburg (2009) report that the majority of participants were under the age of 30, 35 percent identified as people of color, and one-third had previous teaching experience.

As previously noted, teacher candidates frequently mention their desire to work with young people, "give back" to society, or do service as reasons for entering teaching. Participants in the MUSE program reflect these trends as well; 23 percent of enrollees identified as people of color and more than 70 percent of enrollees in the program reported having prior experience working as tutors or classroom aides in urban settings (Freedman & Appleman, 2009). Studies have reported that the urban education focus is especially important for teacher persistence. In a retention study of MUSE graduates (Freedman & Appleman, 2009), participants stated that they chose the program for its "sense of mission," a feature that they also cited as helping them persist in their roles as classroom teachers.

Box 2 provides another example of an urban TPP at the University of California, Los Angeles.

Myriad other urban MA programs exist, including ones based at Johns Hopkins University, the University of Chicago, Rutgers, The State University of New Jersey, Clark University, and the University of San Francisco. Some have roots in the 1960s MAT programs, while others grew out of efforts to create alternative certification pathways for students who decided that they wanted to become teachers after they had received their undergraduate degrees. Evaluations of and research on programs such as these suggest that they can successfully redress two problems faced by traditional teacher preparation—preparing teachers to be skillful and persistent in urban schools and attracting a more diverse teacher workforce—while also leveraging teacher candidates' inclination toward intrinsic rewards. Lyons (2007), for example, found that Center X graduates were three times more likely to remain teaching at their initial placement school than teachers from other programs in high-poverty urban school districts.

Replicable Teacher Education Program Models:
UTeach: Preparing STEM Teachers

Another challenge that TPPs face is recruiting sufficient numbers of teachers in shortage areas, including mathematics, science, and increasingly, technology and engineering, as well as World Language, special education, and ELLs. In response, institutions and organizations nationwide have created programs and pathways to entice prospective teachers with interests in these specializations.

One compelling example is UTeach, which began at The University of Texas at Austin in 1997 as an innovative way to recruit undergraduate STEM majors into teaching. Central to the program was the involvement of STEM faculty in the relevant disciplinary departments in the university, as well as education faculty, and clinical faculty in public schools. The goals were to ensure that teacher candidates had strong prepa-

BOX 2
University of California, Los Angeles,
Center X Teacher Education Program

Another example of an urban teacher preparation program is the one based at the University of California, Los Angeles, Center X, an institution established in 1992 in the wake of the Rodney King verdict uprisings in Los Angeles that is dedicated to working toward equity in education. Center X's teacher education program is a 2-years master's and California state credentialing program that focuses on preparing teachers to work in urban settings; it has trained more than 1,500 teachers to serve in high-poverty urban schools across California. In the first year, teacher candidates complete coursework and student teaching in partner schools throughout Los Angeles. In the second year, participants serve as full-time teachers while finishing coursework and receiving coaching support from program staff (Quartz et al., 2009). A central program tenet is that teachers' learning is lifelong. To support this belief, the program places teachers in cohorts at partner schools and offers an alumni network.

The program emphasizes eight principles that focus on social justice coursework, ongoing inquiry and development, integration theory and practice, and collaboration between communities and universities.[a] In the mid-2000s, the program moved its classes to local school sites to further integrate teacher preparation courses and the urban community (Quartz et al., 2009). Center X specifically recruits a diverse population of teachers who are interested in centering their pedagogy in social justice work and offers more than 30 scholarships to interested candidates. Despite initially serving a majority of White and Asian teacher candidates, the program shifted recruitment efforts and now more accurately reflects the Los Angeles region's demographics with 30 percent of teacher candidates identifying as Latinx, 25 percent as Asian, 5 percent as African American, and 10 percent as mixed race (Quartz et al., 2009). Center X participants overwhelmingly report Center X's social justice focus and work with high-poverty urban schools as being central to their reason for choosing the program. Quartz et al. (2009) reported that nearly all students ranked serving students in low-income communities as a motivating factor in their program and career choice. This was particularly true for the teacher candidates of color; in one case study of 15 Center X participants and alumni, Olsen and Anderson (2007) found that many teachers chose the program and the profession to become the teacher they never had.

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[a] See https://centerx.gseis.ucla.edu/teacher-education.

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ration in their content and an efficient route to attaining teacher certification; teaching candidates completed their STEM majors and their teacher certification requirements within 4 years. Other program hallmarks include the proactive recruitment of teacher candidates (e.g., through use of financial incentives, like tuition stipends) and early and intensive field experiences starting from the first year.

After establishing the roots of the program in Texas, UTeach developed a set of design principles and an expansion plan. Since 2009, the National Math and Science Initiative (NMSI) has worked with the UTeach Institute to expand the program—underwritten by numerous funders, including the Howard Hughes Medical Institute and Exxon Mobil—at 45 other IHEs.[12] As of 2020, more than 6,000 STEM teachers have graduated from UTeach programs nationwide; projections are that by 2025, the total will

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[12] See https://institute.uteach.utexas.edu/uteach-programs-nationwide for additional information.

be more than 9,000. As of 2019, 22 percent of graduates identified as under-represented minorities; 89 percent entered teaching; and 87 percent have taught for at least 4 years. Sixty-nine percent of graduates are teaching in K-12 schools with a majority economically disadvantaged population (UTeach Institute, 2020). In 2020, NMSI announced that it had received a planning grant to design UTeach STEM TPPs at up to 15 HBCUs in six states and the District of Columbia.

One example is the CalTeach Program in the University of California state system, which includes a CalTeach program at the University of California, Berkeley (see Box 3).

BOX 3
CalTeach Berkeley Program Recruitment and Retention Efforts

Based on the UTeach model, the CalTeach Program at the University of California, Berkeley, was designed to recruit high-quality science, mathematics, and engineering teachers for urban schools. It is part of a network of CalTeach programs across the state, located at all nine of the University of California's undergraduate institutions. The approach involves a package of components meant to address several historical challenges faced by teacher educators and schools in teacher recruitment, preparation, and retention: (a) a concerted effort to recruit diverse candidates; (b) the consistent integration of clinical experiences with content preparation and pedagogical preparation; and (c) the forging of partnerships within the University of California, Berkeley, across the university and with several partner school districts.

From the moment they enroll in the university as freshmen or transfer students, prospective teachers take coursework and have experiences that integrate field experiences, pedagogy, and subject-matter preparation. The ability to start their professional preparation while taking content courses allows science, technology, engineering, and mathematics (STEM) majors to pursue both goals simultaneously instead of foregrounding content preparation and postponing immersion in professional preparation experiences.[a] It also means that when they graduate as undergraduates, the teacher candidates can work full time as teachers of record, therefore not delaying their ability to earn a living. Field placements in local, diverse, urban schools help the teacher candidates understand students in those schools, the local communities, and the pressing need for high-quality STEM teachers in those schools. The program also entails the close collaboration of faculty in mathematics, engineering, and the sciences across the university campus, who also have a commitment to partnering with local K-12 schools. These partnerships among faculty across the university and the schools help create and nurture a broad professional CalTeach community that helps both with retaining students but also in recruiting them (Newton et al., 2010).

The program offers a cohort model that encourages the development of professional relationships and support systems, a range of tuition relief scholarships, and opportunities for paid classroom externships during university breaks. In 2014-2015, the program saw a 9 percent increase in credentials awarded, granting 308 teaching credentials to teachers who now work throughout California. Currently, the program has more than 500 students enrolled with a goal of granting 50 teaching credentials per year. Participants in the CalTeach program trend more diversely in race, gender, and family background than other undergraduate STEM majors on the university campus, with approximately 21 percent identifying as students of color, 46 percent identifying as female, and 45 percent identifying as first-generation college students (University of California, 2016).

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[a] As an example of the significance of state policies, the fact that UTeach participants can start their teacher preparation as undergraduates was an important selling point in California, where individuals who wanted to become teachers would most often have to wait until they had completed their undergraduate studies before launching their professional studies. In other states where undergraduate preparation of teachers is more the norm, this feature of the program is not as noteworthy.

