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The Student Has Become the Teacher:

Tracking the Racial Diversity and Academic Composition of the Teacher Supply Pipeline

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Background

It is widely acknowledged that teachers are the most important educational resource in schools (Rivkin, Hanushek, & Kain, 2005; Wright, Horn, & Sanders, 1997). As a result, a great deal of research and policy attention is being given to understanding how to attract, allocate, and retain teachers so as to promote equitable access to well-qualified teachers for all students, especially those from minority and low-income backgrounds. Studies show that academically skilled teachers have positive impacts on students (Rice, 2003; Rockoff, Jacob, Kane, & Staiger 2011) and there are currently numerous efforts underway to improve the selectivity of the nation's teaching force. Internationally, recent analyses conducted by organizations such as McKinsey & Company (Auguste, Kihn, & Miller, 2010) and the Organization for Economic Cooperation and Development (OECD, 2011) have noted that teacher preparation programs in high-achieving countries such as Finland, South Korea, and Singapore are highly selective and tend to recruit teachers from at least the top third of their high school graduates (among other notable differences in educational policy). It is not surprising then, that recommendations to raise the bar for admission into teacher preparation programs have gained considerable traction among policymakers in the United States as a strategy for improving the American education system (Sawchuk, 2013). At least 25 states—including Illinois—have signed on to the Council of Chief State School Officers' strategy to improve teacher training and licensure, and committed to raising entry requirements for their teacher preparation programs (Council of Chief State School Officers, 2012; Sawchuk, 2012b). The American Federation of Teachers has also recommended raising the bar for entry into the teaching profession and suggests a minimum GPA of 3.0 and ACT composite score of 24 (American Federation of Teachers, 2012). Similarly, the Illinois State Board of Education (ISBE) recently raised the cut scores for the state's teacher basic skills examination and implemented a provision allowing candidates with an ACT composite of 22 or higher to opt out of this exam (Sawchuk, 2012a).

Studies show that academically skilled teachers have positive impacts on students and there are currently numerous efforts underway to improve the selectivity of the nation's teaching force.

Research also shows that racial/ethnic minority teachers have a positive impact on minority student outcomes (Villegas & Irvine, 2010). In particular, studies have found that a racial/ethnicity match between teachers and students has a positive impact on student achievement growth, especially for minority students (Dee, 2004; Hanushek, Kain, O'Brien, & Rivkin, 2005; Goldhaber & Hansen, 2010). As a result, there has been a concurrent policy movement to recruit a more diverse teacher corps that more accurately reflects the demographics of the country's students. Nationally, people of color made up 41% of the public school student population in 2008, , compared to only 16.5% of the teaching corps (NCES, 2009). Similarly, in 2012, 49% of Illinois' students were non-White, compared to only 17% of the state's teachers, and the state ranked third from the bottom on the Center for American Progress' "Teacher Diversity Index" (Boser, 2011; Northern Illinois University, 2012; Northern Illinois University, 2013).

Numerous studies have found that a racial/ethnicity match between teachers and students has a positive impact on student achievement growth, especially for minority students.

In response to these and other factors, the Illinois P-20 Council has a stated priority to increase the state's pipeline of diverse, academically talented teaching candidates (Illinois P-20 Council, 2013). In addition, new standards for accreditation of teacher preparation programs drafted by the Council for Accreditation of Educator Preparation (CAEP) call for the recruitment of candidates that reflect the diversity of the nation's students and propose

that admission standards for teacher preparation programs ensure that each entering cohort of candidates has a GPA of at least 3.0 and an average achievement in the top third of a national assessment such as the ACT, SAT, or GRE by 2020 (Council for the Accreditation of Educator Preparation, 2013).

Yet, some evidence suggests that efforts to improve the academic skills of the overall teaching force can have a negative impact on teacher diversity without a parallel commitment to maintaining such diversity (Lewis, Shears, & Furman, 2010; Memory, Coleman, & Watkins, 2003). For example, a previous but unrelated study of Illinois teachers between 1997 and 2006 discovered an overall increase in the mean ACT composite score, but an overall decline in the percentage of minority (i.e., non-White) teachers (DeAngelis & Presley, 2007). The changes in Chicago were particularly striking, with new teachers' mean ACT score increasing by over 11% and the proportion of minority teachers declining by over 30% during that timeframe. It appears from those results that improvements in new Illinois teachers' academic skills during that time came at the expense of diversifying the teaching force. However, a recent report from the Center for American Progress (Bireda & Chait, 2011) highlights, through case studies, programs such as North Carolina Teaching Fellows Scholarship Program, Teach Tomorrow in Oakland, and Teach for America, that have shown some success in attracting racially diverse teachers with strong academic backgrounds at the state, district, and national levels. In Illinois, Teach for America (TFA) and the Golden Apple scholarship program have both established track records for attracting racial/ethnic minority students with strong academic backgrounds into the state's teaching corps. For example, TFA places approximately 100 racial/ethnic minority teachers into Chicago classrooms annually, and the overall average ACT score for TFA teachers nationwide was approximately 30 (ACT, 2013a; Teach For America, 2009; Teach For America, 2013).

Some evidence suggests that efforts to improve the academic skills of the overall teaching force can have a negative impact on teacher diversity without a parallel commitment to maintaining such diversity.

The goal of this pipeline study is to inform the design of policies and practices to improve the supply of academically skilled, racially and ethnically diverse individuals into teaching in Illinois. We do this by tracking two cohorts of Illinois students from high school through college and into the workforce in order to determine how each stage in the teacher supply pipeline affects the composition of this piece of the state's new teacher corps. Most prior studies of the teacher pipeline began with college graduates and consider their decisions to enter teaching (Lee, Clery, & Presley, 2001; Manski, 1987; Murnane, Singer, Willett, Kemple, & Olsen, 1991; Podgursky, Monroe, & Watson, 2004; Vance & Schlechty, 1982). Generally, these studies show that individuals with weaker academic skills are more likely than their peers with stronger academic skills to enter the profession. However, a handful of other studies suggest that decisions and factors beginning in high school and extending through college impact who ultimately enters teaching (Hanushek & Pace, 1995; Mau, Ellsworth, & Hawley, 2008; Reininger, 2006; Vegas, Murnane, & Willett, 2001). For example, Vegas et al. (2001) tracked a national sample of high school graduates through college and found that college enrollment and graduation were significant barriers to minority students' entry into teaching. Together, existing studies point to the need to consider the entire pipeline in efforts to fully understand who enters teaching.

Research Questions

This study focuses on the teacher supply pipeline and examines how each stage from high school through college and initial certification into teaching affects the composition of new entrants to K-12 public school teaching in Illinois. The analysis pays particular attention to the academic skills and racial/ethnic diversity of new teachers because, as described above, these two characteristics of the teaching force are at the forefront of local and national policy concerns (Bacolod, 2007; Corcoran, Evans, & Schwab, 2004; Karp & Harris, 2011; Lewis, et al., 2010; Villegas & Lucas, 2004). Using a unique, longitudinal state database, we aim to provide a better understanding of how each stage in this important source of teacher supply influences the characteristics of those who enter the profession by answering the following broad research questions: 1) Who is interested in teaching? 2) Who eventually becomes a teacher? and 3) To what extent does each step in the pipeline impact Illinois' ability to attract an academically skilled, diverse teaching force?

This study focuses on the teacher supply pipeline and examines how each stage from high school through college and initial teacher certification into teaching affects the composition of new entrants to K-12 public school teaching in Illinois.

Conceptual Framework and Methods

Nearly all existing studies of the new teacher pipeline employ national longitudinal datasets, mainly from the 1970s and 1980s. National datasets have an advantage over state datasets in terms of the generalizability of the findings. However, the oft-used federal datasets are now dated and their sample sizes get prohibitively small in this type of study, particularly for minority groups. For example, the National Educational Longitudinal Survey of 1988 utilized by Mau et al. (2008) and Reininger (2006), among others, begins with a sample of students that was about a decade older and about one-tenth the size of that used in this report. The state database that we use provides a large enough sample to examine racial/ethnic differences at each stage and opportunities to examine in detail differences in teacher supply among more localized geographic areas, as we plan to do in future analyses.

As shown in Figure 1, this study focuses on five stages in the pipeline from high school to K-12 teaching. We start by considering those who aspired/did not aspire to teach while in high school. Though only a portion of teaching aspirants eventually enter the profession (Hanushek & Pace, 1995; Mau et al., 2008), early aspirations have been shown to be a significant predictor of future occupational choice (Mau & Bikos, 2000). Moreover, students' early career interests can be a potentially important point of policy intervention (Lewis et al., 2010; Tracey, Robbins, & Hofsess, 2005).

Figure 1.
Conceptual Model of Stages in the Teacher Pipeline

Because a bachelor's degree is a prerequisite for virtually all teaching positions in Illinois public schools,[1] the next two stages focus on students' postsecondary enrollment and graduation. Like Reininger (2006), this study considers the type of college attended because college enrollment patterns differ by academic preparation and race/ethnicity (Goldrick-Rab, Carter, & Wagner, 2007; Roderick, Nagaoka, & Allensworth, 2006; Smalley, Lichtenberger, & Brown, 2010) and studies have found that two-year college attendance can have a negative impact on bachelor's degree attainment (Grubb, 1997; Kane & Rouse, 1995; Reininger, 2006).

This study also included earning a teaching certificate as an interim stage between graduating with a baccalaureate degree and entering teaching.[2] As Podgursky et al. (2004) explain, entering teaching is the outcome of a joint decision between supply and demand. To assess supply behavior, one needs to consider a decision that reflects only the supply side. We also considered the type of teaching certificate earned because differences have been found in the characteristics of teachers who enter through alternative versus traditional routes (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2006). Moreover, the percentage of Illinois teachers entering via different certification routes has changed in recent years (DeAngelis, White, & Presley, 2010). The final stage involved students' entry into K-12 public school teaching positions in Illinois. Due to data limitations, students who entered teaching in private schools in Illinois[3] or in schools out-of-state are not identified as having become a teacher in this study.

Because our dataset is comprised of population data for the 2002 and 2003 cohorts of high school students, inferential tests of differences were not necessary (Evans & Rosenthal, 2010;

[1] At the time of this study, the provisional vocational certificate could be granted to individuals with considerable work experience but lacking bachelor's degrees (Illinois State Board of Education, 2011). No such certificants were present in these cohorts, however.

[2] Though the Illinois State Board of Education currently administers a teacher licensure (rather than certification) system, the students from these cohorts would have progressed through the previous (certification) system.

[3] As of 2011-12, there were 1,572 private schools in Illinois, serving 226,265 students (Broughman & Swaim, 2013).

Wehrly, 2010). Thus, we use descriptive statistics to address the research questions. For the sake of simplicity and due to the fact that there were no substantial trend differences between the two cohorts of students involved in this study, we show combined statistics for both cohorts of students throughout this report.

Data

Four large administrative datasets were merged for this study in order to track two Illinois high school cohorts (classes of 2002 and 2003) from high school through college and into K-12 public school teaching in Illinois. By "classes of 2002 and 2003" we are referring to all Illinois public high school students who took the Prairie State Achievement Examination (PSAE) during their junior year in high school (spring of 2001 and 2002, respectively). We do not have individual high school graduation data, so there is likely a small percentage of each cohort that did not graduate from high school the following year.[4]

Four large administrative datasets were merged for this study in order to track two Illinois high school cohorts (classes of 2002 and 2003) from high school through college and into K-12 public school teaching in Illinois.

