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The Changing Distribution of Teacher Qualifications Across Schools: A Statewide Perspective Post-NCLB

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Abstract: A number of recent policy initiatives, including NCLB's highly qualified teacher provisions, have sought to improve the qualifications of teachers and their distribution across schools. Little is known, however, about the impact of these policies. In this study, we use population data on teachers and schools in Illinois to examine changes in the level and distribution of teacher qualifications from 2001 to 2006. We find that schools in Chicago, especially those serving the highest percentages of low-income and minority students, experienced the greatest improvements in teacher qualifications during the period. Although positive changes in teachers' academic qualifications in Illinois were not restricted to the state's largest urban district, the results were more mixed in non-Chicago locales. The employment of new teachers with stronger academic skills and reductions in the employment of new and experienced teachers without full certification contributed to these outcomes. Our results suggest that a number of policy initiatives, including NCLB's highly qualified teacher provisions, the introduction of alternative route programs in Illinois, and Chicago's comprehensive efforts to recruit talented new teachers, together had a

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positive impact on the level and distribution of teacher qualifications. Even so, Illinois has a long way to go before disparities in teacher qualifications across its schools are eliminated.

Keywords: teacher distribution; teacher qualifications; educational policy

La cambiante distribución de competencias docentes en las escuelas: Una perspectiva en un estado post-NCLB.

Resumen: Una serie de iniciativas políticas recientes, inclusive las disposiciones sobre “maestros altamente calificados” según la ley NCLB, han tratado de mejorar las competencias de maestros y su distribución en todas las escuelas. Sin embargo, se sabe poco acerca del impacto de estas políticas.

En este estudio usamos datos de población de docentes y escuelas en Illinois para examinar los cambios en el nivel y la distribución de las competencias de los docentes desde 2001 a 2006.

Encontramos que las escuelas en Chicago, especialmente las que sirven porcentajes más altos de estudiantes de minorías y de bajos ingresos, experimentaron las mejoras más grandes en las cualificaciones de maestros durante el periodo. Aunque los cambios positivos en las competencias académicas de maestros en Illinois no se limitaban al distrito urbano más grande del estado, los resultados fueron mixtos en otros lugares. Contrataciones de maestros nuevos con competencias académicas más fuertes y reducciones en las contrataciones de maestros nuevos y con experiencia, pero sin certificación completa contribuyeron a estos resultados. Nuestros resultados sugieren que una serie de iniciativas políticas, inclusive las disposiciones de maestros altamente calificados según la ley NCLB, la introducción en Illinois de programas de rutas alternativas de certificación profesional, y los esfuerzos comprensivos de Chicago por contratar a nuevos docentes talentosos, tuvieron un impacto positivo en el nivel y la distribución de competencias de los docentes. Aún así, Illinois tiene un largo camino por recorrer antes de que se eliminen las disparidades en las competencias de los docentes en todas sus escuelas.

Palabras-clave: distribución de docentes; competencias de los docentes; políticas educativas.

A cambiante distribuição de qualificações dos docentes em escolas: uma perspectiva em um estado pós-NCLB.

Resumo: Uma série de iniciativas políticas recentes, incluindo as disposições sobre “professores altamente qualificados” da lei NCLB, tentaram melhorar as competências dos professores e distribuição deles em todas as escolas. No entanto, pouco se sabe sobre o impacto destas políticas.

Este estudo utilizou dados da população de professores e escolas em Illinois para examinar as mudanças no nível e distribuição de qualificações dos professores desde 2001 até 2006.

Descobrimos que as escolas de Chicago, especialmente aquelas que atendem maiores percentagens de estudantes de minorias étnicas e de baixa renda, experimentou maiores melhorias nas qualificações dos professores durante o período. Embora mudanças positivas nas qualificações acadêmicas dos professores em Illinois, não se limitaram a grande zona urbana de Chicago, os resultados foram mistos em outras áreas do estado. A contratação de novos professores com mais qualificações acadêmicas e a forte redução no emprego de professores novos e com experiência, mas sem certificação completa contribuíram para estas mudanças encontradas na pesquisa. Nossos resultados sugerem que uma série de iniciativas políticas, incluindo as disposições sobre professores altamente qualificados na lei NCLB, a introdução de programas alternativos de certificação profissional em Illinois e o grande esforço de Chicago para contratar novos docentes com talento, teve um impacto positivo sobre o nível e a distribuição de competências dos professores. Ainda assim, Illinois tem um longo caminho a percorrer antes de eliminar as disparidades nas habilidades de professores em todas as suas escolas.