An emerging body of research examines the effects of UTeach in terms of the recruitment, retention, and effectiveness of its graduates. For example, using data collected by the UTeach Austin program between 2011 and 2018, Cade et al. (2019) found that the program was successful at initially recruiting from two pools of students: those who had intended to pursue teaching before being recruited by the program (60 percent), and those who had not intended to pursue teaching (40 percent). UTeach is designed to allow prospective teachers to explore teaching as a career gradually so that if an individual decides to commit to UTeach after taking two free courses that introduce them to teaching, they do so with a solid understanding of the demands of teaching. Twenty-two percent of the candidates who completed the program had not originally intended to become teachers, which suggests that the program was successful in both initially recruiting candidates who might not have pursued a credential and retaining them. This is especially promising given a survey conducted by the American Physical Society (Marder et al., 2017) that found that around half of STEM majors indicated some interest in teaching, a group that might find the UTeach components and supports attractive enough to serve as a tipping point.

Other programs dedicated to recruiting and keeping talented STEM teachers include those sponsored by the Robert Noyce Teacher Scholarship Program, which is administered through the National Science Foundation and awards competitive grants to IHEs to create innovative approaches to recruiting STEM teachers through the use of stipends, scholarships, and fellowships.[13] Awards are also made to programs designed to support master teachers, the presence of which is essential to the development of a stronger intergenerational workforce. Efforts to increase research on the effectiveness of various approaches are being cultivated by the American Association for the Advancement of Science's Advancing Research & Innovation in the STEM Education of Preservice Teachers in High-Need School Districts network.[14]

Residencies That Capitalize on the Local Nature of the Workforce

A more recent addition to the array of available preparation programs is teacher residencies. Residencies tackle two challenges historically faced by teacher education programs: a disconnect between the university preparation offered by local IHEs and the lack of training in the district- and school-specific policies, norms, practices, and materials involved in teaching. For instance, most TPPs do not know what elementary mathematics curricula their graduates will encounter in their first job. In a teacher residency, because the TPP is based in a specific district, teacher candidates are socialized into teaching through the concrete and specific materials they will use, including textbooks, assessments, teacher evaluation, and the like. Hence, the goals of such programs include (a) creating a means for recruiting diverse teachers in high need fields to specific school districts in need; (b) offering candidates preparation that is tailored to the specifics of a particular region and school district; (c) blurring the lines between preparation and induction so as to offer teacher candidates ongoing support for the first 4 to 5 years of their career; and (d) providing significant financial incentives to attract and keep teachers in the school district.

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[13] See https://www.nsf.gov/pubs/2017/nsf17541/nsf17541.htm#pgm_desc_txt for additional information.
[14] See https://aaas-arise.org for additional information.

Residencies draw on a set of ideas that have deep roots in U.S. teacher preparation innovation, including MAT programs in the 1960s and 1970s, as well as professional development school reforms from the 1980s (Berry et al., 2008; Byrd & McIntyre, 1999; Darling-Hammond & Lieberman, 2005). The design principles include

1. Strong school–university partnerships
2. Consistent integration of coursework with clinical experience (including both who teaches the courses and the content of those courses)
3. Full-year teaching residency/longer clinical placement during which one is paired with a trained mentor teacher who co-teaches with the resident and is paid and prepared for the position
4. High ability, diverse teaching candidates in high need areas that are specific to the school or district needs
5. Cohorts of teaching candidates placed in "teaching schools" in which other teachers model quality teaching to diverse students
6. Financial support for the residents
7. Commitments from residents to teach in partner schools for 3-5 years, with ongoing support for the first 1-3 years of full-time teaching (Guha et al., 2016)

There are now more than 50 programs nationwide, with 45 percent of participants identifying as people of color (Guha et al., 2016). One such example is the Boston Teacher Residency (see Box 4).

As with many education innovations, interest has been higher in replicating residencies than in carefully researching their content, pedagogy, components, design, and effectiveness. The research base is just beginning to be built, although efforts have been made like that by Guha et al. (2016) to cull "research-based" lessons learned across the current literature. In terms of contributing to the teacher candidate population, there is evidence that residencies are more successful at recruiting a diverse teacher population that reflects the broader community, and that in general brings some knowledge of the community and its relevant resources. Applications to the programs tend to exceed the number of teachers that the district needs, and the program design is such that a residency program can adapt to shifts in the subject-matter areas and grade levels of greatest need.

BOX 4
The Boston Teacher Residency[a]

The Boston Teacher Residency (BTR) was created in 2002. The program recruits and trains more than 75 teachers per year; one study reported that recruits now represent 30 percent of all new teachers hired in the Boston Public Schools (BPS) each year (Solomon, 2009). Teacher candidates are clustered at two Teaching Academy schools to create a cohort community and ensure continuity in programming with existing master teachers and site directors. In the first year, candidates work as teaching residents in their placement school and take classes to obtain initial licensure in their content area and Sheltered English Instruction (SEI), as well as a discounted master's degree in teaching, while also earning a small stipend. At the end of this first year, residents receive an AmeriCorps award that can be applied to education costs and commit to teaching in BPS for 3 years as they continue professional development with the program. The program works closely to recruit and train a cohort that matches BPS's hiring needs; currently, BTR offers elementary residencies in grades 1-5, secondary residencies in English, math, general science, and computer science in grades 6-12, and biology, chemistry, and physics residencies in grades 9-12. Solomon's (2009) program review showed that more than half of the residents taught mathematics or science.

BTR is funded by a public–private partnership developed to balance the goals and power of private funders and district leaders, with half of the funds coming from BPS and the other half coming from philanthropic and private donations (Boggess, 2010). The program consists of four teams designed to meet different needs within the recruitment, training, and retention of new teachers: recruitment/admissions, field placements, curriculum, and induction (Solomon, 2009). Central to the experience of being a BTR resident is the inclusion in program, content, and school cohorts and mentorship from the classroom teacher and school at large. Mentors receive a $3,000 stipend to attend summer and school-year training, meet with their mentees for at least 2 hours each week, and gradually release teaching responsibility to residents. In a case site study of the program, Boggess (2010) found that the program emphasized offerings on race awareness and social justice to develop teachers with an "activist disposition."

The program attributes its success to the partnership with the school district, the continuity and length of programming, the emphasis on purposefully connecting theory to practice, and the central role of highly effective teacher mentors who are trained and treated as teacher educators. BTR has had notable success with recruiting and retaining teachers in BPS, especially teachers of color. Forty-nine percent of their current cohort are teachers of color; 35 percent are Black or Latinx. To date, they have trained more than 600 teachers, 71 percent of whom have remained in the classroom for at least 6 years. The program has been so successful that it has since been replicated in 22 cities (Boston Plan for Excellence, 2021).

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[a] See https://www.bpe.org/boston-teacher-residency/program/faqs/#toggle-id-1 for additional information.

Recruitment Programs: Teach for America

One well-known alternative pathway into teaching is Teach for America (TFA), which was founded in 1989 and largely recruits high performing college students to teach at 2,500 school partners in 51 urban and rural districts across the United States.[15] Other programs, like the New Teacher Project Teaching Fellows (which later became TNTP), have used a similar model, teaming up with specific school districts and teacher

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[15] See https://www.teachforamerica.org/how-to-join/eligibility for additional information.

preparation institutions across the country. These programs speak to concerns related to recruiting academically talented individuals to teaching (e.g., Auguste et al., 2010). Both organizations are examples of the increasing hybridization of teacher preparation models across the country, as TFA is not a program but a pathway that prospective teachers can opt into. The particular program that they experience depends on the partnering institution that offers support after initial summer orientation. Partnering institutions can be teacher residences (e.g., TNTP's Baltimore City Teaching Residency) or traditional and alternative IHE-based programs.

In TFA, after a brief summer training, corps members commit to teaching for 2 years in their placement district; during their commitment, they receive a full salary and benefits from the partner school district, and after fulfilling the 2 years, they receive a generous AmeriCorps stipend. Many regions offer master's degree partnerships with local universities for a reduced tuition. TFA invests heavily in recruitment efforts at college campuses, where they hire college students to host regular events about the organization's mission and history. In 2017, the program reported 49,000 applications and 3,500 incoming corps members; in the 2016 and 2017 corps, there were 2,000 STEM and 1,000 special education teachers. The organization reports that half of the corps members identify as people of color or from a low-income background and one-third are the first in their families to go to college.[16]

In one small case study of teachers prepared through TFA, 64 percent of participants described themselves as White and from the middle or upper middle class; just 12 percent self-identified as coming from a low-income community (Straubhaar & Gottfried, 2016). In addition, participants described themselves as "idealistic, driven, hardworking, organized, and intelligent" (Straubhaar & Gottfried, 2016). This resonates with other reports, including those of TFA corps members (e.g., Kuo, 2018; Lanier, 2012). The program has traditionally appealed to new college graduates interested in a short path to the classroom that may eventually lead to a different, higher status career; in one study, more than 56 percent of corps members indicated that they planned to teach for no more than the required 2 years upon entering the program (Donaldson & Johnson, 2011). Despite this stereotype, Donaldson and Johnson (2011) reported that in a sample of 2,029 current and former corps members, more than 60 percent remained teaching for a third year and 35.5 percent remained for a fifth year. Of its 62,000 alumni and corps members, 15,200 are currently teachers. Multiple studies of TFA have been conducted, often using designs that compare TFA graduates with those from other "traditional" TPPs (e.g., Clark et al., 2015; U.S. Department of Education, 2016c; Xu et al., 2011). Several studies using administrative data report district or state retention rates for TFA candidates in North Carolina, New York, Texas, among others. After 3 years, these studies found 80-90 percent of TFA teachers left (Boyd et al., 2006; Darling-Hammond et al., 2005, 2019; Kane et al., 2008).