The first dataset contained ACT scores and background information for all public school students in Illinois who took the 11th grade PSAE in 2001 and 2002. In all, 225,196 high school students from those two classes comprised the study sample. It should be noted that 2001 was the first year in which Illinois administered the ACT test to all 11th graders as part of the PSAE. For this study, we divided the ACT distribution from these cohorts into thirds in order to facilitate tracking the top third of high school graduates on whom many teacher policy advocates focus. Because the ACT composite scores for these cohorts were distributed such that the 33rd and 67th percentile did not occur precisely between two composite scores, we selected the cut points that most closely approximated thirds: the top third of the distribution consisted of the 36.4% of students who scored 22 or above on the ACT composite measure, the middle third consisted of the 26.8% of students who scored between 18 and 21 (inclusive), and the bottom third consisted of the 36.8% of students who had ACT composite scores of 17 and below.

As part of the ACT test, students provided background information, including gender, race/ethnicity, family income, and aspirations regarding postsecondary education and career. Because race/ethnicity was so important in answering the research questions in this study, missing data were imputed for some of the cases (7.5% of the overall cohorts) in which this variable was lacking. A deductive (or logical) imputation strategy was employed, whereby missing data were deduced using known information from the same case (Nordholt, 1998; Carlson, Cox, & Bandeh, 1995). The auxiliary variables utilized for deducing race/ethnicity in this study included (in descending order): the demographics of the student's high school combined with the student's estimates of the proportion of his or her high school classmates who were of a race similar to their own; student given name and surname information combined with U.S. Census data (Ting, 2009; U.S. Census, 2000); and affiliations with racially/ethnically identifiable student organizations. In instances where the auxiliary information used to impute race/ethnicity was also missing or where race/ethnicity could not be deduced from the available data (5.2% of the students in this study), we left race blank. These cases were excluded from comparisons between Whites and non-Whites in this study (such as the race by ACT comparisons throughout this report). Multiracial students were

[4] According to the Illinois State Board of Education (Illinois State Board of Education, 2002; Illinois Board of Education, 2003) the high school dropout rates for these years was about 5%.

considered to be racial/ethnic minorities for such comparisons. A similar process was used to impute gender for a much smaller proportion of cases (0.5%).

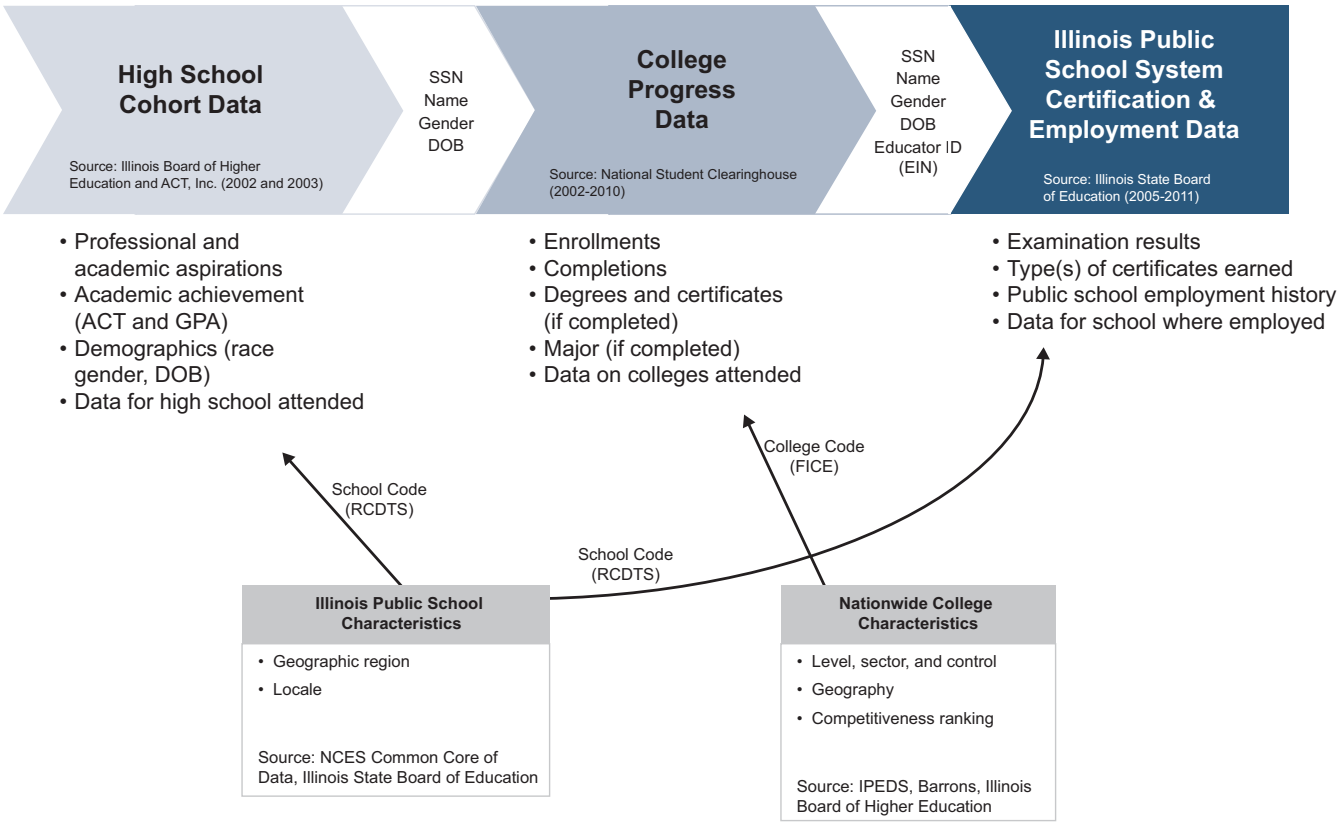
The second longitudinal dataset used in this study contained postsecondary enrollment and completion data from the National Student Clearinghouse (NSC). Though the NSC data have limitations (Goldrick-Rab & Harris, 2010; Lichtenberger, 2013), this dataset enabled us to track students from both cohorts into and across participating postsecondary institutions both in-state and out-of-state. NSC also allowed us to determine which students stopped out, graduated with certificates or degrees (two-year or four-year), or were still enrolled at the end of the tracking period.

The final two datasets used in this study—the Teacher Certification Information System (TCIS) and Teacher Service Record (TSR)—were both provided by the Illinois State Board of Education. These files provided information regarding all individuals who became certified to teach (TCIS) and entered teaching (TSR) in an Illinois public school (IPS).[5] Using various combinations of student identifiers (e.g., name, date of birth, and social security number), gender, and college enrollment information, TCIS and TSR data from the 2003-04 through 2010-11 academic years were merged with the ACT and postsecondary datasets to create a longitudinal record of up to 10 years for each student from the Class of 2002 and nine years for the Class of 2003.

To supplement the four primary sources of individual-level information, we obtained school-level information from annual, publicly-available Illinois school report card and the National Center for Education Statistics' Common Core of Data (CCD) datasets. These datasets provided information related to the characteristics of the high schools attended by those in our cohorts. We also integrated information regarding the postsecondary institutions from the Integrated Postsecondary Education Data System (IPEDS), the Illinois Board of Higher Education, and Barrons' (2003) ratings of college competitiveness from 2003 (while Barron's ratings are relatively stable, this edition would have been most relevant to students from these cohorts). The resultant longitudinal dataset, and the linkages between these files, is graphically depicted in Figure 2.

[5] Illinois charter schools began fully participating in the Teacher Service Record data collection in 2008. Prior to that, charter school participation was limited to only a few sites.

Figure 2.
Longitudinal Dataset



Results

The results for this paper are organized into three broad sections, each corresponding to one of our primary research questions. First, findings regarding the characteristics of teaching aspirants and those who did not aspire to teach are reported. Next, we describe who from these cohorts eventually became (and did not become) teachers in Illinois public schools and discuss the pathways they took to get there. Finally, the study addresses how each stage in the teaching pipeline played a role in changing the composition of new teachers who emerged from this pipeline.

Who is interested in teaching during high school?

The study began at the first stage in the pipeline by investigating the racial/ethnic and academic characteristics of students who aspired to teach while in high school and how they differed from those of non-aspirants. Aspirants were identified using data regarding students' anticipated college major and occupational choice, which the students provided in 11th grade as part of the ACT student profile questionnaire. Those who selected any type of education field except for adult education or educational administration as an intended college major or first or second occupational choice were classified as aspirants. That is, the group of aspirants consisted of the individuals who indicated an interest in teaching while in high school.

Of the 225,196 individuals in the dataset, 11.5% aspired to teach while in high school.

Table 1 shows that of the 225,196 individuals in the dataset, 11.5% aspired to teach while in high school. Perhaps not surprising given the gender distribution of teachers both nationally and in Illinois (NCES, 2009; Northern Illinois University, 2013), males were significantly underrepresented among aspirants. Men comprised about half of non-aspirants (51.3%)

Table 1
Student Characteristics, Overall and by Aspirant Category

Background Characteristics	Overall	Aspirants	Non-Aspirants
% Male	48.5	27.3	51.3
Race/Ethnicity			
% African American	12.5	7.2	13.2
% Asian	4.3	2.4	4.6
% Latino	10.2	7.4	10.6
% Multi-racial	3.5	3.0	3.6
% Native American	0.5	0.5	0.5
% White	63.7	77.0	61.9
% missing	5.2	2.6	5.6
ACT Composite			
% Top 1/3 (ACT ≥ 22)	36.4	40.8	35.8
% Middle 1/3	26.8	31.2	26.2
% Bottom 1/3 (ACT ≤ 17)	36.8	28.0	38.0
Race & ACT*			
% Minority, Top 1/3	6.0	4.3	6.3
% White, Top 1/3	30.7	36.5	29.9
% Minority, Bottom 2/3	26.8	16.7	28.1
% White, Bottom 2/3	36.5	42.5	35.7
N	225,196	25,899	199,297
% of High School Cohorts		11.5	88.5

* Includes only those with valid (i.e., non-missing) race and ACT data.

and individuals in the dataset overall (48.5%), but just slightly more than a quarter of the aspirants (27.3%).

With the exception of Native Americans (who comprised only 0.5% of all students in these cohorts), all racial/ethnic minority groups were underrepresented among the teacher aspirants compared to non-aspirants and high school students overall. For example, African American students comprised 12.5% of all high school students, but just 7.2% of teacher aspirants. Conversely, White students were overrepresented among aspirants, representing 63.7% of high school students overall, but 77.0% of aspirants. These figures suggest that the lack of racial/ethnic diversity in the current Illinois teaching corps begins at least as early as high school with lower levels of interest in teaching among racial/ethnic minority students.

Racial/ethnic minority students, regardless of academic background, were underrepresented among those who aspired to teach.

Students who aspired to teach while in high school were stronger academically than non-aspirants and students in the cohorts overall, as evidenced by the relatively higher proportion of aspirants who scored within the top third and middle third of the ACT composite score distribution. When we examined racial and academic characteristics combined, we found that racial/ethnic minority students, regardless of academic background, were underrepresented among those who aspired to teach.

Table 2 shows the popularity of education as an intended major and describes the differences in its popularity ranking by race/ethnicity, performance on the ACT, and the combination the two.[6] Education was ranked as the fourth most popular intended major among all students, but this varied widely by student background. For instance, among Native American and White students, education was the third most popular intended major. However, for African American and Asian-American students, education was ranked eighth and ninth, respectively. Compared to Asian-American and African American students, more than twice the proportion of White students intended to major in education. While there were only slight differences in the popularity of education by student academics, the statistics for race and academics combined indicated substantial discrepancies. For instance, whereas education ranked as the third most popular intended major for White students from the bottom two-thirds of the ACT distribution (with 11.0% of such students interested in pursuing this field of study) and 5th (9.8%) for White students from the top third of the ACT distribution, it ranked 8th (5.7%) for non-White students from the bottom two-thirds of the ACT distribution and 9th (5.3%) for those from the top third by ACT. These data indicate that the field of education was considerably less popular among minority students regardless of academic background.