Palavras-chave: distribuição de professores, qualificações de professores, política de educação.

Introduction

Like educational resources more generally, there exist substantial disparities in the distribution of teacher resources across schools. Specifically, research shows that schools with high percentages of minority, low-income, and/or low performing students tend to employ less qualified teachers than schools serving more white, high-income, and/or high performing student populations (Betts, Rueben, & Danenberg, 2000; Clotfelter, Ladd, & Vigdor, 2006; DeAngelis, Presley, & White, 2005; Goe, 2002; Goldhaber, Choi, & Cramer, 2007; Knoepfel, 2007; Lankford, Loeb, & Wyckoff, 2002; Lu, Shen, & Poppink, 2007; Peske & Haycock, 2006; Wayne, 2002). In New York, for example, Lankford et al. (2002) found that non-white students were over four times more likely to be taught by teachers who were not certified in their subject assignments and three times more likely to be taught by teachers who failed their licensure exams than white students in the state in 2000.

Concern regarding these disparities in teacher resources has prompted substantial policy changes in recent years, perhaps most notable of which are the highly qualified teacher provisions of the federal No Child Left Behind Act of 2001 (NCLB). In addition to mandating a basic level of qualifications for teachers of core academic subjects in all schools, NCLB has required states to develop and implement equity plans to eliminate differences in the distribution of non-highly qualified, inexperienced, and out-of-field teachers across districts and schools (U.S. Department of Education, 2002).¹ At more local levels, a variety of policies, including economic incentives, alternative certification routes into the profession, and changes in hiring practices, have been implemented by states, districts, and schools in an effort to improve the recruitment and/or distribution of high-quality teachers (Loeb & Miller, 2006b; Rice, Roellke, Sparks, & Kolbe, 2009).

Little is known, however, about the impact of recent policy initiatives on teacher quality and the sorting of teachers across schools. A recent analysis of highly qualified teacher figures reported by states for NCLB compliance purposes showed that the majority of states made some progress between 2003-04 and 2007-08 toward meeting NCLB's mandated teacher qualifications (U.S. Department of Education, 2009), although the reliability of some states' data has been questioned (GAO, 2005). Another study that utilized an independent data source (i.e., the Schools and Staffing Survey) to examine the status of the nation and states in meeting NCLB's highly qualified teacher provisions found persisting disparities in teacher qualifications across schools in 2003-04, but just two years had passed since the law's enactment (Kolbe & Rice, 2009). A third study, which considered a broader set of measurable teacher attributes than the minimum qualifications targeted by NCLB, found that the distribution of teachers across schools in New York City became more equal between 2000 and 2005 with the employment of more highly qualified teachers in the district's most disadvantaged schools (Boyd, Lankford, Loeb, Rockoff, & Wyckoff, 2008). Moreover, using a

¹ The basic qualifications for teachers of core academic subjects include (1) full state certification or licensure, (2) the completion of at least a bachelor's degree, and (3) demonstrated proficiency in core subject assignments. In addition, middle and high school teachers must demonstrate competency in each core subject assignment by (1) completing an academic major, graduate degree, credits equivalent to an academic major, or advanced state certification; (2) passing a state-developed content test; or (3) for teachers hired before the passage of NCLB, meeting state-developed high objective uniform state standard of evaluation (HOUSSE) rules. See Kolbe and Rice (2009) or Loeb and Miller (2006a) for a more detailed discussion of these NCLB provisions.

value-added methodology the authors were able to link the positive changes in the distribution of teachers' observable characteristics to student achievement gains during the period.

In this study, we take an approach similar to that of Boyd, Lankford, et al. (2008) in that we consider multiple measures of teacher qualifications, not simply those targeted by NCLB. However, we expand on their work by using a broader lens to examine recent changes in the level and distribution of teacher qualifications across public schools in the entire state of Illinois from 2001 to 2006. More specifically, we address the following research questions: To what extent did the level of teacher qualifications in Illinois change between 2001 and 2006? What changes occurred in the distribution of teacher qualifications across schools with different contexts during the six-year period? And lastly, what explains the changes in teacher qualifications in Illinois?

In contrast to Boyd, Lankford, et al. (2008), data limitations preclude us from examining the link between changes in teacher qualifications and changes in student outcomes in this study. Nonetheless, with a statewide focus we are able to compare distributional changes across a wider variety of school contexts (e.g., urban versus non-urban schools, schools with nearly all low-income (minority) students versus schools with almost no low-income (minority) students) than their single district study permitted. Our results demonstrate that this broader, statewide perspective is important to showing that improvements in teacher qualifications in Illinois between 2001 and 2006 were not restricted to schools in Chicago, the state's largest urban district.