Over its 30-year history, TFA has produced more than 62,000 corps members and alumni; TNTP's Teaching Fellows has produced 37,000. As with other alternative programs, they attract higher percentages of people of color and their recruits are primarily younger, with little to no experience in schools. Candidates also tend to come from more selective colleges. Reports vary in terms of how long the teacher candidates remain

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[16] See https://www.teachforamerica.org/what-we-do/impact for additional information.

in teaching, and so it is difficult to ascertain the programs' broader effects on teacher supply and demand. According to TFA, their alumni pursue careers in business, education, law, health care, policy, government, and in the nonprofit sector.[17]

Grow-Your-Own/Pipeline Programs

"Pipeline" programs—colloquially known as "grow-your-own" programs—also have a history in teacher preparation, often involving efforts to entice promising middle and high school students to consider teaching as a career. For example, in 2003 The Eli and Edythe Broad Foundation invested 6 million dollars in a partnership between Michigan State University (MSU) and the Detroit Public Schools Community District (DPSCD) to recruit, prepare, place, and support DPSCD high school students who became teachers through MSU. Students received scholarships and loans to cover the cost of attending the university. Once they completed the university's 5-year TPP, they returned to DPSCD as teachers. The program included an intensive summer program for DPSCD high school students; a fellows program to place MSU teaching candidates in Detroit schools; and partial loan repayment for MSU graduates who took positions in the DPSCD system.

This program and similar ones capitalize on the local nature of the teacher workforce, and include a mélange of programs designed to recruit nontraditional teacher candidates, including middle and high school students, paraprofessionals, career changers, community organizers, after-school program leaders or educators, and local community members. Programs offer financial assistance, programming designed to introduce prospective teacher candidates to teaching as a career, and various forms of support in completing a BA and earning a teaching credential. For example, Boston Public Schools (BPS) started the BPS High School to Teacher Program (now the BPS Teacher Cadet Program), which involves identifying city students who would be great teachers, taking college prep classes, working with mentors, tuition reimbursement (up to half), and teaching jobs: 87 percent of participants are Black and Latino/a (U.S. Department of Education, 2016b). American University (AU) and the Washington, DC, Public Schools (DCPS) have a similar partnership, the AU/DCPS Teacher Pipeline Project, which involves a dual enrollment program through which Washington, DC, high school seniors enroll in two courses (free of charge) alongside current AU students. Between 10-20 high school students participate in the dual enrollment experience. Interested students can then apply to AU's TPP to become teaching fellows. Fellows receive full scholarships, with the understanding that they will teach in DCPS for 5 years. Other efforts include those of Phi Delta Kappa's Future Educators of America, now Educators Rising, which has chapters nationwide, and partners with IHEs, local communities, and national professional organizations to create an array of opportunities for students to explore their interests in teaching as a career.

Other grow-your-own programs are also proliferating. In 1995, California created the School Paraprofessional Teacher Training Program, which was revised in 2016-2017 as the Classified School Employee Teacher Credentialing Program. Both programs had diverse participant populations: 65 percent of the paraprofessional program participants

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[17] See https://www.teachforamerica.org/life-as-an-alum/careers-after-tfa for additional information.

were people of color and/or bilingual; more than half of the classified school employee program participants were Latinx or Black. Another example is the Massachusetts Paraprofessional Teacher Preparation Grant program, which provides financial assistance to Massachusetts residents who are currently employed as paraprofessionals in Massachusetts public schools, and wish to become certified as full-time teachers. This grant is designed to reduce their financial burden and help address the commonwealth's current teacher shortage. Financial need is not a requirement to qualify for the program.

One consortium, consisting of Portland State University (PSU), 3 community colleges, and 17 school districts collaborated to recruit and prepare bilingual/bicultural teachers through a career ladder for paraprofessionals, called the Bilingual Teacher Pathway. The consortium included both undergraduate and graduate pathways that

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BOX 5
The DeWitt Wallace-Reader's Digest Fund's
Pathways to Teaching Careers Program

From 1994 to 2000, the DeWitt Wallace-Reader's Digest Fund's Pathways to Teaching Careers Program provided $50 million to fund 26 programs for paraeducators and non-certified teachers, and 14 programs for recent Peace Corps returnees to earn teaching degrees and/or certifications (Clewell & Villegas, 2001). To do this, the program focused efforts on recruiting and training nontraditional teacher candidates and paired universities and local school districts to ensure the teachers met the hiring needs of the districts. In total, the program trained 2,593 teachers over 6 years and increased the minority teacher workforce by 14.7 percent. Participants, including 840 emergency certified teachers, 633 paraeducators, and 460 Peace Corps members, completed the program at far higher rates than the nationwide average (75 percent versus 60 percent). In addition, almost all program completers worked in high need districts in both urban (58 percent) and rural (23 percent) placements.

The Pathways to Teaching program involved partnerships between universities and local school districts that involved both BA and MA programs and local school districts agreed to help secure jobs for participants. It consisted of 26 programs. The graduates received higher ratings from principals and independent evaluators of the program than did their typical peers. Eighty-one percent stayed in teaching for at least 3 years. Each site met six criteria:

1. A partnership between teacher education and the school districts that hired the candidates.
2. A recruitment and selection process that gave an active role to the school district, as well as the teacher education institution.
3. A participant selection process that included traditional and nontraditional criteria (including maturity, residency in the community, intention to continue teaching, expressed commitment to teaching in urban settings, and leadership abilities).
4. A teacher education curriculum that involved structural and curriculum adjustments to meet the needs of participants (e.g., infusion of practices that respected participants' backgrounds, courses offered at night and in the summer, extensive field experiences, and explicit connections to participants' everyday experiences).
5. A system of academic and social supports (e.g., orientation, meetings with advisors, tutorials, child care services at no cost, social activities designed to enhance a sense of community, and support in preparing for state certification exams).
6. A plan for tuition assistance. (Clewell & Villegas, 1999).

allowed for the program to meet teacher candidates' specific needs. The program included strong recruiting, a licensure program, strong coursework and clinical experiences, and supports for individuals ranging from financial assistance to mentors to academic support. More than 400 teacher candidates have graduated from the Bilingual Teacher Pathway since 1998, representing 26 countries and speaking 12 languages; they work at all levels of the K-12 system (early childhood education, elementary, and high schools) and across content areas of foreign language, mathematics, social studies, business, drama, and library media (Brown et al., 2008).

Yet, another example was the long-term investment of the DeWitt Wallace-Reader's Digest Fund in its Pathways to Teaching Careers program (see Box 5).