Table 2
Intended Major, by Student Characteristics

Background Characteristics	% of Students in this Group Intending to Major in Education	Education Popularity Rank for this Student Group
All students	8.9%	4th
Race/Ethnicity		
% African American	5.0%	8th
% Asian	4.2%	9th
% Latino	6.5%	7th
% Multi-racial	6.7%	6th
% Native American	7.8%	3rd
% White	10.5%	3rd
ACT Composite		
% Top 1/3 (ACT ≥ 22)	9.0%	5th
% Middle 1/3	10.4%	4th
% Bottom 1/3 (ACT ≤ 17)	7.6%	4th
Race & ACT*		
% Minority, ACT Top 1/3	5.3%	9th
% White, ACT Top 1/3	9.8%	5th
% Minority, ACT Bottom 2/3	5.7%	8th
% White, ACT Bottom 2/3	11.0%	3rd

* Includes only those with valid (i.e., non-missing) race and ACT data.

[6] Note that these figures reflect only those interested in majoring in education or teacher education, and not all teacher aspirants as defined in the current study, which also included students interested in education as a career. We do this in order to allow more direct comparison with the more recent figures published by ACT and displayed in Table 4 of this paper. While our analyses classifies students with missing data for intended major or career as non-aspirants, Tables 2 and 3 exclude these individuals altogether.

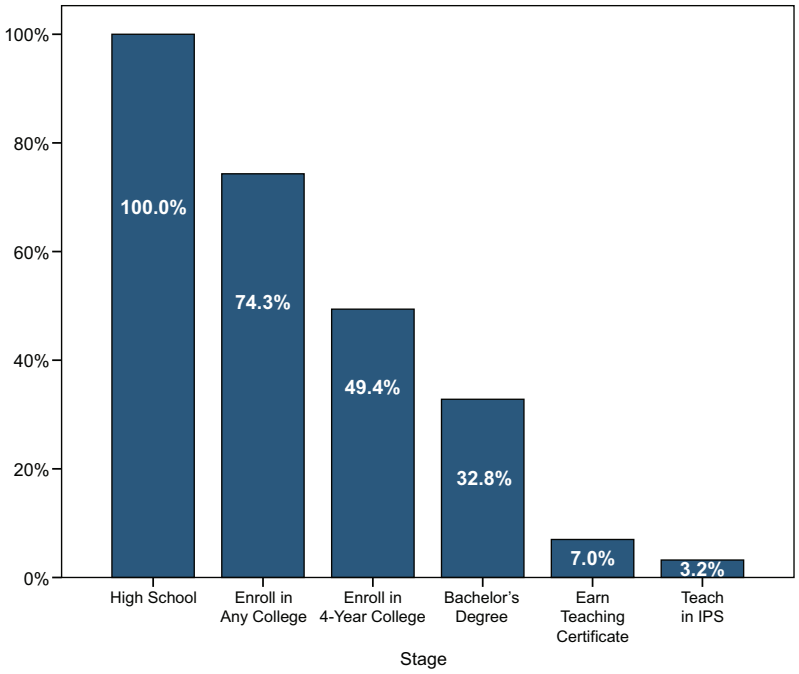
The data from this study show that the average ACT composite score for students from the 2002 and 2003 cohorts who intended to major in education was 20.5. Analogous data from a more recent cohort (ACT, 2013b) shows that students from the 2013 graduating class who intended to major in education had a slightly higher mean score, 20.9. However, during this time frame, education appeared to decline in terms of popularity, with only 6% of the 2013 Illinois high schoolers intending to major in education, compared to 10% across 2002 and 2003. Taken together, these data indicate that the field of education may be becoming less attractive as a major to students overall, but that the academic caliber of the students interested in education appears to be improving slightly, which suggests that those losing interest tend to be from the lower end of the ACT distribution.

Who becomes a teacher?

Only 3.2% of all students in these cohorts ended up as teachers in Illinois Public Schools at any point between 2005 and 2011.

This section focuses on the employment stage of the teacher pipeline and examines those students who obtained teaching positions in Illinois public schools at any point through the end of the 2010-11 school year. Figure 3 depicts the degree to which the size of the potential teaching corps shrinks at each stage in the pipeline. Tracking these students through these stages, we found that three quarters (74.3%) enrolled in some postsecondary education (either two-year or four-year college) for at least a semester during the tracking period. Almost one-half (49.4%) enrolled at a four-year institution, either as a direct entrant or as a transfer student from a two-year college. Less than one third (32.8%) of the students in the study eventually earned a bachelor's degree, and just 7.0% earned a teaching certificate. By the time they reached the final stage, only 3.2% of all students in these cohorts ended up as teachers in Illinois Public Schools (IPS) at any point between 2005 and 2011.

Figure 3
Percentage of the Cohort that Progressed Through Each Stage of the Pipeline



Next, we proceeded to investigate whether students with particular background characteristics were more (or less) likely to become Illinois public school teachers, relative to other students from these cohorts. Table 3 displays the number and proportion of students from each of the separate demographic and academic groups who went on to become teachers in Illinois public schools. This analysis revealed that more than three times as many women (4.8%) as compared to men (1.5%) from these cohorts went on to teach in IPS, and that students who aspired to teach while in high school became IPS teachers at nearly seven times the rate (13.1%) of those who did not do so (1.9%). More importantly, White students became IPS teachers at more than double the rate (4.3%) of students from any other racial/ethnic group. In fact, no more than 2% of the high schoolers from any other racial/ethnic group went on to teach in Illinois public schools during this study's timeframe, including less than 1% (0.9%) of African-Americans. Further, students from the top third of the ACT distribution moved on to teaching positions in IPS at considerably higher rates (5.4%) than students from the middle (3.7%) or bottom (0.7%) thirds. As a result of these combinations, White students from the top third of the ACT distribution emerged as the group with the highest proportion of high schoolers who became teachers (5.9%), approximately doubling the rates for White students from the bottom two thirds of the ACT distribution (2.9%) and for racial/ethnic minorities from the top ACT third (3.1%). Although these latter two proportions (2.9% and 3.1%) seem quite similar, it is important to note that there were more than five times as many White students from the bottom two thirds of the ACT distribution who became teachers (2,232) than there were racial/ethnic minorities from the top ACT third who progressed to the teaching stage (395). Only 0.9% of non-White students from the bottom two-thirds of the ACT distribution became IPS teachers.

Students from the top third of the ACT distribution moved on to teaching positions in IPS at considerably higher rates than students from the middle or bottom thirds.

Table 3
Number and Proportion of Students Who Became Teachers in Illinois Public Schools, by Background Characteristics

	Became Teacher in IPS	
	N	%
Overall	7,209	3.2
Gender		
Male	1,655	1.5
Female	5,553	4.8
Aspirant in HS		
Yes	3,401	13.1
Not	3,808	1.9
Race/Ethnicity		
African American	241	0.9
Asian	173	1.8
Latino	356	1.5
Multi-racial	134	1.7
Native American	11	1.0
White	6,104	4.3
missing	190	1.6
ACT Composite		
Top 1/3 (ACT ≥ 22)	4,399	5.4
Middle 1/3	2,259	3.7
Bottom 1/3 (ACT ≤ 17)	551	0.7
Race and ACT*		
Minority, ACT Top 1/3	395	3.1
White, ACT Top 1/3	3,872	5.9
Minority, ACT Bottom 2/3	520	0.9
White, ACT Bottom 2/3	2,232	2.9

*Includes only those with valid (i.e., non-missing) race and ACT data

The small fraction of teachers who emerged from these cohorts were much less racially/ethnically diverse but had notably stronger academic characteristics than their high school peers overall.

Table 4 provides a comparison of the characteristics of students who became teachers in Illinois public schools to those who did not become teachers, in the context of both their high school peers and other bachelor's degree earners. Due to the fact that becoming a teacher requires the additional step of gaining employment, and because data for such a parallel step were not available for the other bachelor's degree completers, Table 4 also presents data for teacher certificants in order to facilitate perhaps more apt comparisons to other bachelor's degree holders. This analyses revealed that the small fraction of Illinois high school students from the 2002 and 2003 cohorts who eventually earned a teaching certificate and became IPS teachers was much less racially/ethnically diverse but had notably stronger academic characteristics than their high school peers overall. However, when the comparison shifted to other four-year college graduates, the difference in terms of diversity decreased and the advantage for teachers in terms of academic qualifications disappeared. In fact, as a group, teaching certificants had somewhat weaker academic qualifications relative to other bachelor's degree earners who became teachers, as well as those who did not become teachers.

These data show that the mean ACT score for students from these cohorts who became teachers was 22.9, compared to 23.7 for non-teaching BA graduates. It is worth observing here that a mean score of 22.9 would surpass the CAEP-recommended benchmark for teacher preparation programs, which would need to average 22.0 in order to place in the top third of all students taking a nationally standardized test such as the ACT. It is also noteworthy that the statewide mean for teachers emerging from these cohorts was considerably higher than the average ACT score for all Illinois teachers from 2001 through

Table 4
Characteristics of Certificants and Teachers Compared to Non-Teachers

Background Characteristics	Certificants	Became IPS Teachers	Did Not Become IPS Teachers	
			Overall	Bachelor's Degree
% Male	28.1	23.0	49.4	44.1
Race/Ethnicity				
% African American	5.5	3.3	12.8	6.6
% Asian	2.7	2.4	4.4	6.8
% Latino	4.4	4.9	10.4	4.6
% Multi-racial	2.2	1.9	3.6	2.8
% Native American	0.2	0.2	0.5	0.2
% White	81.8	84.7	63.0	75.2
% missing	3.1	2.6	5.3	3.8
ACT Composite				
% Top 1/3 (ACT ≥ 22)	57.6	61.0	35.6	66.3
% Middle 1/3	31.4	31.3	26.6	24.6
% Bottom 1/3 (ACT ≤ 17)	11.0	7.6	37.8	9.1
Race and ACT*				
% Minority, ACT Top 1/3	5.8	5.6	6.1	10.7
% White, ACT Top 1/3	51.7	55.2	29.8	55.4
% Minority, ACT Bottom 2/3	9.8	7.4	27.4	11.1
% White, ACT Bottom 2/3	32.8	31.8	36.7	22.8
N	15,824	7,209	217,987	66,584
% of High School Cohorts	7.0	3.2	96.8	32.8

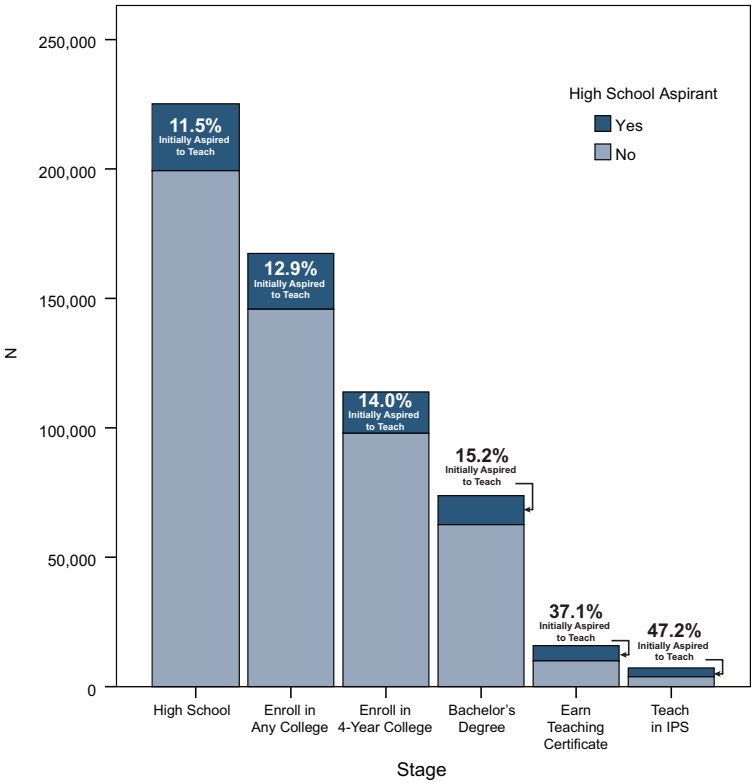
* Includes only those with valid (i.e., non-missing) race and ACT data

2006 (21.5) and higher than the average for new teachers from that era (21.9) (White, Presley, & DeAngelis, 2008), indicating that teaching may be becoming more attractive to higher achieving students or less accessible to lower achieving students. Meanwhile, the proportion of racial/ethnic minority teachers in the state has remained relatively stable over the past decade, with proportions of White teachers hovering around 83-85%, quite similar to the proportions emerging from these cohorts (Northern Illinois University, 2013).