Background

Existing studies of the distribution of teachers utilize a variety of data sources, including national sample data (Lu et al., 2007; Kolbe & Rice, 2009; Wayne, 2002), numerous state (Betts et al., 2000; Clotfelter et al., 2006; DeAngelis et al., 2005; Goe, 2002; Goldhaber et al., 2007; Lankford et al., 2002; Peske & Haycock, 2006) and district administrative records (Boyd, Lankford, et al., 2008; Peske & Haycock, 2006), and school sample data within a single state (Knoeppel, 2007). In addition, they assess inequities in the distribution of teacher resources using a variety of measurable teacher attributes, such as their certification status, licensure exam scores, college entrance exam scores, undergraduate college selectivity, education level, and years of experience. Yet, notwithstanding these differences in data sources and measures, the studies are remarkably consistent in their findings: more poorly qualified teachers and those with relatively weak academic backgrounds are disproportionately employed in schools that serve high percentages of poor, minority, and/or low performing students. In one of the earliest studies, for example, Betts et al. (2000) found the average percentage of not-fully certified teachers in California to be nearly 11 times greater (21.7% versus 2.0%) in the state's lowest SES schools compared to its highest SES schools. Similarly, nearly three times the percentage of teachers in the highest poverty schools in New York City failed the state licensure test on their first attempt compared to teachers in the district's lowest poverty schools (Boyd, Lankford, et al., 2008).

Research shows that these distributional patterns stem from decisions and practices on both the supply and demand sides of the labor market for teachers. As Loeb and Miller (2006a, 2006b) explained, the supply of individuals to teaching is affected by wages, non-wage job characteristics, and costs associated with entering the profession relative to opportunities in non-teaching occupations. The lower the remuneration, both monetary and non-monetary, in teaching and the higher the costs to enter, the less likely individuals will be to choose teaching. Once the decision is made to enter the profession, wages, working conditions, and location preferences of teachers, combined with the preferences and hiring practices of district and school administrators, determine where teachers work (Loeb & Miller, 2006b). Absent much wage variation within and across districts

within a region, teachers' preferences to work close to where they grew up and in schools with relatively more attractive working conditions have a strong influence on where well-qualified teachers ultimately teach (Boyd, Lankford, Loeb, & Wyckoff, 2005a, 2005b; Hanushek, Kain, & Rivkin, 2004; Scafidi, Sjoquist, & Stinebrickner, 2007). In addition, the hiring practices and preferences of local administrators, as well as the policies that affect those practices, such as seniority-based teacher transfer rules, impact the distribution of teachers (Ballou, 1996; Levin & Quinn, 2003; Murphy & DeArmond, 2003). Together, these dynamics disadvantage urban schools and schools across locales with relatively high percentages of poor, non-white, and low performing students.

Various policies at multiple levels have been implemented over the past several years in an attempt to address a range of teacher staffing problems, including the supply of high quality teachers and their distribution across schools. These multi-tiered efforts have created unique "bundles" or "webs" of policies that often target different dimensions of the problem depending on the function of the particular level (Loeb & Miller, 2006b; Rice et al., 2009). The passage of NCLB, for example, established for the first time federal standards for teacher qualifications and incentives linked to Title I funding for states to meet those standards and to eliminate inequities in teacher distribution across schools (Kolbe & Rice, 2009; Loeb & Miller, 2006a). Before then, standards for teacher certification and licensure had been set and overseen by individual states. Over the years, though, inconsistency in the enforcement of state standards resulted in the use of waivers and other "less than full" teacher certificates, particularly in hard-to-staff districts and schools, thereby contributing to inequities in teacher qualifications across schools (Kolbe & Rice, 2009, p. 98; Shen & Poppink, 2003).

State-level efforts to improve teacher supply and influence teacher distribution, some of which predate the passage of NCLB, also have targeted certification and licensure policies. In addition, states have developed a variety of incentives, such as tuition benefits, loan forgiveness programs, and housing assistance, to encourage individuals to enter the profession or to work in particular school settings (Hirsch, Koppich, & Knapp, 2001; Loeb & Miller, 2006b; Rice et al., 2009). While there is little evidence regarding the impact of many of these policies, changes to state certification policies have led to a marked increase since the 1990s in the number of teachers entering the profession via alternative routes, which typically lower the cost of entry to teaching by reducing course requirements and/or enabling participants to satisfy course requirements while earning a salary as a teacher (Loeb & Miller, 2006b); there is some evidence that alternative routes increase both the supply and the academic qualifications of individuals interested in teaching (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2006).