In addition to targeting paraprofessionals, other grow-your-own programs target men, given their under-representation in the workforce. Call Me MISTER (Mentors Instructing Students Toward Effective Role Models) was created at the University of South Carolina in 2000 to recruit all students—particularly college male freshmen of color—from the community into teaching. Expanded to Jackson State University in Mississippi as well, student participants are selected from among under-served, socio-economically disadvantaged and educationally at-risk communities. Loan forgiveness, assistance with job placement, academic support in college, and the use of a cohort system for social and cultural support are among the strategies used to encourage students to become teacher candidates (U.S. Department of Education, 2016b). An alternative model is Black Men Teach Twin Cities, based in Minnesota, which recruits, prepares, and strives to retain Black male teachers in elementary schools. This includes supporting teacher candidates as they select a TPP, helping them to secure resources to assist in paying for that training, locating jobs for teacher candidates in partner schools with strong induction programs, and providing additional career growth opportunities.[18]

Additional programs target other high need areas as well, including recruiting teachers prepared to teach in rural settings. The University of Utah offers an alternative preparation program specifically designed to prepare teachers for rural placements in low-incidence special education classrooms (Jameson et al., 2019). The program recruits candidates in rural parts of southern and central Utah and partners with 14 local education agencies in these same areas to provide field experiences and student teaching supervision. Students, many of whom already work in these remote schools as paraeducators or general education teachers, attend both synchronous and asynchronous classes with a cohort of peers through a broadband connection provided by the Utah Education Network. The nature of the classes, in-person fieldwork and student teaching, and cohort model provide a program experience that is more aligned to on-site teacher education programs despite the rural and remote locations of the teacher education candidates. From 2004 to 2016, the University of Utah special education department received three significant grants from the U.S. Department of Education, Office of Special Education Programs for the preparation of rural special education teachers. This funding allowed the program to provide a range of supports for the teacher candidates including tuition benefits, computers, book money, and stipends. In exit surveys, nearly all participants named these benefits as being instrumental to their ability to complete the program.

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[18] See https://blackmenteachtc.org for additional information.

Here too there is a modest research base. Kaufman et al. (2020) report on an evaluation of school districts creating their own teacher education programs to address shortages. TNTP's TEACh program was developed in partnership with three urban school districts. The goal was to develop in-house TPPs that were sustainable. The school districts and TNTP did considerable planning. Two districts had the explicit goal of recruiting a more diverse workforce, including teachers of color. "We're looking for diverse candidates who have ties to the district … who have been students, who have worked in the district, people from the community who want to give back" (p. 11). All three districts reached out to candidates in a variety of ways, including online advertising and in-person outreach. Program staff reviewed the applications, selecting those who they felt would succeed and were best suited for the district and its needs. All accepted candidates then went through preservice training during the summer, which included field experiences in a summer school program, in-person training with their cohort, and online modules. At the end of the training, candidates were reviewed using a variety of measures, including observations of their teaching. Programs supported candidates as they sought positions for the fall, but the candidates were responsible for finding positions. Toward the end of the year, they were evaluated again using observations, the completion of modules, student surveys, and the like. The outcome variable of interest for the comparison across programs was the performance of candidates in their second year of teaching. However, interview data, candidate observations, and the artifactual trail of their program were used in the full analysis.

The programs were of different sizes, ranging from 20 to 100 teachers who made it through the entire process and were hired in the target district's school. Candidates were drawn to all three programs as being efficient, affordable, and accessible. They liked the accelerated timeline and the low financial burden (they did not have to take out loans to enroll, and they were paid as first-year teachers). They were also attracted to the supports that were offered—mentoring and coaching—as well as access to the school districts.

State certification requirements complicated the process; in particular, the state certification tests were challenging and the failure rate high. The recruitment and selection processes were labor intensive and required considerable district capacity. Summer school programs did not offer complete field experiences; candidates reported that their field experiences included short school days, fewer students, and fewer students who presented management problems. Cooperating teachers also varied in their quality, and this affected candidate experiences in summer school. Candidates did not feel like the support offered to help them find jobs was sufficient, and aligning school hiring with program recruitment and training was challenging even within one district. Candidates found the time they spent with coaches to be valuable, but coaching supports were varied and not consistently strong or equal; online modules seemed disconnected from candidates' teaching and experiences.

Despite these challenges, TEACh contributed substantially to the new hires in two of the three districts, particularly the districts' teacher diversity goals: in the two districts with the most TEACh hires, TEACh candidates were less likely to be White and more likely to be Black (District C) or Latinx (Districts B and C) than other new teachers. TEACh hires were also more likely to be certified to teach in high need areas.

Grow-your-own programs meet a variety of different needs and often target niches in the teacher supply and demand market, including Black male teachers, rural teachers, bilingual teachers, special education teachers, or STEM, for example. As with many such programs, the field of educational innovation has a long history of experimentation, but has placed less emphasis on systematic research that documents program qualities and effects. While program evaluations often provide insight into a program's success at reaching a particular teacher candidate pool, they do less to thoroughly document the factors that shape program success/failure or the effectiveness of programs and their components.

We might also note that most of these innovations take advantage of the local nature of the teacher workforce. In addition to the hyperlocalization of how one becomes certified as a teacher (i.e., available programs and licensure requirements), teacher candidates rely on their social networks to locate employment opportunities (Maier & Youngs, 2009), as well as an increasing number of websites dedicated to advertising teaching positions (e.g., schoolspring.com, educationamerica.net, teachers-teachers.com among them). This includes gleaning information about open jobs primarily from their student teaching placement and connections with other student teachers in their programs. As a result, teacher candidates take jobs in communities that are geographically close to and demographically similar to where they grew up. These factors, and the largely White, female composition of the teaching force, furthers inequities in staffing patterns as those schools and districts with existing relationships to teacher candidates and universities benefit from access to highly qualified recent graduates. This is a particular challenge in urban settings where demand for teachers outweighs the number of teacher candidates originally from those areas (Boyd et al., 2005).

An important aspect of the innovations and examples highlighted here is that programs are comprised of particular personnel, curricula, components, pedagogies, and practices that are designed to align with the program's values and needs, and are often honed (through experience) to candidate needs. These practices also are not well documented, which makes their replication difficult and undermines the field's capacity to learn from past and present experimentation. Some of these practices are captured in lists of design principles, like those offered by Guha et al. (2016): strong university–K-12 school partnerships, for example, or the integration of clinical experience with coursework. Other promising practices include adjusting the times that coursework is offered to meet students' needs; using a range of financial supports (summer internships; financial aid for tuition, stipends, fellowships, instructional materials, book money, and living expenses; child care); using a range of academic supports (tutors, study buddies, summer orientations); revising the curriculum to speak to students' needs (e.g., courses in culturally-relevant/responsive/sustaining pedagogy); and using a range of pedagogies (coaching, mentoring, project-based learning, apprenticeships). One important role for case study research in this domain is to offer thick descriptions of how these practices are conceptualized and used, as well as how they align with and leverage local contexts. As other institutions attempt to adapt these practices to their specific context, the details matter.

Also crucial to these programs are human, material, social, and financial resources. Many programs have roots in earlier innovations and reforms, like Teacher Corps or MAT programs of the 1960s and 1970s. Those earlier programs may have laid founda-

tions, including infrastructure that supports communication or relationships that serve as social capital. But breaking with past programs can require a catalyst, which often comes in the form of a policy mandate that can be associated with financial incentives. Several programs described above were funded, in part, by state or federal programs designed to expand the pool of teacher candidates. It is to those policies that we now turn.

Policy Initiatives to Secure a Strong Pool of Teacher Candidates

Policymakers and philanthropic organizations have tried myriad approaches to attracting—and retaining—more, and more diverse, individuals to teaching. In 2017 alone, 23 states enacted 47 bills to recruit teachers. As we have noted, understanding who shows up as a TPP candidate is best understood in the broader context of the educational system and the historical, social, economic, and political forces at play. That is, teacher shortages are not simply due to a decline in interest in becoming a teacher, but are better understood as being shaped by contemporary ideas about whether teaching is a promising career, shifts in the economy and the job market, how teaching as a career meets the personal and professional needs of the next generation of the workforce, and how teaching is perceived by the public.

Thus, policy approaches to recruiting teachers often package together incentives for attracting candidates and keeping them that are sensitive to state and regional forces, coupling recruitment efforts with efforts to curb attrition. As Aragon (2018) notes,

> High retention rates in some schools and districts mask high attrition rates in others. The severity of the teacher shortage problem varies significantly by state, district, school, and subject. As such, many experts argue that efforts to address shortages should be less about recruiting teachers generally and more about recruiting and retaining the right teachers, in the right subjects, for the right schools. (p. 1)

Programs target specific points in the candidate pipeline: (a) incentives for states and organizations to create programs to attract particular populations of teaching candidates, like the residencies and grow-your-own programs that were discussed above; (b) incentives for teacher candidates to attend TPPs and/or to become certified to teach (e.g., loan forgiveness or tuition reimbursement); (c) incentives for teaching candidates to apply for certain jobs in particular schools or shortage areas; and (d) incentives to stay in teaching through the early stages of one's career (e.g., Guarino et al., 2006; Podolsky et al., 2016).