Figure 4 shows the size and composition of the teacher pipeline at each stage and highlights the proportion of students who aspired to teach while in high school. As noted earlier, 11.5% of the students in the two cohorts were teacher aspirants. However, as members of the cohort progressed through the first three stages of the pipeline, aspiring teachers comprised slightly higher proportions of the students at each successive stage. So, even though those who initially aspired to teach constituted only 11.5% of high school students, they represented 12.9% of all students who enrolled in any college, 14.0% of those who enrolled at a four-year college and so on, until the final stage, where they constituted nearly half (47.2%) of all original members of these cohorts who eventually became teachers.

Even though those who initially aspired to teach constituted only 11.5% of high school students, they constituted nearly half of all original members of these cohorts who eventually became teachers.

Figure 4
Percentage of the Cohort that Progressed Through Each Stage of the Pipeline, by Initial Aspirant Status



Next we explored the racial and academic differences between those teachers who initially aspired to teach and those teachers who did not (see Table 5). Among the members of the cohorts who became IPS teachers, just over half (52.8%) were either undecided or planned to major in another field while in high school. Table 5 also reveals some differences in characteristics between aspirants and non-aspirants who became teachers. Most noteworthy was the greater gender diversity among non-aspirants who became teachers, with males comprising 28.0% of such teachers compared to 16.6% of teachers from the aspirant group. In addition, those who aspired to teach while in high school were somewhat less ethnically diverse, but slightly stronger academically than those who did not initially aspire. For example, White students comprised a larger proportion of the teachers who aspired to teach while in high school (87.6%) compared to their share of the teachers who did not initially aspire to become teachers (82.0%). This indicates that, relative to White students, racial/ethnic minorities appear to have been more apt to choose to pursue a teaching career later, during their college years, despite being interested in other fields or undecided while in high school. This was true of all racial/ethnic minorities regardless of academic qualifications, but most markedly so for racial/ethnic minorities in the ACT's bottom two-thirds. Overall, the academic profiles of both the aspirant and non-aspirant groups who eventually became IPS teachers were quite similar.

Just as not all teachers aspired to teach while in high school, not everyone who aspired to teach became teachers. In fact, as shown in Table 5, only 13.1% of high school aspirants eventually became IPS teachers (and only 1.9% of high school non-aspirants). So we were

Table 5
Characteristics of Those Who Became IPS Teachers, by Initial Aspirant Status

	Overall	Became IPS Teachers	
		Aspirants	Did Not Aspire in High School
N	7,209	3,401	3,808
% of Overall Cohort	13.2	13.1	1.9
% of Teachers	100.0	47.2	52.8
% Male	23.0	16.6	28.0
Race/Ethnicity			
% African American	3.3	2.3	4.3
% Asian	2.4	2.0	2.8
% Latino	4.9	4.2	5.6
% Multi-racial	1.9	2.1	1.6
% Native American	0.2	0.1	0.2
% White	84.7	87.6	82.0
% missing	2.6	1.7	3.4
ACT Composite			
% Top 1/3 (ACT ≤ 22)	61.0	62.0	60.2
% Middle 1/3	31.3	31.4	31.3
% Bottom 1/3 (ACT ≤ 17)	7.6	6.6	8.6
Race and ACT*			
% Minority, ACT Top 1/3	5.6	5.1	6.1
% White, ACT Top 1/3	55.2	56.8	53.7
% Minority, ACT Bottom 2/3	7.4	5.7	9.0
% White, ACT Bottom 2/3	31.8	32.4	31.2

* Includes only those with valid (i.e., non-missing) race and ACT data.

curious to see what alternative majors were pursued by those who had initially aspired to teach and had completed four-year degrees, but did not earn a teaching certificate in Illinois (see Table 6). Examining college graduates' Classification of Instructional Programs (CIP) codes revealed that, by far, the greatest number of bachelor's degrees earned by non-certificants was in business (15.4%). This figure was almost seven percentage points higher than the next three majors: communication and journalism (8.6%), psychology (8.5%), and social sciences (8.5%). Interestingly, 7.2% of these non-certificants had earned a degree in education, but did not progress to the certification stage in Illinois (though some may have obtained teaching certification from another state).

Table 6
Top Ten Baccalaureate Degrees Earned by Non-Certificants Who Initially Aspired to Teach

CIP Family	%
Business, Management, Marketing, and Related Support Services	15.4
Communication, Journalism, and Related Programs	8.6
Psychology	8.5
Social Sciences	8.5
Health Professions and Related Programs	7.6
Education	7.2
Visual and Performing Arts	6.2
English Language and Literature/Letters	5.7
History	4.1
Parks, Recreation, Leisure, and Fitness Studies	3.9

It is also important to note that not all certificants majored in education. Table 7 displays the top ten bachelor's degree majors of all students from our cohorts who received teacher certification and also compares students who aspired to teach while in high school with those who did not. As shown in Table 7, only about half (51.1%) of all certificants for whom we had valid data majored in education. This proportion of certificants majoring in education is likely somewhat of an underestimate, though, as some colleges classify majors such as math teacher education as being within the mathematics and statistics CIP family rather than education. There were some notable differences between certificants who aspired to teach during high school and those who did not, suggesting that early teaching aspirations appeared to play a role in one's major, even among students who become employed in the same careers. A substantially higher proportion of the certificants who aspired to teach while in high school majored in education (67.5%) compared to those who did not aspire to teach (40.7%).

Only about half (51.1%) of all certificants for whom we had valid data majored in education.

Table 7
Top Ten Baccalaureate Degrees Earned by Certificants, by Aspirant Status

CIP Family	All Certificants	Aspired to Teach While in HS?	
		Yes	No
Education	51.1%	67.5%	40.7%
English Language and Literature/Letters	6.1%	6.0%	6.2%
History	4.9%	4.7%	5.0%
Psychology	4.2%	2.2%	5.5%
Social Sciences	4.2%	2.1%	5.5%
Communication, Journalism, and Related Programs	3.8%	1.3%	5.3%
Business, Management, Marketing, and Related Support Services	3.4%	0.9%	5.0%
Mathematics and Statistics	3.2%	3.6%	3.0%
Visual and Performing Arts	3.1%	1.9%	3.8%
Biological and Biomedical Sciences	2.9%	1.2%	3.9%

Different Pathways, Different Teachers? Next, we explored whether teachers with different characteristics tended to take particular pathways through the pipeline, and whether certain pathways tended to produce teachers with particular characteristics. The first step in this analysis was to investigate whether teachers who began their college careers at two-year institutions had different characteristics than those who started at four-year institutions (see Table 8). Compared to teachers directly enrolling at four-year colleges, slightly higher proportions of teachers who started at two-year colleges were White and Latino, whereas lower proportions were African American and Asian-American. Teachers who started at two-year institutions had lower academic qualifications relative to those starting at four-year colleges, as evidenced by the ACT distribution. In terms of aspirations, proportionally fewer of the teachers who started at two-year colleges aspired to teach while in high school. While this suggests that the community college pathway could be used as a way to attract late aspirants, the composition of this pathway described above shows it was generally associated with slightly less racial/ethnic diversity (with Latinos being the one exception), substantially lower academic qualifications, and a lower proportion of minority students from the top ACT third.

Table 8 also provides a comparison of the teachers who enrolled at Illinois colleges with those who enrolled out-of-state. The data indicate that, compared to teachers who enrolled in state, those who attended out-of-state colleges and returned to the Illinois to teach included proportionally more African Americans. Teachers who attended colleges outside of Illinois also had a stronger academic profile than their counterparts who initially enrolled in Illinois colleges.

Table 8
Characteristics of Those Who Became IPS Teachers, by First Certification Pathway

	College Pathway		First Baccalaureate College		Baccalaureate College Competitiveness*			First Certification Type			
	2 Year to 4 Year	4 Year Only	In-State	Out-of-State	More/Most Competitive	Competitive	Less/Non Competitive	Regular	Alternative	Substitute	Provisional
N	1,443	5,766	6,560	649	874	5273	543	5,765	109	774	548
% of Teachers Overall	20.0	80.0	91.0	9.0	13.0	78.7	8.1	80.0	1.5	10.7	7.6
Race/Ethnicity											
% African American	2.0	3.7	3.1	5.4	3.7	3.0	3.7	2.8	21.1	4.3	3.8
% Asian	1.0	2.8	2.5	--	5.6	1.9	2.8	2.4	—	3.4	—
% Latino	5.8	4.7	5.0	3.9	4.1	4.3	9.2	5.0	—	6.1	—
% Multi-racial	2.0	1.8	1.8	2.5	1.9	1.8	1.8	1.7	—	2.3	1.8
% Native American	—	—	—	—	—	—		0.2	—	—	—
% White	86.5	84.2	84.8	82.9	81.9	86.3	79.6	85.4	56.9	81.3	88.1
% missing	2.4	2.7	2.5	4.0	2.6	2.5	2.9	2.5	—	2.7	3.5
ACT Composite											
% Top 1/3 (ACT ≥ 22)	39.1	66.5	59.9	72.1	91.9	57.8	48.6	60.3	77.1	58.9	68.8
% Middle 1/3	41.1	28.9	32.2	22.3	7.2	34.8	37.9	32.2	18.3	31.3	24.8
% Bottom 1/3 (ACT ≤ 17)	19.8	4.6	7.9	5.5	—	7.4	13.4	7.5	4.6	9.8	6.4
Race and ACT**											
% Minority, ACT Top 1/3	2.3	6.5	5.6	6.3	11.8	4.6	5.1	5.4	25.5	5.6	3.8
% White, ACT Top 1/3	36.6	59.8	54.2	65.2	80.1	52.9	43.3	54.7	51.9	53.1	64.3
% Minority, ACT Bottom 2/3	9.1	7.0	7.4	7.4	4.1	6.8	12.9	7.0	16.0	10.9	4.9
% White,w ACT Bottom 2/3	52.0	26.7	32.8	21.2	4.0	35.6	38.7	33.0	—	30.4	27.0
Aspirant Status											
% Did Not Aspire to Teach in HS	59.5	50.9	54.5	50.6	89.0	63.7	53.1	58.6	51.4	52.4	57.5
% Aspired to Teach while in HS	40.7	49.1	45.5	49.4	11.0	36.3	46.9	41.4	48.6	47.6	42.5

* Includes only college with valid competitiveness rankings; specialized colleges are omitted.
** Includes only those with valid (i.e., non-missing) race and ACT data

Next, we investigated the differences between teachers who attended colleges of varying degrees of competitiveness (based on Barron's ratings). The results show, unsurprisingly, that teachers who attended more competitive colleges had considerably stronger academic backgrounds than other teachers from these cohorts. Perhaps more surprisingly, the racial/ethnic composition of teachers who graduated from these most competitive colleges was somewhat more diverse than teachers who attended colleges of average competitiveness, spurred primarily by high proportions of Asian-American teachers. This indicates that non-White students from the top third of the ACT distribution emerged from more/most competitive colleges at more than double the rate that they did from other types of institutions. Interestingly, these students also made up a slightly larger proportion of teachers from the least competitive colleges relative to those of average competitiveness, indicating that institutions across the competitiveness spectrum can still serve as viable sources of high achieving ethnic minority teachers.