At the local level, districts and schools have not only instituted programs in response to higher-level policies, such as mentoring and induction programs for new teachers, but have worked to improve their own policies and practices regarding teacher hiring, professional development, and working conditions in an effort to recruit, distribute, and retain high quality teachers (Rice et al., 2009).

Many of the existing studies on teacher distribution report on conditions prior to NCLB and other recent policy initiatives. Moreover, most observe the distribution of teacher resources during a single period (i.e., one academic year), thereby precluding an examination of changes in the level and distribution of teacher qualifications over time. Given the considerable attention that has been focused on this issue during the past several years, longitudinal studies using more current data are needed to determine if this attention is having any effect. The aforementioned study by Boyd, Lankford, et al. (2008) provided longitudinal evidence of recent changes that occurred in a single large urban district, namely New York City. Disparities in teacher qualifications, though, are not limited to large urban districts or even to urban schools more generally. We demonstrated in an

earlier study that the range in the average qualifications of teachers across Illinois schools exceeded 1.5 standard deviations in all locale types in 2003 (DeAngelis et al., 2005). Lankford et al. (2002) reported similar magnitudes of inequity in their examination of different geographic regions in New York State. This study provides additional longitudinal evidence of post-NCLB changes in the level and distribution of teacher qualifications by examining the population of schools and teachers across an entire state.

Measuring Teacher Resources

A primary goal of recent policy initiatives, like NCLB, that target the qualifications and distribution of teachers is to ensure that all schools are staffed with high quality teachers. The question remains, though, regarding what makes a high quality teacher (Rice, 2008). The development of value-added and other methodologies has shown that some teachers are much more effective than others at producing student achievement gains (Aaronson, Barrow, & Sander, 2007; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004; Sanders & Rivers, 1996). In fact, Rivkin et al. (2005) concluded that “a succession of good teachers could, by our estimates, go a long way toward closing existing achievement gaps across income groups” (p. 449). Evidence regarding the particular attributes or qualifications of teachers that account for these differences in effectiveness is mixed. The few measurable qualifications that reviews of the literature have identified as being most consistently linked to teacher effectiveness include teachers’ own verbal and general academic skills (as measured by their own test scores or the selectivity of their undergraduate college), their content knowledge in subject assignments (particularly at the high school level in math and science), and their years of teaching experience (Rice, 2003; Wayne & Youngs, 2003).² More recent studies suggest that teachers’ certification status matters as well, with certified teachers showing greater effectiveness than uncertified teachers (Boyd, Grossman, et al., 2006; Clotfelter et al., 2007).

The effect sizes of these individual teacher attributes generally fall within 5% of a standard deviation (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008), prompting some to question policy makers’ focus on observable qualifications as a means to improve teacher quality (Kane, Rockoff, & Staiger, 2008; Palardy & Rumberger, 2008; Rivkin et al., 2005). However, more recent studies indicate that reported effect sizes are underestimated for two reasons. First, teacher qualifications tend to vary together across schools so that, for example, schools that employ teachers with relatively low average ACT scores also tend to have a relatively high percentage of uncertified teachers. As a result, the impact on student outcomes of differences in multiple measurable attributes of teachers is more substantive than estimates of the impact of a single attribute suggest (Boyd, Lankford, et al., 2008; Clotfelter et al., 2007; Rockoff, Jacob, Kane, & Staiger, 2008). Second, when measurement error associated with student outcomes is taken into account, the effects of teacher qualifications can be as much as four times larger than existing estimates (Boyd, Grossman, et al., 2008). According to Boyd, Lankford, et al. (2008), effect sizes on the order of 0.10 to 0.20 or more standard deviations are much more probable. So, while teacher qualifications like those considered in this and previous studies admittedly account for just a portion of the variation in actual teacher and teaching quality that exists across schools, differences in these qualifications do have a substantive, policy-relevant impact on student outcomes.