Based on their review of empirical evidence, best practices, and innovative approaches taken by states, Espinoza et al. (2018) describe six policies that can address teacher shortages and increase teacher recruitment and retention:

1. Service scholarships and loan forgiveness
2. High-retention pathways into teaching
3. Mentoring and induction for new teachers
4. Developing high-quality school principals
5. Competitive compensation
6. Recruitment policies to expand the pool of qualified candidates

TABLE 4 Challenges Facing TPPs When Recruiting and Supporting a Diverse Teacher Candidate Pool, and Strategies for Addressing Those Challenges

Challenge 1: Attracting Students from Under-represented Groups	Challenge 2: Admitting Students Equipped with Financial Literacy and Adequate Financial Support	Challenge 3: Supporting Students and Helping Them Maintain Their GPA	Challenge 4: Graduating Diverse Teacher Candidates
• Develop university/school district partnerships • Create grow-your-own programs • Attract and support nontraditional students • Collaborate and coordinate with state efforts to increase teacher diversity • * Recruit students from within the college/university	• Provide students with the knowledge to understand the financial aid process • * Ensure that students have adequate knowledge of what financial support is available to them	• Build a diverse and welcoming program that proactively supports students • Use placement assessments to identify students at risk • * Determine which support strategies are most needed for students to receive additional learning support and are cost-effective	• Take advantage of outcomes-based funding • Promote successful candidate/school assignment matches • Determine student support needs in preparing for licensure assessments

Other policies that have been recommended by scholars include collecting teacher supply and demand data to guide state and district decision making; giving state and local education agencies flexibility to design their own targeted teacher recruitment programs; and teacher license/certification and retirement fund reciprocity (e.g., Espinoza et al., 2018).

With regard to the specific challenge of attracting and supporting candidates from under-represented groups, Goe and Roth (2019) present a framework of key challenges faced by TPPs and review the empirical evidence concerning strategies that may address those challenges, including many that we have mentioned thus far (see Table 4).

Incentives for Programs and Changing Certification Requirements

Teacher certification and licensure are under state jurisdiction, and states have different policies for types of credentials available: temporary versus permanent, elementary versus middle school, or by focal area, for example, mathematics, social studies, special education, bilingual education, and the like. The contemporary alternative route "movement" is generally credited to New Jersey's Provisional Teacher Process (PTP), which targeted candidates with the same qualifications as those of its traditional programs: a BA in an appropriate content domain and a passing score on a teacher test (Klagholz, 2000; Tamir, 2008). Candidates would be assigned a mentor, and complete a 1-year program of training. Other states followed suit; California, Connecticut, and Texas also created policies to enable alternative certification (cf., Hawley, 1992). For example, Houston and Dallas Independent School Districts both created in-house teacher certification programs to address shortage areas. Connecticut's Alternate Route to Certification (ARC) targeted well-educated adults to become teachers (Bliss, 1992). Areas of certification were dependent upon enrollment, critical needs in subject areas,

and needs of school districts. The ARC curriculum included a 9-week, full-time summer program, plus a weekend program from fall to spring.

Many of these initiatives were funded through federal and state programs. Federal funding for teacher preparation and recruitment comes from several different sources. The HEA funds both the Teacher Education Assistance for College and Higher Education (TEACH) grant through the College Cost Reduction and Access Act and the Teacher Quality Partnership grant program. TEACH grants fund undergraduate and graduate students for tuition and related expenses. The Special Education Personnel Preparation program supports programs at IHEs for the preparation of special education, general education, and specialized instructional personnel through the Individuals with Disabilities Education Act. Another major source of funding is the Every Student Succeeds Act (ESSA), the funds of which can be used for a range of teacher quality issues, including professional development, the development of data systems, and educator career ladders, as well as programs more tightly aligned with TPPs:

1. Reforming teacher, principal, or other school leader certification, recertification, licensing, tenure systems, or preparation program standards and approval processes;
2. Carrying out programs that establish, expand, or improve alternative routes for state certification of teachers (especially for teachers of children with disabilities, English learners, or science, technology, engineering, mathematics, or other

	Even Start[a]	Striving Readers[a]	Mathematics and Science Partnerships[a]	Improving Teacher Quality State Grants[a]	Title I, Part A	School Improvement Grants	Transition to Teaching[a]	Advanced Certification or Advanced Credentialing[a]	Teacher Quality Partnership Grants[a]	Language Resource Centers	Teachers for a Competitive Tomorrow Program: Baccalaureate[a]	Teachers for a Competitive Tomorrow: Masters[a]	Foreign Language Assistance Program[a]	Teach for America[a]
Objective														
Improve Education in Specific Subjects	●	●	●						●	●	●	●		
Improve Education in General	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Improve Education for Special Populations	●	●		●	●	●	●	●			●	●		●
Target Group														
Current Teachers	●	●	●	●	●		●		●		●	●	●	
Prospective Teachers				●		●		●		●	●	●		●
Other Education Professionals	●	●		●	●	●				●				
Activity[b]														
Teacher Preparation				●			●		●		●	●		●
Professional Development	●	●	●	●	●	●			●	●	●	●	●	
Recruitment or Retention			●	●	●	●	●	●	●		●	●		●
Certification or Licensure				●			●	●	●		●	●		
Induction or Mentoring				●			●		●		●			●

FIGURE 13 Areas of overlap among selected U.S. Department of Education programs that support teacher quality.
SOURCE: U.S. Government Accountability Office, 2009.

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areas where the state experiences a shortage of educators), principals, or other school leaders; and

3. Developing, improving, and implementing mechanisms to assist local educational agencies and schools in effectively recruiting and retaining teachers, principals, or other school leaders who are effective in improving student academic achievement, including effective teachers from under-represented minority groups and teachers with disabilities. (AACTE, n.d.)

A 2009 report by the U.S. Government Accountability Office found 82 distinct programs designed to support the improvement of teacher quality, administered by 10 federal agencies. At least six supported prospective teachers, at least 10 supported recruitment and retention; and at least six supported teacher preparation (see Figure 13).

Over the past 30 years, these various funding streams have catalyzed much of the creation of alternative routes. The Bush administration also actively encouraged the development of such programs through the creation of the National Center for Alternative Certification, the classification of candidates who graduated from alternative routes as "highly qualified," and support of the American Board for Certification of Teacher Excellence (ABCTE), which certifies teacher candidates in 13 states through background checks, the completion of minimal state requirements, written examinations, and a fee of about $1,900 (e.g., Zeichner & Hutchinson, 2008). The late 1990s-early 2000s included a flurry of policy initiatives stimulated at the federal level, including Troops to Teachers in 1994 to reduce veteran unemployment and address shortage areas and diversity in the teacher workforce, as well as the Transition to Teaching program in 2001. The Transition to Teaching program supports the recruitment and retention of mid-career professionals, including qualified paraprofessionals, and recent college graduates who have not majored in education to teach in high need schools. The program provides 5-year grants to state and local educational agencies, for-profit organizations, nonprofit organizations, and cross-institution partnerships. Participating institutions develop and implement comprehensive approaches to prepare, place, and support teacher candidates in high need schools for at least 3 years.

The Race to the Top grant program also included incentives to support alternative programs targeting shortage areas and specific teacher candidate populations. States seeking funding needed to allow for alternative routes in their state legislation; and most of the 12 funded states proposed to grow or expand credentialing options. North Carolina proposed using the funding to expand TFA and to build a state Teacher Corps. New York proposed to encourage the development of teacher residencies statewide. Washington, DC, proposed to develop teacher pipeline models through K-12 charter school networks (Crowe, 2011).

Incentives for Individuals: Loan Forgiveness and Service Scholarship Programs

In addition to incentivizing states, organizations, and school districts to create programs, other policies target teacher candidates directly. Policies that relieve prospective teachers of debt accrued through student loans and tuition are crucial for attracting a diverse workforce. More than two-thirds of teacher candidates borrow money to pay for their education; the average debt for a prospective teacher with a BA is $20,000,

and for one with an MA, it is $50,000 (Podolsky & Kini, 2016). Teachers of color are more likely to borrow federal student loan money to fund both their undergraduate and graduate education than White teachers. Between 2007 and 2008, 91 percent of Black teacher candidates who completed their degree requirements and 82 percent of Latinx teacher candidates borrowed money through federal student loans, compared with 76 percent of White students. Black teacher candidates also had significantly higher median student loan debt ($22,699) compared to their White ($16,158) or Latinx ($15,932) counterparts. These trends hold true for the undergraduate and graduate levels. Because teaching does not offer salaries competitive with those in other professions that require similar levels of education, the potential for facing this kind of debt burden could be a major factor in discouraging people of color from considering teaching as a career choice (Fiddiman et al., 2019). The fact that Black teachers, on average, are paid less than their White peers might further discourage an individual from considering teaching as a career.