The racial/ethnic composition of teachers who graduated from most competitive colleges was somewhat more diverse than teachers who attended colleges of average competitiveness.

Finally, we explored whether individuals who earned regular teaching certification differed from those who took the alternative, substitute, or provisional certification pathways (see Table 8). First, it is important to recognize, as shown in the first two rows of Table 8 that the vast majority (80%) of the teachers from these cohorts initially earned a regular teaching certificate. Only 1.5% of the teachers (109) took the alternative certification route, 10.7% initially had a substitute certification, and 7.6% were provisionally certified. However, compared to regularly certified teachers from these cohorts, teachers who initially received alternative certification had notably stronger academic qualifications (77.1% were in the ACT top third compared to 60.3% for regularly certified teachers). A similar pattern in terms of academic qualifications held true for provisionally certified teachers, while substitute teacher certificants tended to be somewhat less academically qualified.

In terms of racial/ethnic diversity, larger proportions of the alternatively certified teachers were African American relative to traditionally certified candidates, whereas the racial composition of the substitute and provisional certificant pools closely mirrored that of the regularly certified teachers. These figures are similar to those cited in Feistritzer's (2011) national study, which found that about 30% of alternatively certified teachers were non-White compared to about 13% of regularly certified teachers. Data from these cohorts show that 9.5% of African American teachers were alternatively certified, compared to 1% of White teachers (not shown in table). Over a quarter (25.5%) of alternatively certified teachers were racial/ethnic minorities from the top third of the ACT distribution, compared to only 5.4% of regularly certified teachers. Nevertheless, it is important to remember that, in terms of raw numbers (rather than proportions), there were still many more regularly certified racial/ethnic minority teachers than those who were alternatively certified. Based on these figures, alternative certification appears to be a promising route into teaching for academically well-qualified racial/ethnic minority teachers, though this pathway is currently much too small to have any widespread impact on the characteristics of the state's teaching force as a whole.

Alternative certification appears to be a promising route into teaching for academically well-qualified racial/ethnic minority teachers, though this pathway is currently much too small to have any widespread impact.

To what extent does each stage in the pipeline affect Illinois' ability to attract an academically skilled, diverse teaching force?

More than one in five bachelor's degree recipients from these cohorts earned an Illinois teaching certification, but fewer than half of those certificants taught in Illinois public schools during this study's time frame.

In this section, we examine the stages of the pipeline that occur between high school and becoming a teacher—college enrollment, degree completion, certification—in order to provide insight into how the academic and racial/ethnic composition of the potential teaching force changes at each step as some students advance through this pipeline while others do not. The information on Table 9 displays the conditional rates of progress for each student group from one stage in the pipeline to the next. That is, contingent upon making it to a given stage, what proportion of students in each demographic category proceeds to the following stage in the pipeline? For example, across all students in these cohorts, 74.3% of high schoolers enrolled in any college, 68.0% of those who enrolled in any college enrolled in a four-year college at some point, 64.8% of those students completed a bachelor's degree, and so on. It is noteworthy to point out here that more than one in five (21.4%) bachelor's degree recipients from these cohorts earned an Illinois teaching certification. However, it is equally as important to observe that fewer than half of those certificants (45.5%) taught in Illinois public schools during this study's timeframe (though some may have been employed in private or out-of-state schools).

Table 9
Conditional Rates of Progress Between Each Stage in the Pipeline

	% of High Schoolers Enrolling in Any College	% of College-Goers Enrolling in 4-Year College	% of 4-Year College-Goers Completing a Bachelor's	% of Bachelor's Recipients Certified to Teach in IPS	% of Certificants Becoming a Teacher in IPS
N	167,371	113,881	73,793	15,824	7,209
All Students	74.3	68.0	64.8	21.4	45.5

Race/Ethnicity. As shown in Table 10, racial/ethnic gaps in the teacher pipeline begin to appear as early as the first stage in the pipeline, where approximately 80% of Whites and Asian-Americans enrolled in some postsecondary education, compared to about 70% of African Americans and multiracial students, and less than 60% of Latinos and Native Americans. Similar findings emerged when two-year enrollees were compared to students who enrolled at four-year institutions. Even taking into account the lower proportions of underrepresented minority students who ever enrolled in four-year institutions, substantially higher proportions of Whites and Asian-Americans (about 70%) completed bachelor's degrees relative to students from underrepresented minority groups (about 40%-50%).

Racial/ethnic gaps in the teacher pipeline begin to appear as early as the first stage in the pipeline.

In terms of certification, somewhat smaller proportions of racial/ethnic minority students (with the exception of Native Americans) became certified to teach in Illinois, and proportionally fewer certificants (with the exception of Latinos) progressed to teaching in Illinois public schools. For example, while 23.0% of White students with bachelor's degrees earned teaching certification, only 8.9% of Asian-Americans who graduated from four-year institutions became certified. Similarly, as nearly half (47.1%) of Whites with teaching certificates transitioned to a teaching position in Illinois public schools, only just over a quarter (27.0%) of African American certificants from these cohorts taught in IPS during the time period of this study. Although, it is worth noting here that Latino certificants transitioned to teaching positions in IPS at the highest rate.

While racial/ethnic gaps in terms of progressing through the college pipeline have been documented by previous IERC research (Smalley, et al, 2010), what is noteworthy here is that, even conditional upon completing a baccalaureate degree, racial/ethnic gaps were still evident at both the certification and teaching stages. While these discrepancies may seem small, they suggest that the underrepresentation of minority teachers in Illinois schools is the result of more than differential rates of progress through college by race.

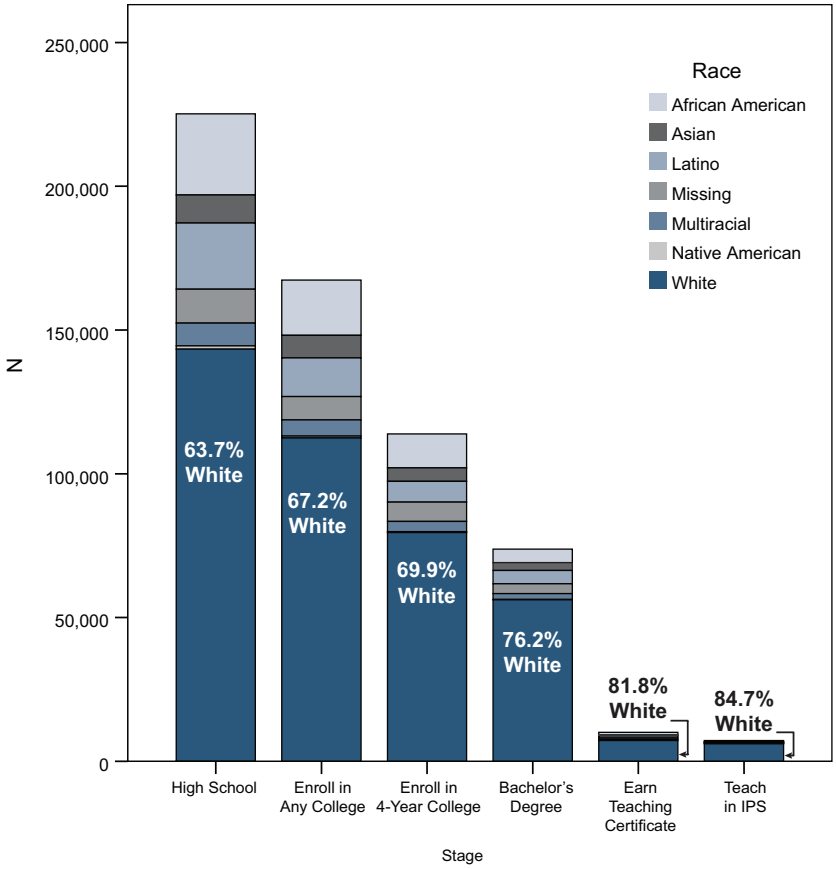
Table 10
Conditional Rates of Progress Between Each Stage in the Pipeline by Race/Ethnicity

	% of High Schoolers Enrolling in Any College	% of College-Goers Enrolling in 4-Year College	% of 4-Year College-Goers Completing a Bachelor's	% of Bachelor's Recipients Certified to Teach in IPS	% of Certificants Becoming a Teacher in IPS
N	167,371	113,881	73,793	15,824	7,209
All Students	74.3	68.0	64.8	21.4	45.5
Race/Ethnicity					
African American	68.2	61.5	39.3	18.9	27.0
Asian	83.0	82.6	70.4	8.9	41.1
Latino	58.4	53.8	47.3	20.5	50.2
Multi-racial	70.9	63.3	55.8	17.5	38.4
Native American	56.1	42.5	48.9	25.6	33.3
White	78.4	70.8	70.6	23.0	47.1
Missing	66.8	59.7	57.4	18.5	38.2

White students represented an increasingly larger share of the students who progressed through each stage of the teacher pipeline, from initial enrollment all the way through employment as teachers.

Figure 5 depicts how the differential rates of progress presented in Table 10 result in changing racial compositions of the potential teaching force at each stage in the pipeline. For example, Table 10 shows that White students had higher rates of progress through the college pipeline from enrollment to bachelor's degree completion (relative to non-Whites as a whole) and relatively more Whites earned teacher certification and taught in Illinois public schools, contingent upon passing each previous stage. As a result, White students represented an increasingly larger share of the students who progressed through each stage of teacher pipeline, from initial enrollment all the way through employment as teachers, as shown in Figure 5. That is, while White students made up only 63.7% of the students in our high school cohorts, they represented 67.2% of students from these cohorts who enrolled in college, 69.9% of students who ever enrolled at a four-year institution, 76.2% of all bachelor's degree completers, 81.8% of all teacher certificants, and fully 84.7% of students from these cohorts who became teachers in Illinois public schools.

Figure 5
Changes in the Composition at each Stage of the Pipeline, by Race



Academic Qualifications. Focusing on academic qualifications, we found that the discrepancies in student progress begin early in the pipeline (see Table 11). When compared to students from the top third of the ACT distribution, considerably fewer of the less academically prepared students enrolled in postsecondary education (especially four-year institutions) and completed bachelor's degrees, even after taking into account advancement to the prior stage of the pipeline. This trend reversed itself at the certification stage, though, when substantially larger proportions of bachelor's degree completers from the bottom two-thirds of the ACT distribution progressed to the teacher certification stage, relative to bachelor's degree earners from the top third by ACT (26.3% and 26.7% for the bottom and middle third, respectively, compared to 18.8% for the top third). This indicates that the teaching profession may be less appealing to college graduates with stronger academic backgrounds. However, considering just certificants, larger proportions from the top two ACT thirds transitioned to teaching positions in Illinois public schools compared to students from the bottom of the ACT distribution. Whether these differences stemmed from preferential hiring by schools and districts or differences across achievement groups in applying for or accepting teaching positions is a question that warrants further investigation.

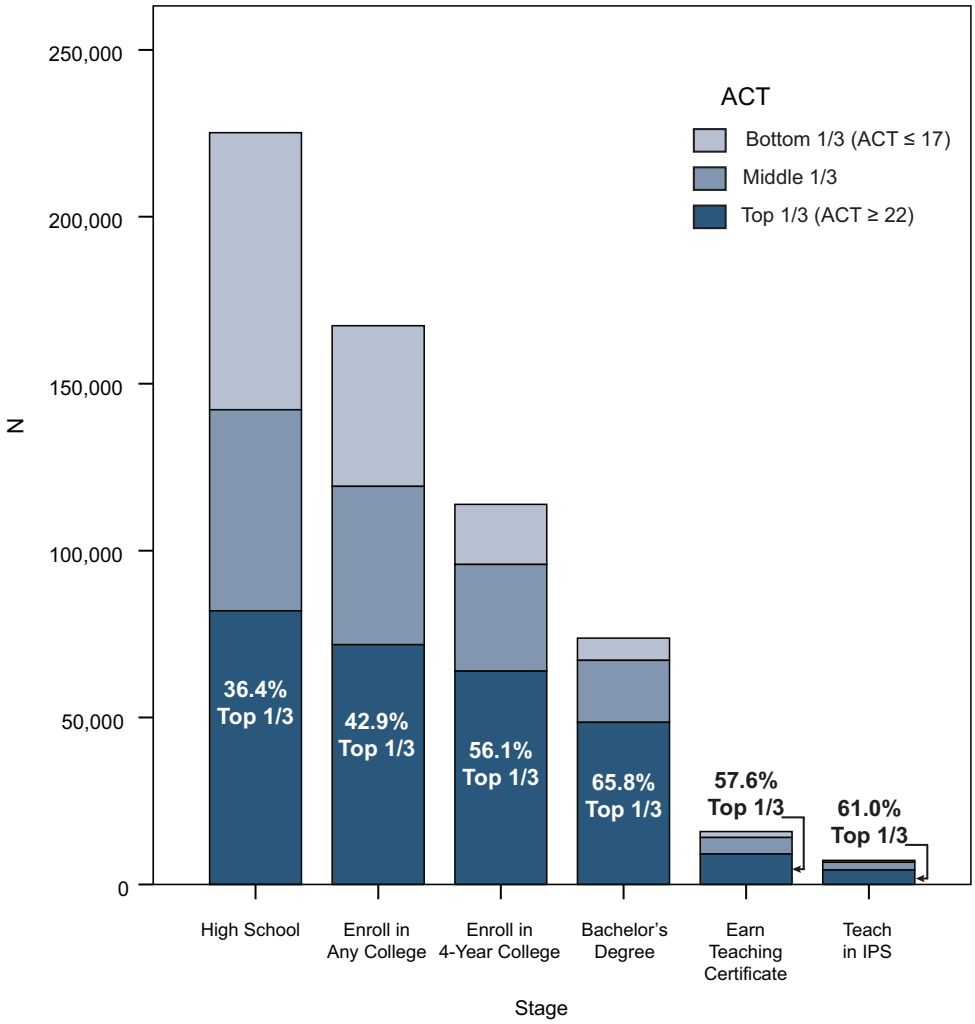
Substantially larger proportions of bachelor's degree completers from the bottom two-thirds of the ACT distribution progressed to the teacher certification stage, relative to bachelor's degree earners from the top third by ACT.

Table 11
Conditional Rates of Progress Between Each Stage in the Pipeline by Academic Qualifications

	% of High Schoolers Enrolling in Any College	% of College-Goers Enrolling in 4-Year College	% of 4-Year College-Goers Completing a Bachelor's	% of Bachelor's Recipients Certified to Teach in IPS	% of Certificants Becoming a Teacher in IPS
N	167,371	113,881	73,793	15,824	7,209
All Students	74.3	68.0	64.8	21.4	45.5
ACT					
Top 1/3 (ACT ≥ 22)	87.6	89.0	75.9	18.8	48.2
Middle 1/3	78.7	67.4	58.3	26.7	45.4
Bottom 1/3 (ACT ≤ 17)	58.0	37.4	36.9	26.3	31.4

Figure 6 depicts how the academic composition of the teaching pipeline changed as some individuals progressed through each stage while others did not. By definition, this study began with high school cohorts that were divided roughly into thirds, with 36.4% in the top ACT category with composite scores of 22 and above. As these cohorts progressed through the pipeline, this top third constituted an increasing proportion of the students enrolled in any college (42.9%), enrolled in four-year colleges (56.1%), and receiving bachelor's degrees (65.8%). However, since bachelor's degree recipients from the top third academically earned teacher certification at lower rates conditional upon earning a four-year degree (see Table 11), the share of such students dropped at the certification stage to 57.6%. Finally, because they became IPS teachers at higher rates conditional upon certification (see Table 11), the proportion of students from the top third increased again at the employment stage to 61.0%.

Figure 6
Changes in the Composition at Each Stage of the Pipeline, by ACT



Race/Ethnicity and Academic Qualifications. As shown in Table 12, when these findings for race and academic preparation were combined, we found that the differential rates of progress through the college pipeline were primarily—but not solely—the result of differences in academic preparation. That is, non-White and White students from the top third of the ACT distribution progressed through the first three stages of the teacher pipeline at similar rates. For students from the bottom two-thirds, though, Whites had considerably higher rates of enrollment at any college and bachelor's degree completion (contingent upon enrolling at a four-year university), relative to racial/ethnic minorities. Regardless of ACT score, proportionally fewer minorities bachelor's degree completers earned teacher certification, and regardless of race, proportionally fewer bachelor's degree completers from the upper third academically earned teacher certification. As a result, the racial and academic combination with the lowest overall certification rate (conditional upon receiving a bachelor's degree) was minority students from the top third of the ACT distribution.

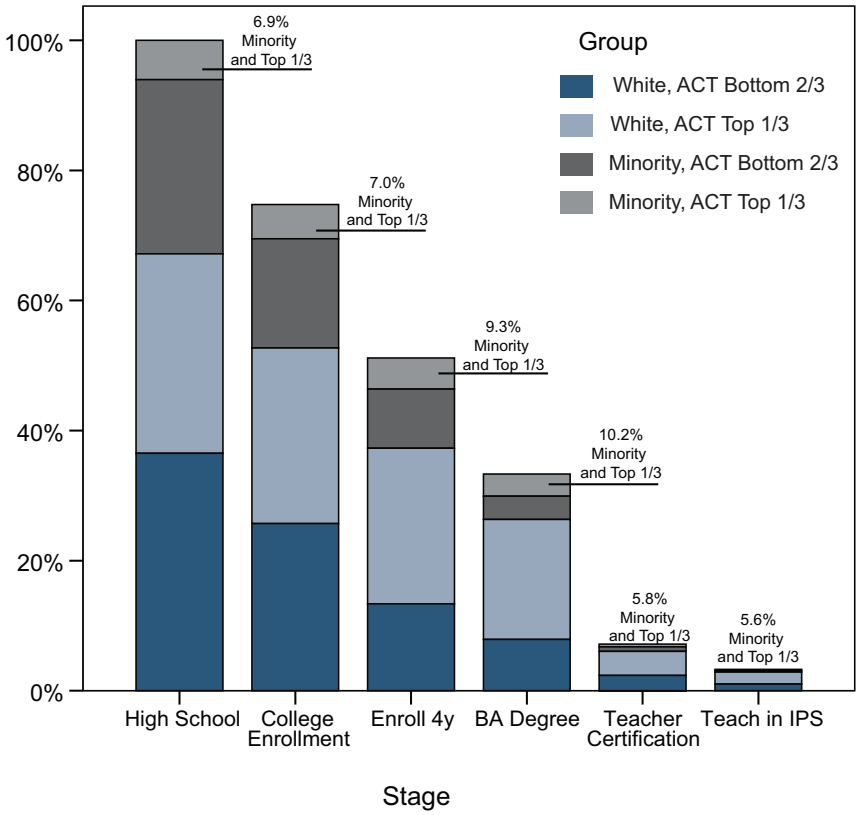
Regardless of ACT score, proportionally fewer minorities with bachelor's degrees completed teacher certification, and regardless of race, proportionally fewer students from the upper third academically earned teacher certification, conditional upon receiving a baccalaureate degree.

Table 12
Conditional Rates of Progress Between Each Stage in the Pipeline by Race/Ethnicity and Academic Qualifications

	% of High Schoolers Enrolling in Any College	% of College-Goers Enrolling in 4-Year College	% of 4-Year College-Goers Completing a Bachelor's	% of Bachelor's Recipients Certified to Teach in IPS	% of Certificants Becoming a Teacher in IPS
N	167,371	113,881	73,793	15,824	7,209
All Students	74.3	68.0	64.8	21.4	45.5
Race & ACT					
Minority, ACT Bottom 2/3	62.7	54.1	39.4	19.6	34.5
Minority, ACT Top 1/3	86.7	91.2	71.2	12.2	44.2
White, ACT Bottom 2/3	70.5	52.0	59.0	29.9	44.4
White, ACT Top 1/3	88.0	88.7	77.1	20.1	48.9

In Figure 7, we combined the statistics from the previous sections to highlight how race/ethnicity and academic qualifications interact as students move through the teaching pipeline, and highlight the proportion of non-White students from the top ACT third that progress at each stage. As shown in Figure 7, non-White students from the top ACT third made up 6.9% of our high school cohorts. Their share of the pipeline continued to grow at each stage through bachelor's degree completion, with non-White students from the top ACT third accounting for 7.0% of all college goers, 9.3% of all students who enrolled at four-year institutions, and 10.2% of all baccalaureate degree earners from these cohorts. However, because college graduates from both groups (most racial/ethnic minority groups and students from the top third academically) tended to obtain teacher certification at lower rates (compared to Whites and to students from the bottom two-thirds academically, respectively, see Table 13), the share of non-White students from the top academic tier dropped nearly in half at the certification stage, and these students represented only 5.8% of the certificants from these cohorts. Transitioning from the certification to the employment stage, the proportion of most academically qualified racial/ethnic minority students fell slightly again—to only 5.6% of those teaching in Illinois public schools—primarily due to the relative underrepresentation of certified African Americans in the teaching force from these cohorts.

Figure 7
Changes in the Composition at each Stage of the Pipeline, by Race and ACT



Gender. Examining differences in the conditional rates of progress by gender (see Table 13) revealed that women from these cohorts advanced through the pipeline at somewhat higher rates than men from college enrollment through college completion. These findings parallel recent research that has established a large gender gap in most postsecondary outcomes favoring women (Lichtenberger & Dietrich, 2012; Smalley, et al., 2010). However, as shown in Table 13, these gender disparities became much larger during the transition from college completion to teacher certification, where 26.7% of women who earned bachelor's degrees earned teacher certification, compared to only 14.3% of men. This gender gap continued into employment as well, where larger proportions of women with teaching certificates became teachers in Illinois public schools (48.7%) compared to certified men (37.1%).

Table 13
Conditional Rates of Progress Between Each Stage in the Pipeline by Gender

	% of High Schoolers Enrolling in Any College	% of College-Goers Enrolling in 4-Year College	% of 4-Year College-Goers Completing a Bachelor's	% of Bachelor's Recipients Certified to Teach in IPS	% of Certificants Becoming a Teacher in IPS
N	167,371	113,881	73,793	15,824	7,209
All Students	74.3	68.0	64.8	21.4	45.5
Gender					
Male	70.8	65.9	61.1	14.3	37.1
Female	77.7	69.9	67.8	26.7	48.7

Initial Aspirant Status. Finally, regarding initial aspirant status, Table 14 shows that students who aspired to become teachers while in high school advanced to each successive stage in the college pipeline through bachelor's degree completion at somewhat higher rates than their peers who did not initially aspire to teach. The differences between these two groups became most clear at the certification stage, where 52.3% of aspirants who received bachelor's degrees earned teacher certification whereas only 15.9% of four-year college completers who were not initially interested in teaching earned certification. Interestingly, these differences continued to emerge as students moved to the teaching stage, where 58.0% of certified aspirants moved into teaching positions in IPS compared to only 38.2% of certificants who did not aspire to teach while in high school.