Since 1958, the federal government and more than 40 states have offered loan forgiveness and/or service scholarship programs to individuals interested in teaching through the National Defense Student Loan program (Feng & Sass, 2015). In their review of states' ESSA programs, Espinoza et al. (2018) found that at least 40 states had loan forgiveness and service scholarship programs. Many of these programs target high need categories like special education or bilingual education; others target high need urban or rural locations. Some programs have deep roots in their states, while others have been recreated in light of recent research and current needs.[19] However, many programs offer a relatively small number of stipends—far fewer than needed—and offer relatively small amounts of funding—not enough to cover tuition—so not all programs are highly effective in reaching their goals.

There is a modest amount of research literature exploring the effectiveness of various policies at recruiting and retaining high-quality teachers. Feng and Sass (2015) investigated the effects of the Florida Critical Teacher Shortage Program, which involved a combination of loan forgiveness, signing bonuses, and tuition reimbursement for pursuing certification in shortage areas. The researchers found that the loan forgiveness program decreased teacher attrition in shortage areas, the signing bonus program (which was short lived) reduced the likelihood of teachers leaving their jobs in the public schools, and—important for this paper—the tuition reimbursement program had modest positive effects on the likelihood that a teacher would become certified in a designated shortage area. This translated into an increase in the likelihood of becoming certified in shortage areas by 0.9 to 1 percent; because the likelihood of becoming certified in a designated shortage area is 0.8 percent, this "represents more than a doubling of the likelihood of becoming certified" (p. 15).

Henry et al. (2012) analyzed data from the North Carolina Teaching Fellows Program between 2005 and 2010. The program provided scholarships that were large enough to cover full tuition for the 4 years of undergraduate school to teacher candidates who attended in-state public and private IHEs and received teacher certification. In return, teacher candidates committed to teaching for 4 years in North Carolina public schools; if they did not, they had to repay the loans with 10 percent interest. Candidates had

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[19] See Espinoza et al. (2018) and Podolsky and Kini (2016) for additional examples.

to demonstrate high academic performance in high school. The researchers found that the competitive scholarships attracted individuals with significantly higher academic credentials, and that the scholarship awardees remained teaching in public schools for 5 years or longer at rates significantly higher than other teachers. However, scholarship recipients chose to teach in schools and classrooms with more high achieving and low poverty students.

As we noted earlier, Bardelli and Ronfeldt (2020) examined whether the Tennessee's investment in recruiting and retaining high need area teachers paid off. Using data from 2010 through 2016, the researchers found that the number of graduating teacher candidates with high need area endorsements steadily increased; teachers who received high need area endorsements were more likely to be male and Hispanic or Asian or to identify with "other" race/ethnicity. They also tended to be from out of state, to have completed an alternative program, and to be older. Teacher candidates who received a STEM-related certification were more likely to be male and Asian; those receiving an ELL or bilingual endorsement tended to be female, Hispanic, and have higher GPAs. Prospective special education teachers were more likely to be female, Black-non-Hispanic or to identify with "other" race/ ethnicity, and to have lower GPAs. The likelihood for employment was significantly higher for new teachers with special education and STEM certification when compared with their non–high need area peers. Bilingual/ESL teachers were also hired at a somewhat higher rate, but the increase was not statistically significant.

Overall, research suggests that loan forgiveness or service scholarship programs have been effective in recruiting and retaining high-quality teachers (Espinoza et al., 2018; Feng & Sass, 2015; Henry et al., 2012; Podolsky & Kini, 2016; Steele et al., 2010). LPI has proposed a set of design principles for such programs, including recruiting candidates who are academically strong, committed to teaching, and well prepared; covering a significant portion of tuition and/or living expenses; and requiring recipients to commit to teaching for between 3 to 5 years with reasonable financial consequences if they do not fulfill the commitment (Espinoza et al., 2018).

As noted earlier, research has also demonstrated the powerful influence of working conditions on teachers' career choices. Kelly (2004) found that undesirable working conditions, particularly negative behavioral climates, were related to increased teacher attrition. Stockard and Lehman (2004) found that teachers working in schools with students who displayed behavioral problems, coupled with less effective leadership and less autonomy, were more discouraged, while Johnson and Birkeland (2003) found that early career teachers who left teaching reported having inadequate support and resources.

We note also that there is some intriguing evidence that broader sets of policies can also shape who pursues teaching. This fits with our general claim that understanding who attends TPPs is best understood systemically and ecologically. That is, the attractiveness of teaching as a profession is shaped by myriad factors, including cultural norms and intellectual and political currents. Within education, the rise in accountability more generally through NCLB, the widespread use of standardized tests, and policies like value-added metrics being used to judge teachers' and schools' effects on student learning are all shifts that could shape how attractive teaching is as a profession to those considering careers. There are teacher-specific policy shifts as well, including

the rise of alternative routes into teaching, right-to-work and tenure reform policies that have limited the power of teachers' unions and teachers' job security, and teacher evaluations and other ways that teachers are held accountable for student learning and school success.

For example, Kraft et al. (2019) examined the effect of teacher accountability policies—specifically high-stakes teacher evaluation policies for all teachers—on the supply and quality of new teachers. The researchers found that the reforms increased the quality of new teachers receiving licenses, as measured by the selectiveness of the undergraduate institutions that the new teachers attended, echoing historical trends in the 20th century that consistently showed that rising professional standards led to attendant increases in proxies for teacher quality. They also found that accountability reforms reduced the number of newly licensed teacher candidates, while increasing the likelihood that schools—especially hard-to-staff schools—would have unfilled teaching positions. Using new teachers' survey responses, the researchers hypothesize that the decreases in the labor market are associated with decreases in teachers' sense of job security, job satisfaction, and professional autonomy.

In a similar vein, Lankford et al. (2014) reported on a case study of the academic ability of entering teachers in New York State between 1985-1986 and 2009-2010. While there was a decline in the academic ability of those certified or entering teaching (as measured by SAT scores) from 1986 to 1999, that trend reversed after 1999, with those entering teaching having significantly higher academic ability as measured on the SAT. This was reflected both in the teacher candidates who were graduating from New York State TPPs and teachers who were newly hired in the state. The selectivity of the entering teachers' IHEs also rose. Trends were more intense in New York City, but they held for New York State more generally, albeit more mutely. The researchers also found a striking decrease in the gap in teacher academic ability between schools with more or less poor students across the K-12 spectrum. The authors posit that these changes were due to a "package of policies at both the state and federal level" (p. 451), which included substantial increases in teacher salaries. Increases in federal scrutiny of teacher quality through the Highly Qualified Teacher provision of NCLB, increased requirements at the state level for teacher preparation and licensure requirements, and shifts in hiring policies and practices were all going on at the same time. The researchers argue that these policies together sent a strong message that teaching as a profession was valued, and that message attracted candidates with higher academic ability. This resonates with Sedlak and Schlossman's (1986) claim that, historically, efforts to increase the standards used for entrance into the profession have not resulted in decreased interest, but rather increased interest among qualified candidates. Often increases in standards have been accompanied by increases in teacher salaries (Loeb & Page, 2000).

DISCUSSION

How do we summarize this history of local innovation, state and federal policies, and existing research concerning the current landscape of TPPs, their participants, and their efforts to recruit and retain a diverse and high-quality workforce? Although there is limited large-scale research that digs below the surface of the demographics of the teacher workforce, specifically the population of teacher candidates in terms of gender,

TABLE 5 Resources Involved in Recruiting and Retaining High-Quality Teacher Candidates

Material/Instructional	Human	Economic/Financial	Social/Cultural	Institutional
• Summer programs • Pre-college programs • Computers and other technology • Infused culturally responsive and sustaining practices • Tutoring • Test preparation for certification examinations	• Advisors and counselors (including peers) • Mentors/coaches/master teachers/supervisors • Strong principal leadership • Well-prepared teacher educators • Boundary crossers who can move easily across various institutions and into the community	• Loan forgiveness • Fellowships • Tuition relief • Book money • Service scholarships • No-cost child care • Competitive salaries	• Strong institutional mission • Community and family valuing of teaching as a career • Strong TPP-connected community/network • Partnerships with preK-12 schools • Alumni networks • Clubs • High-quality teacher professional community • Strong school leadership • Partnerships with universities and formal/informal institutes (museums, etc.)	• Professional development for clinical faculty and collaborating teachers • Release time for faculty to support teacher candidates and collaborate with field-based personnel • Courses offered at times convenient to candidates (e.g., evening, summer) • Productive hiring practices • Educative teacher evaluation • Induction programs • Policies that support cross-state certification/licensure and pension portability

age, race and ethnicity, and age, we know quite a lot by drawing from quantitative and qualitative research, from the systematic culling of innovations for design principles, and from close descriptions of particular cases. As we have noted, TPPs, states, and federal funding programs have identified a range of relevant resources: material/instructional, human, economic, social/cultural, and institutional (see Table 5).