Students who aspired to become teachers while in high school were somewhat more likely to advance to each successive stage in the college pipeline through bachelor's degree completion when compared to their peers who did not initially aspire to teach.

Next we examined the transition from bachelor's degree completion to teacher certification, in order to establish the mediating role that certification exams may have played between these stages. As in other states, teacher certification examinations in Illinois play a

Table 14
Conditional Rates of Progress Between Each Stage in the Pipeline by Initial Aspirant Status

	% of High Schoolers Enrolling in Any College	% of College-Goers Enrolling in 4-Year College	% of 4-Year College-Goers Completing a Bachelor's	% of Bachelor's Recipients Certified to Teach in IPS	% of Certificants Becoming a Teacher in IPS
N	167,371	113,881	73,793	15,824	7,209
All Students	74.3	68.0	64.8	21.4	45.5
Aspirant in HS					
Yes	83.3	74.1	70.2	52.3	58.0
No	73.2	67.1	63.9	15.9	38.2

gatekeeping role in the teacher pipeline, helping to determine which students possess the minimal knowledge, skills, and dispositions to advance to the certification stage. There are three types of tests that students from these cohorts were required to pass in order to become certified to teach in Illinois—the Basic Skills test (BST)[7], the Assessment of Professional Teaching (APT), and subject area tests specific to the content a prospective teacher desires to teach. As shown in Table 15, 10.8% of all Illinois college-goers attempted the Basic Skills test. BST participation rates were the highest for White students (12.9%) and students from the top two-thirds of the ACT distribution (12.3% and 13.7%), while only 4.8% of African American college goers attempted the BST. The vast majority (84.7%) of students who took the Basic Skills test passed this initial exam and, as shown in the next two columns, pass rates were much higher among those who would eventually go on to earn a bachelor's degree (89.6% overall) than among those who did not complete a degree (53.0% overall). The lowest passing rates overall were for African American students (62.9%) and those from the bottom third of the ACT distribution (60.9%), though these groups also showed considerable differentiation in results between those who completed a bachelor's degree and those who did not (70.8% versus 35.6% for African Americans, and 75.4% versus 25.6% for bottom third ACT).

Table 15
Certification Testing Results, by Student Characteristics

	N[a]	Took Basic Skills Test (%)	Passed Basic Skills Test (%)[b]			Passed APT and Subject Area Test (of those who passed BST)	Became Certified (conditional on having taken the Basic Skills Test)
			Overall	Completed Bachelor's Degree	Did Not Complete Bachelor's Degree		
Overall	167,371	10.8	84.7	89.6	53.0	73.2	70.9
Race/Ethnicity							
% African American	19,231	4.8	62.9	70.8	35.6	58.5	56.0
% Asian	8,094	6.4	85.6	88.6	60.7	74.4	71.2
% Latino	13,454	7.6	75.3	85.8	42.4	70.6	59.8
% Multi-racial	5,656	7.3	77.7	86.6	43.5	72.6	66.3
% Native American	621	4.8	76.7	88.0	—	91.3	73.3
% White	112,461	12.9	87.4	91.3	57.9	74.1	73.0
% missing	7,854	7.6	74.5	82.5	38.3	70.8	65.5
ACT Composite							
% Top 1/3 (ACT ≥ 22)	71,839	13.7	89.8	92.0	68.2	72.8	74.6
% Middle 1/3	47,410	12.3	85.8	90.3	59.4	73.8	70.8
% Bottom 1/3 (ACT ≤ 17)	481,22	4.9	60.9	75.4	25.6	74.0	55.8
Race/Ethnicity by ACT							
% Minority, ACT Top 1/3	11,192	8.9	85.7	88.2	67.0	70.9	71.1
% White, ACT Top 1/3	57,560	14.9	90.0	91.9	69.5	73.2	75.3
% Minority, ACT Bottom 2/3	35,864	5.4	67.0	77.7	35.8	67.1	56.9
% White, ACT Bottom 2/3	54,901	11.0	82.5	890	49.4	75.5	70.0

[a] Based on those who enrolled in college (two-year or four-year) after high school.
[b] Percentage reflects those who passed all sections of the Basic Skills Test among those who took it.

[7] Note that the vast majority of students from these 2002 and 2003 high school cohorts would have taken the Basic Skills test prior to the cut scores being raised, the number of attempts being limited to five, and the introduction of the Test of Academic Proficiency in 2010.

Of those students who passed the Basic Skills test and were admitted to teacher preparation programs, 73.2% went on to pass the APT and subject area exams and 70.9% went on to earn teacher certification, indicating these students maintained high levels of interest in pursuing teaching as a career overall. However, only just over half of African Americans who passed the Basic Skills test also passed the remaining exams (58.5%) and became certified to teach (56.0%). Interestingly, looking at these data by ACT and by race and ACT combined revealed that students from the top ACT third progressed past the basic skills stage at slightly lower rates (72.8%) than students from the bottom two-thirds of the ACT distribution (74.0%), and that non-White students from the top ACT third progressed through this stage at lower rates (70.9%) than White students from the bottom two-thirds of the ACT distribution (75.5%). This is because the differences in rates of progress through this stage were mostly due to variation in the proportions of students from each group who attempted the APT and subject area tests, rather than variations in pass rates (which tended to be high overall). That is, the students who did not progress past the Basic Skills stage tended to do so because they did not attempt the subsequent exams, rather than because they could not pass the subsequent exams. Thus, the relatively low rates of progress through this portion of the pipeline for students with higher ACT scores suggests that they stopped out at this stage of the teacher pipeline at slightly higher rates than students with lower ACT scores. However, students from the top third of the ACT distribution again surpassed those from the bottom two-thirds in terms of progressing from the APT and subject area tests to teacher certification.

The students who did not advance past the Basic Skills stage tended to do so because they did not attempt the subsequent exams, rather than because they could not pass these exams.

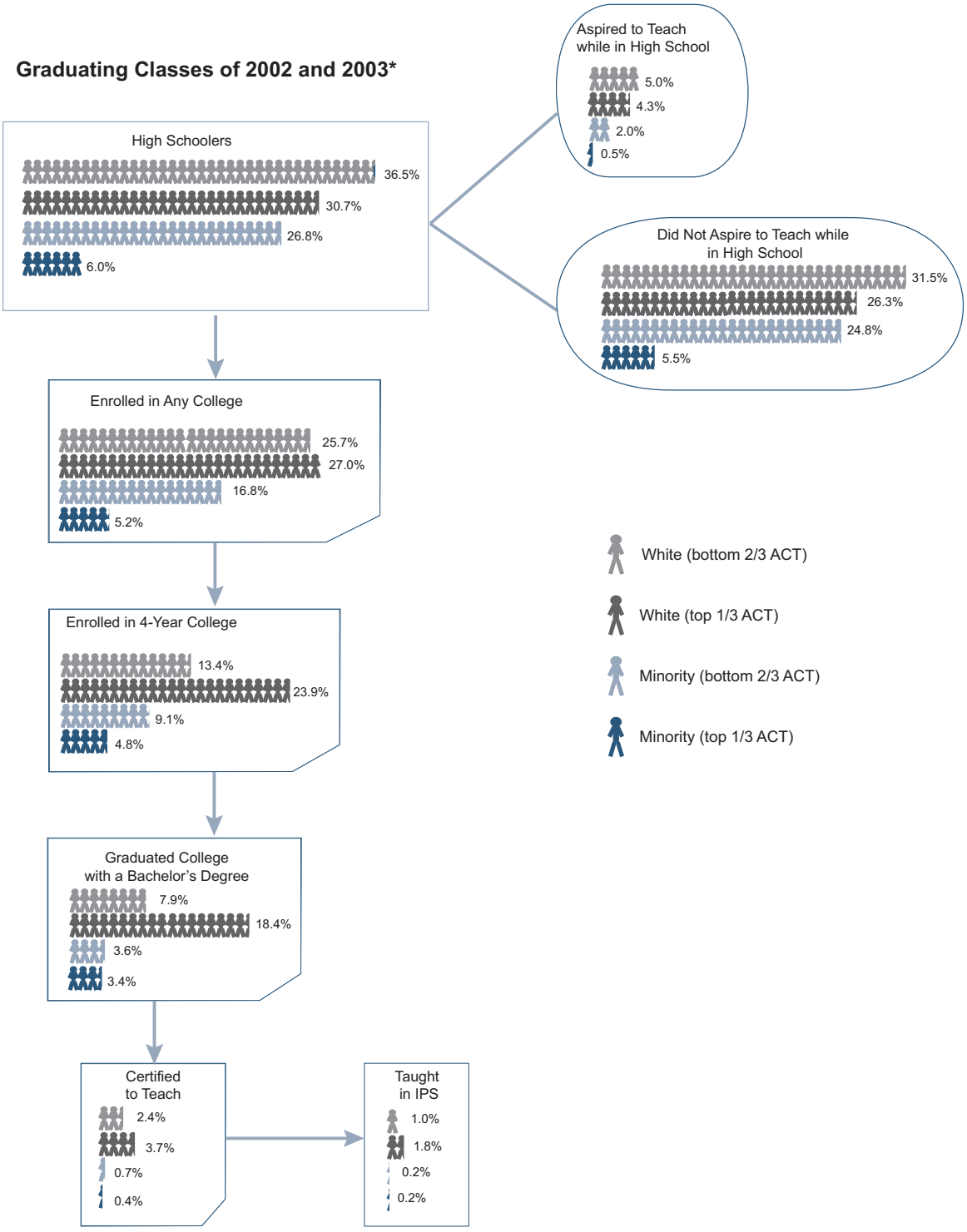
Overview: Race, Academics, and the Teacher Supply Pipeline

Every stage in the teacher supply pipeline contributed to some extent to the changes in composition of the potential teaching force between high school and employment.

As shown in Figure 8, every stage in the teacher supply pipeline contributed to some extent to the changes in composition of the potential teaching force between high school and employment. At the outset, racial/ethnic minorities comprised about one third (26.8% + 6.0%) of the students in these cohorts with non-missing race data, with non-Whites from the top third of the ACT distribution making up only 6.0% of all Illinois public high schoolers. While more than one in ten (11.5%) of these high schoolers aspired to either an academic major or a career in education, compared to White students, the profession was generally less attractive to racial/ethnic minorities. In particular, racial/ethnic minorities from the top third of the ACT distribution who aspired to teach while in high school represented less than 1% of all students from these cohorts. Although nearly three quarters (74.5%) of the students from these cohorts advanced to postsecondary education, less than half of all students (49.4%) enrolled at a four-year institution, with students from the top ACT third accounting for 28.7% (23.9% + 4.8%) of this total. Just under a third (32.8%) of the students from these cohorts earned a bachelor's degree during the course of this study, but racial/ethnic minorities accounted for only 7.0% of this total, roughly equally divided between those from the top ACT third (3.4%) and those from the bottom two-thirds of the ACT distribution (3.6%). Seven percent of all students from these cohorts earned teacher certification, yet the number of racial/ethnic minorities who became certified teachers was equal to just 1.1% of all students in this study. Further, the size of the teacher pipeline was cut in half again as students transitioned (or did not transition) from certification to the employment stage. After this final stage, racial/ethnic minorities who became teachers in Illinois public schools represented less than half a percent (0.4%) of the students who began this study, evenly divided between those from the top third (0.2%) and bottom two-thirds (0.2%) of the ACT distribution. Meanwhile, the number of White teachers emerging from these cohorts equated to 2.8% of the cohorts overall, with White teachers from the top ACT third accounting for 1.8% of the original population and White teachers from the bottom two-thirds of the ACT distribution accounting for 1.0% of the two cohorts in this study.

Race/Ethnicity and the Teacher Pipeline. Racial/ethnic disparities in the teacher preparation pipeline began early, when considerably lower proportions of non-White students compared to White students aspired to major or work in education. These racial/ethnic gaps continued into the college enrollment and completion stages, where Whites and Asian-Americans enrolled in and completed postsecondary education at higher rates than other racial/ethnic groups. But, even conditional on completing a baccalaureate degree, fewer racial/ethnic minorities, relative to White students, become certified to teach in Illinois and progressed from certification to teaching in Illinois public schools. Thus, because White students had high rates of progress through the college pipeline in addition to high rates of transition from the teacher certification stage and into teaching, they represented an increasingly larger share of the remaining students at each stage throughout the teacher pipeline.

Figure 8
Summary of Progress through the Pipeline, by Race and ACT



* Includes only those with valid (i.e., non-missing) race and ACT data.

Bachelor's degree completers from the bottom two-thirds of the ACT distribution proceeded to the teacher certification stage at considerably higher rates than those from the top third of the ACT distribution.

Academics and the Teacher Pipeline. Academic disparities also emerged early in the pipeline. Students from the top third of the ACT distribution progressed through the postsecondary pipeline at higher rates than their less academically prepared peers, had higher rates of college enrollment (especially at four-year institutions), and higher rates of bachelor's degree completion compared to students from the bottom two-thirds by ACT. This trend reversed itself at the certification stage, however, where bachelor's degree completers from the bottom two-thirds of the ACT distribution proceeded to the teacher certification stage at considerably higher rates than those from the top third of the ACT distribution.

Race, Academics, and the Teacher Pipeline. The intersection of race and academics in the teacher pipeline represents the culmination of the trends discussed in the previous two paragraphs. In general, racial/ethnic minorities with high ACT scores were less interested in education as a career, whether defined as high school students' major or career aspirations, certification rates among bachelor's degree recipients, or employment as a teacher among certificants. Regardless of achievement level, racial/ethnic minorities with bachelor's degrees completed teacher certification at lower rates than Whites with bachelor's degrees. And regardless of race, students from the upper third academically earned teacher certification at lower rates than students from the lower two-thirds of the ACT distribution, conditional upon receiving a baccalaureate degree. As a result, even though the proportion of non-White students from the top ACT third grew at each stage through bachelor's degree completion, their share dropped by almost half at the certification stage.

Summary

The results of this study show that only a small percentage of Illinois public high school students became public school teachers in the state. Across two high school cohorts in Illinois, just 3.2% of the students went on to become teachers in Illinois within roughly a decade after high school. Somewhat surprisingly, the transition from certification to teaching appeared to be one of the more critical stages in this pipeline. Although more than one in five (21.4%) bachelor's degree completers from these cohorts earned teacher certification, less than half (45.5%) of these certificants actually ended up teaching in Illinois public schools.

The students who became teachers differed substantially in terms of their demographic background characteristics relative to students who did not become teachers. The teachers who emerged from these cohorts were much less racially/ethnically diverse but stronger academically than the high school cohorts from which they came. Compared to other bachelor's degree recipients from these cohorts who did not become teachers, teachers were quite similar academically, but still less racially/ethnically diverse. However, when teacher certificants were compared to other bachelor's degree earners who did not become teachers—perhaps a more relevant comparison—teacher certificants had notably weaker academic qualifications, with a greater proportion scoring in the middle third and a smaller proportion scoring in the top third of the ACT distribution.

Aspirations matter. Substantially higher proportions of the students who aspired to become teachers while in high school advanced to each successive stage in the teacher pipeline. Most notably, more than half of the aspirants who received bachelor's degrees continued on to earn teacher certification, compared to only 15.9% of four-year college completers who did not aspire to teach while in high school. Perhaps more interestingly, these differences continue to emerge as students moved to the teaching stage, where considerably more certified aspirants became employed as teachers in IPS compared to certificants who did not aspire to teach while in high school, indicating that high school aspirations play a large role in the development of the teaching force all the way through the employment stage.

The compositional changes to the teacher pipeline by race/ethnicity and academic qualifications occurred to a greater or lesser extent at each stage, beginning as early as high school when smaller percentages of non-White students and students from the top third of the ACT distribution indicated aspirations to pursue education as a college major or potential career choice. College enrollment and bachelor's degree completion also had a negative impact on racial/ethnic minority representation, in part due to the stronger academic preparation required at those stages and the relatively weak academic backgrounds of non-Asian minority high school students from these cohorts (Presley & Gong, 2005). Regardless of academic preparation, minority high school students still aspired to teach at lower rates, minority bachelor's degree recipients were less likely to have earned teaching certificates, and minorities with teaching certificates were less likely to become teachers in Illinois public schools, compared to Whites. These all indicate that other factors besides academic preparation also have a large impact on the relatively low minority representation of new public school teachers in Illinois.

Conclusions and Implications

The focus on recruitment of talented minority students has not been misplaced and cannot yet be considered complete.

In a recent research report, Ingersoll and May (2011) argued that "widespread efforts over the past several decades to recruit more minority teachers and employ them in hard-to-staff and disadvantaged schools have been very successful" (p. i). While this may be the case nationally, our results from Illinois suggest that there is still considerable work to be done in terms of making teaching a career choice that is equally attractive to minority students with strong academic backgrounds—especially high achieving African American students—as it is to Whites. Though we cannot determine from this study why certain student groups are less interested in teaching, it is clear that this is the case, which suggests that the focus on recruitment of talented minority students has not been misplaced and cannot yet be considered complete. Our evidence indicates that recruitment efforts should start at least as early as high school, as students from these cohorts who aspired to teach while in high school progressed through the entire pipeline to become teachers at nearly seven times the rate as those who did not express similar aspirations at that stage. Recent research indicates that minority students' motivations to pursue teaching as a career may differ from those of White students, which has important implications for how early recruitment programs might think about engaging high school students (Irizarry & Donaldson, 2012). Our results also indicate that recruitment into the profession can continue to be successful once students enter college. In fact, just over half of the teachers who emerged from these cohorts did not express an interest in teaching while in high school. Thus, recruitment and policy efforts aimed at attracting college students into teaching are just as necessary.

One potentially fruitful strategy for recruiting more academically talented individuals into the profession, including racial/ethnic minorities and students who may not have initially been interested in teaching, is alternative certification—particularly more selective alternative certification programs. This study, along with other national evidence, indicates that larger proportions of high achieving and minority candidates, relative to other students, choose the alternative certification pathway. However, our results indicate that this approach by itself will not be sufficient given the small proportion of recent college graduates who enter teaching via that pathway.

We also found that students with higher ACT scores (especially minorities) tended to be overrepresented among those who initially enrolled in college outside of Illinois, so providing incentives to convince those students to return to teach in Illinois public schools could also prove productive. This is particularly the case for African-American Illinois natives who enroll in historically black colleges and universities, none of which are located in the state, but which produce half of all Black teachers according to a widely cited figure (see, for example, Sawchuk, 2013; Thurgood Marshall College Fund, 2013). Another possible solution would be to create additional programs or incentives to retain these students in Illinois for postsecondary education from the outset.

A complementary approach, though not specifically addressed in this report, would involve efforts to make the teaching profession more appealing to men in order to broaden the base of potential teachers from which high achieving and minority professionals could emerge. More targeted efforts could include strategies similar to those set forth in the Call Me

MISTER program, which was designed to recruit, train, and retain minority male teachers at the elementary school level (Holsendolph, 2007) through a national network of colleges. Additional promising practices and innovative approaches might also be identified by examining the policies and programs utilized in demographically similar states that ranked higher than Illinois on the Center for American Progress' diversity index (Boser, 2011). On the other hand, strategies that emphasize improving recruitment from two-year colleges or transitions from two- to four-year institutions appear less likely to improve the overall diversity and academics of the teaching force even if successful, because the teachers from our study who followed these pathways were, in general, disproportionately White and less academically qualified. Just as efforts to increase the academic qualifications of teachers should attend to the impact on teacher diversity, initiatives that focus on boosting teacher diversity should not neglect teacher academics.

Just as efforts to increase the academic qualifications of teachers should attend to the impact on teacher diversity, initiatives that focus on boosting teacher diversity should not neglect teacher academics.

While these less traditional pathways to teaching have shown small-scale success with these cohorts in Illinois, it remains to be seen whether these are scalable solutions that could have more widespread impact while continuing to target the teachers we most need. Though doubling down on recruitment alone will not completely eradicate the minority teacher gap, it appears such efforts could make a significant impact. Putting aside for a moment students' differing rates of college enrollment and completion, if minority bachelor's degree completers earned certification and obtained teaching jobs at the same rates as Whites, Illinois would have employed 710 more minority teachers from these cohorts during the period of our study, a 78% increase over the level (915 teachers) produced by the pipeline from these cohorts.

Of course, disparate rates of postsecondary participation and completion cannot be ignored, nor should they be, and efforts to increase the proportion of high achieving, minority teachers must address improving the educational opportunities and outcomes for all minority students, from early childhood through postsecondary education. To put this issue in a similar context, if non-Whites entered into and progressed through the college pipeline at the same rates as Whites, all else equal, Illinois would have employed 761 more minority teachers from this cohort, or an increase of 83%. Thus, it is clear that efforts to improve recruitment into the profession as well as initiatives to increase college enrollment and completion could both have significant impacts on the composition of the state's teaching force.

Efforts to improve recruitment into the profession as well as initiatives to increase college enrollment and completion could both have significant impacts on the composition of the state's teaching force.

This presents a paradox, though: if one of the most viable long-term strategies for increasing the achievement of minority students is to increase their access to high-quality teachers of color, where do we get those teachers in the short-term? Fortunately, this focus coincides with numerous efforts that are already underway to improve the composition of the teaching force in Illinois, from the state's revised Basic Skills test to new performance-based teacher licensure exams, to the state's P-20 committee work focusing on building diverse teacher pipelines. Other strategies that have been suggested, both in Illinois (Illinois P-20 Council, 2010) and by other analysts (Bireda & Chait, 2011), include holding teacher preparation programs more accountable for both the quality and diversity of the teachers they train and

the creation of a statewide initiative to fund teacher preparation programs targeting high-achieving minority candidates.

*The transition (or lack thereof) from certification to the employment stage **is** a significant point of leakage from the pipeline.*

One often overlooked component of these approaches is the transition (or lack thereof) from certification to the employment stage, which our research illustrates to be a significant point of leakage from the pipeline. More than half of the remaining pool of prospective teachers is lost at this transition point, including broad swaths of academically skilled students from all racial/ethnic groups. Though the recent fiscal crisis may have had some impact on new teacher demand near the end of this study, evidence from an earlier time period suggests that our observations are fairly typical of rates of transition from certificant to teacher in Illinois (DeAngelis, Peddler, & Trott, 2002). Further research is needed to determine whether the loss of talent between the certification and teacher employment stages is an issue of supply (e.g., certificants not applying for positions, distributional patterns leading to oversupply in some geographic or certification areas and undersupply in others) or one of demand (e.g., limited hiring of new teachers, local hiring practices that do not prioritize teacher diversity). Further research is also needed to help understand the role that student finances play in Illinois' new teacher pipeline, from college affordability through the role of teacher salaries on students' career choices.

It is important to remember that the recent Illinois high school cohorts profiled in this study are just one component of new teacher supply in the state. Career switchers, teachers transitioning from other states or private schools, and those who delayed entry into college or the workforce could also serve as valuable sources for improving the diversity and academics of Illinois' teaching corps. These additional sources of teachers should not be ignored among the state's broader recruitment efforts, and we need to ensure that licensure processes are sufficiently streamlined to make teaching in Illinois public schools an attractive option for these population as well. Finally, it is still important to remember that getting these diverse, academically talented teachers through the pipeline and into the classroom in only the first step. Once they get there, there needs to be a concerted effort to retain these high-quality educators in the classroom, as Ingersoll and Mays (2011) suggest.

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