These diverse resources arise when one conceptualizes the teacher labor force by situating it in time and place. As we have noted repeatedly, historically the teacher labor force has been best understood as regional, reflecting the population and communities that encircle the schools. The vast majority of TPPs produce teachers who stay close to home. Attempts to enhance the teacher workforce need to be tailored to local needs and local populations. That said, 25 percent of teachers now move across state lines (Sutcher et al., 2016), reflecting the general trend in the U.S. population to be more mobile than 20 years ago. Thus, these efforts need to be supplemented with innovative programs that recruit newcomers from an area to teach, as well as programs that are designed to "nationalize" the profession and prepare teachers who will not be bound by region.

However, while the teacher workforce is best understood locally, there are some broad generalizations that hold, most notably that the workforce does not reflect the diversity of the U.S. population, is dominated by women, and is and has been largely White. But there is reason to hope that the workforce can be significantly diversified. There was a significant increase in Black teachers prior to desegregation, and so we know it is possible to tap into that population. We also know that there has been a

significant increase in Latinx teachers. We know that MSIs supply a disproportionate percentage of teachers of color in the United States, and that they are a significant resource for learning about how to design, adapt, and implement programs that attract and keep teacher candidates. Research also suggests that policies and practices that increase affordability (e.g., loan forgiveness, tuition reimbursement, internships); accessibility (e.g., residencies, flexible scheduling); and relevance (e.g., clinical placements) have succeeded in attracting a diverse set of teacher candidates, from STEM majors to Black men to bilingual paraprofessionals to career changers. We know that because programs need to be specifically tailored to local needs, adaptations include what is taught, how it is taught, the partnerships between the K-12 schools and IHEs and other organizations, who teaches in the programs, and the timing and venues for program offerings. We know less about the specific practices that have proven successful in those programs to implement those ideas.

We know that the decision to pursue teaching as a career is often based on intrinsic motivation, but is also influenced by both push and pull factors, including attitudes toward the profession and education more generally, salaries and other professional benefits, and broader political, social, and cultural trends such as accountability. Attracting teacher candidates might best be thought of as a "package deal" that includes compensation, quality of working conditions, and cultural attitudes toward teaching, stability, and flexibility. It is also clear that getting teacher candidates into and through programs is not enough. For instance, we are losing many teachers of color to attrition due to working conditions, which suggests that initiatives to support a diverse and qualified teacher workforce need to take a systemic and ecological approach that addresses issues of both teacher and school quality. In other words, who our teacher candidates will be in the future depends on how the country and communities value teachers and the schools they work in, and how those values are reflected in supportive policies.

Policy Recommendations

Several organizations, including LPI and the Educational Testing Service (e.g., Espinoza et al., 2018; Goe & Roth, 2019; Podolsky et al., 2016) lay out a comprehensive view of policy recommendations for the recruitment and retention of teachers generally, most of which are relevant to attracting the next-generation teacher workforce. Policy can be a blunt instrument, yet adapting to local circumstances requires TPPs to be both nimble and attentive to the large and small ways that institutions communicate care, commitment, and support to their clients. This leads us to conclude that the best policies for attracting and retaining a diverse and talented workforce will depend on how policies can nevertheless be used to attend to details. In part, this requires the flexibility that many state and federal policies have built into legislation to allow for local variation. The TPPs that we have described and the extant research hints at the importance of specific practices that policies can enable. Here we list some of them, distinguishing by program type (see Table 6).

Post-program support for all of these programs needs to attend to the intended and unintended consequences that educational policies more broadly have on teachers. This includes considering how teacher evaluation and professional development policies

TABLE 6 Practices and Policies That Support Teacher Candidate Recruitment and Retention

Program Type	Recruitment Practices	Retention Strategies	Program Vision	Program Content/Design
University-Based	• Recruit existing school staff (e.g., paraeducators, tutors) • Offer pre-college programs for local high school students	• Provide material resources for teacher candidates (e.g., book money, technology, scholarships) • Provide internships/student teaching in schools that have strong leadership on diversity, equity, and inclusion initiatives • Offer job placement support • Create or enhance robust school teacher education program induction programs • Offer a prolonged induction period (>1 year) that includes observations, mentoring, and professional development • Develop or enhance mentorship programs where teacher candidates are matched with in-service teachers in the same content area • Place teachers in schools that will recognize and affirm teachers' lived knowledge and experiences, especially for teachers of color	• Provide multiple high-quality pathways toward certification (e.g., alternative, residency, part-time, traditional) • Courses and field experiences designed with central vision	• Offer flexible programming (e.g., class times, student teaching) • Provide regular professional development to faculty and collaborating teachers
Urban Education Master's	• Recruit candidates specifically interested in urban education and social justice		• Emphasis on social justice and culturally relevant pedagogy • Accentuate the importance of knowing school communities and contexts by holding classes on-site	• Purposeful partnerships with local urban school districts • Opportunities to complete coursework, student teaching, and full-time teaching while enrolled in the program
STEM Programs	• Recruit science, technology, engineering, and mathematics (STEM) majors and professionals currently working in the STEM field • Offer tuition stipends		• Emphasis on dual degree and professional experiences • Partnerships with university STEM departments	• Provide low-stakes opportunities for people to learn about teaching before making a commitment • Integrate teacher prep and content area coursework with field experiences
Residencies	• Recruit highly qualified, diverse candidates interested in long-term teaching careers • Financial supports including tuition reductions/remission and living stipends • Provide stipends during courses and clinical work		• Substantial and consistent teaching support from instructional coaches • Merge teacher preparation and induction programs	• Emphasize cohort model in candidate placement and training • Consistent integration of coursework and clinical experiences • Provide ongoing mentorship after initial residency years
Grow-Your-Own Programs	• Recruit people with existing connections to school districts (e.g., high school students, paraprofessionals) • Offer financial incentives (e.g., free introductory classes, tuition assistance)		• Create a pipeline of school district graduates to teachers • Accentuate partnerships with school district	• Tuition assistance or reimbursement for candidates who return to teach in district • Flexible programming (e.g., class schedules, meeting clinical requirements) • Academic and social supports (e.g., child care, tutorials)

shape teachers' perspectives on and experiences in schools, and how policies concerning curriculum, assessment, instruction, and school organization can have positive and negative impacts on teachers' commitments to teaching.

Recommended Actions

Based on our review of the extant literature and synthesis of program features, we recommend the following actions for enhancing teacher recruitment and retention across the United States.

Recall our underlying argument that enhancing the teacher workforce calls for systemic thinking and an ecological conceptualization of the problem as one of a pipeline into teaching. This calls for work on multiple fronts, with myriad stakeholders, and adaptation to local contexts. To paraphrase Garcia and Weiss (2020), who argue in terms of an approach to address teacher shortages, we need to understand the teacher workforce as being shaped by multiple factors and "thus can only be tackled with a comprehensive set of long-term solutions" and "coordinated efforts of multiple stakeholders" (p. 1). We first note that there are two overarching principles culled from a long history of experimentation and innovation that should guide policy and program development:

1. Policies should be conceptualized as addressing both push and pull factors that are particularly relevant to a specific region and/or specific populations. Push and pull factors include individual motivation, societal values and attitudes, supportive working conditions in the schools, and supports for the challenges faced by potential teacher candidates. Some factors are directly related to the candidates themselves while others are related to creating communities, networks, and supportive TPP and school cultures, which may be seen as secondary to individual candidates but all of which are contexts that shape who is attracted to and persists in pursuing teaching as a career. We see them as important contexts, both up and downstream, that shape who considers and pursues teaching as a career. Policies must be flexible enough to adapt to the specific contexts and needs of individual communities.
2. Policies should recognize and address the systemic and longitudinal nature of the problem of teacher candidate recruitment and retention both within and across time and institutions (recall, for example, how Latinx teacher candidates have increased, but have exited the profession prematurely due to working conditions).

These two principles serve as guides for the development of the following recommended actions at different levels of teacher recruitment and retention. These recommendations include the following:

1. Increase the economic and material resources available to teaching candidates, preservice, and practicing teachers.

By the federal and state governments:
- Develop or expand programs that provide fellowships, tuition assistance, and loan forgiveness to preservice teachers attending preparation programs
- Develop recruitment strategies and admissions requirements that enhance workforce diversity
- Enhance loan forgiveness, service scholarships, and other financial incentive programs for teacher candidates and teachers, especially those who are certified and serving in hard-to-staff positions and locations
- Require that programs set high retention and candidate diversity goals, and regularly report progress toward those goals
- Develop and invest in high-retention programs, including teacher residencies and grow-your-own programs that are designed according to research-based principles

By colleges, universities, and teacher preparation programs:
- Offer material resources to preservice teachers enrolled in TPPs, including scholarships, book money, no or low-cost child care, and free or low cost computers
- Establish and prioritize recruitment goals for diverse candidates

By school districts and charter organizations:
- Increase salaries to be commensurate and competitive with professions that require similar levels of preparation
- Where possible, provide housing stipends to offset the costs of living

2. Enhance the professional community and professional support available for preservice and practicing teachers.

By the federal and state governments:
- Develop funding formulas that allow funds to be allocated for university–school district partnerships and teacher development
- Maintain a state database that highlights locally available professional development opportunities
- Create educative teacher evaluation systems that align with teacher certification processes, both in terms of initial certification and advanced certification (e.g., National Board for Professional Teaching Standards certification)
- Align teacher certification/licensure and pension portability across state lines

By colleges, universities, and TPPs:
- Develop or enhance mentoring and advising programs for preservice teachers
- Offer free or low-cost certification test preparation and tutoring services

- Provide free or low cost and flexible continuing education opportunities, especially those that intentionally connect preservice and practicing teachers
- Create programs that are grounded both in a central vision for what kind of teachers they graduate and in the knowledge base of effective teaching and effective teacher preparation
- Eliminate or amend policies and practices that serve as obstacles to candidate success
- Create an inclusive and diverse program culture
- Develop and advertise robust alumni networks for professional guidance and job seekers
- Create a database to track why teacher candidates exit programs
- Offer release time for faculty to support teacher candidates and collaborate with field-based personnel

By school districts and charter organizations:
- Recruit from staff and students already in the district and provide incentives for attending TPPs and returning to the community
- Develop or enhance mentoring and coaching programs for new and practicing teachers, with resources like release time to support such coaching
- Create enduring induction programs for early career teachers that provide an introduction to policies and practices, and offer continuing professional development
- Cultivate high-quality school leaders who have knowledge and skill in instruction, faculty ongoing development, and the creation and sustenance of collegial organizations

3. Elevate the view of teaching as a profession.

    By the federal and state governments:
    - Develop federal and state level public relations campaigns that highlight the importance of teaching and why people become teachers (e.g., to give back, to build a better society, to share knowledge, to fight inequality, etc.)
    - Enhance funding opportunities for districts to raise teacher salaries in general, and redress inequitable compensation across districts
    - Enhance funding opportunities for teachers to continue their education

    By colleges, universities, and TPPs:
    - Partner with local high schools to create pre-college programs to introduce students to the idea of teaching
    - Elevate and enable partnerships between colleges of education and disciplinary departments to strengthen pedagogical skills and content knowledge for faculty, as well as understanding of and commitment to teacher preparation as a cross-university responsibility

By school districts and charter organizations:
- Develop strong school leadership that supports teachers
- Develop partnerships with other stakeholders in teacher preparation (IHEs, non-IHEs with TPPs) and create infrastructure to support communication and collaboration
- Provide signing or performance bonuses, especially for hard-to-staff positions or locations, and salary structures that encourage retention
- Enhance the quality and professionalism of recruitment efforts (e.g., clear job postings and early, efficient hiring processes; hire dedicated, skilled staff with requisite knowledge and skill)
- Create pathways for teacher leadership within schools and school districts, including advanced certification

Research Recommendations

The past 30 years have included an expansion of the teacher preparation system and of the organizations participating in the recruitment and preparation of teacher candidates, often in response to rallying cries for innovation. But claims of innovation are (often) ahistorical. As a field, teacher preparation has a long history of innovation in recruiting and preparing teacher candidates. Long before Teach for America, there was the Teacher Corps. Before today's urban MA programs, there were MAT programs. MSIs have been recruiting and preparing teachers of color since their founding well before the Civil War. Unfortunately, American innovation—especially in education—does not often include an investment in research on innovations or careful scholarship to cull lessons to be learned.

We know that both research and literature syntheses can play a significant role in learning from past innovation. A pluralistic approach to scholarship is needed. Case-based research allows for the description of contextual factors and documentation of specific strategies that are used to create local programs focused on specific needs. Case studies of MSIs that are characterized by a "student-centered, community-minded, partnership-oriented" ethic (Browning, 2017), and that often take a process-oriented, multi-pronged approach to recruiting and nurturing the teacher candidates in their TPPs, would also add new insights to how strategies and contexts interact. Another topic that would benefit from highly detailed cases would be case studies of leaky pipelines in context. We know that prospective teachers of color are lost at every station along a pipeline, but we know little to nothing about the specifics of who leaves, why they leave, and what happens to them after they leave.

Quantitative research has already demonstrated its usefulness at examining the effects of different program and policy approaches, for example, loan forgiveness or tuition reimbursement. Designs that are well suited for the complexity that results from the "push and pull" and situated nature of TPPs would be particularly useful. The systematic replication of design principles, as in the case of UTeach, offers another example of how to both honor the need for local adaptation while also adhering to quality design principles. The syntheses of relevant literature by LPI demonstrate how experiences across cases can be culled for lessons learned and research-based tenets. Also of note is the usefulness of infographics and other forms of data representation

that help communicate complex problems to both educators and the public; LPI has some noteworthy examples to use as inspiration. Central to all of this is the need for investing in consistent, centralized data—both qualitative and quantitative—that can be used across research teams and projects.

CONCLUSION

In conclusion, it is no surprise that, as Sedlak and Schlossman (1986) note, the United States has always struggled with maintaining a quality teacher workforce that reflects the U.S. public in all of its diversity. Recruiting, responsibly preparing, and retaining 3 to 4 million individuals to meet the needs of our children is no small feat. Maintaining an able teacher workforce in the United States will always be a federated story. After all, the task of ensuring a qualified teacher workforce for all U.S. students belongs to the states and to their communities, but the federal government (and other central organizations) play an essential role. Supplying states and localities with research-based practices and policies, along with detailed descriptions of how programs have been designed to address local needs and what it takes to sustain successful implementation, is crucial to progress, as is incentivizing innovation that breaks new ground and does so with the wisdom that learning from others' efforts provides.

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AUTHOR BIOGRAPHIES

Suzanne M. Wilson is a Neag Endowed Professor of Teacher Education at the University of Connecticut in the Neag School of Education's Department of Curriculum & Instruction. Her undergraduate degree is in history and American studies from Brown University; she also has an M.S. in statistics and a Ph.D. in psychological studies in education from Stanford University. She was a university distinguished professor in the Department of Teacher Education at Michigan State University, where she served on the faculty for 26 years. She has written on teacher knowledge and assessment and on teacher preparation programs and accountability. Wilson's current work concerns exploring the effects of professional development and describing past and present public debates over good teaching and the regulation and ongoing development of the teacher workforce.

Shannon L. Kelley is a doctoral candidate in the Department of Curriculum & Instruction at the University of Connecticut's Neag School of Education. Her research applies lenses from institutional theory to understand how middle and high schools conceptualize and organize reading programs for students with persistent reading difficulty. She has also engaged in research on teacher preparation, multisyllabic word reading instruction, and dyslexia discourse. Prior to graduate school, she taught high school English and middle school special education for a decade. In addition to her studies, she currently teaches undergraduate and master's level courses on literacy instructional methods and works with local districts to design and implement high school reading intervention courses.
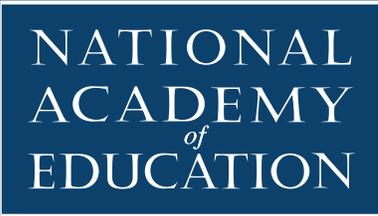
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