In this study, we construct and utilize a school-level composite measure of teachers’ qualifications in order to capture multiple characteristics of the teachers in each school. We refer to

² The effects of experience have been found to be non-linear, with the most substantial returns to experience occurring during teachers’ first few years (Clotfelter, Ladd, & Vigdor, 2007; Rivkin et al., 2005; Rockoff, 2004).

this composite as the Index of Teacher Academic Capital (ITAC) in recognition of the fact that it is comprised solely of indicators of teachers' academic background and preparation. These indicators, which are based on available individual teacher information aggregated to the school level, are similar to what others have used in prior work in this area (Boyd, Lankford, et al., 2008; Clotfelter et al., 2007; Rockoff et al., 2008). They include: the average ACT English and composite scores of teachers (to capture their verbal and general academic skills, respectively), the average Barron's competitiveness ranking of teachers' baccalaureate institutions, the percentage of teachers in each school that failed the state's Basic Skills licensure test on the first attempt, and the percentage of teachers in each school that were not fully certified. This last measure is based on the certification component of NCLB regulations, which considers both traditionally and alternatively certified teachers as fully certified and all others (e.g., emergency, temporary, provisional) as not fully certified. ITAC was constructed using principal components analysis, a statistical technique that enabled us to combine the five attributes into a single standardized index.³ Though we focus primarily on changes in ITAC over time for ease of discussion, we also report trends in each of the five attributes in order to show which teacher qualifications changed during the study period.

The percentage of inexperienced teachers (i.e., teachers with three or less years of experience) in each school is excluded from ITAC because it contributed very little to the index and was not related conceptually to the other measures. However, given its importance to both student outcomes and current policy discussions, we consider inexperience as a separate indicator of teacher qualifications and present those findings in the section following our examination of changes in the level and distribution of ITAC.

Data and Methods

This study employs data from Illinois, the fifth most populous state in the U.S. (U.S. Census Bureau, 2008). Illinois' K-12 education system is comprised of approximately 900 districts scattered across a wide range of urban, suburban, small town, and rural areas. In fact, about one quarter of Illinois' more than 4,000 schools are located in urban locales, while another quarter are located in rural settings. The Chicago public school district, which is Illinois' largest, ranks third in terms of student enrollment among school districts in the United States with over 400,000 students (NCES, 2008a). On average, Illinois students perform at or very near the national average on the National Assessment of Educational Progress tests (NCES, 2008b). Perhaps most important for this study, previous research has shown that Illinois faces challenges similar to those found in other states in terms of inequities in the distribution of teachers across its schools (DeAngelis et al., 2005).

Data

Our longitudinal examination of the level and distribution of teachers' academic qualifications across school contexts in Illinois from 2000-01 (2001) to 2005-06 (2006) required the use of multiple data sources. Together, the sources provided information on the population of over 4,000 regular public schools and 125,000 public school teachers each year in Illinois during the six-year period. Charter schools are excluded from the study due to a lack of qualifications data for

³ The ITAC components have the following statistically-derived loadings: teachers' mean ACT composite score (0.87), teachers' mean ACT English score (0.87), percent of teachers failing the Illinois Basic Skills test on the first attempt (-0.63), percent of teachers not fully certified (-0.46), and teachers' mean undergraduate college competitiveness rating (0.50). The loadings maximize the amount of explained variation in the component measures across schools, in this case 48%.

charter school teachers. Teacher-level information used in the construction of ITAC was drawn primarily from the Teacher Service Record (TSR) data files compiled and maintained by the Illinois State Board of Education (ISBE). The annual TSR files contain rich information about all public school teachers employed in the state in a given academic year, including their years of teaching experience, hours employed, the identity of the school in which they were teaching, and position held. The TSR data were supplemented with teacher licensure test, certification status, and baccalaureate college information from the Teacher Certification Information System (TCIS), which is also maintained by ISBE. Barron's *Profiles of American Colleges* provided competitiveness rankings of teachers' baccalaureate colleges, and teachers' ACT scores were obtained from ACT, Inc. Information regarding the characteristics of Illinois public schools, including school locale and the race/ethnicity and free/reduced-priced lunch eligibility of students, was gathered from the Common Core of Data (CCD) files compiled by the National Center for Education Statistics.

Methods

To assess change in the level and distribution of ITAC across schools over time, a base year was used to estimate the principal component weights so that these constant, derived weights could be applied to the five components for each school in each year. The year 2003 was chosen as the base to correspond with earlier work on this topic, although the weights from the other years differed so negligibly that the choice of base year is immaterial to the results of this study. Each school's ITAC score in each year of the study reflects the school's standing relative to the average school in Illinois during the base year of 2003. Since the average school in 2003 had an ITAC of 0.0 (recall that ITAC is measured in standardized units), a school with an ITAC score of 1.0 in 2006, for example, employed teachers whose average academic qualifications were one standard deviation higher than the average Illinois school in 2003. To make this difference more comprehensible in terms of actual teacher qualifications, Table 1 shows how each of the five components of ITAC varied across select points in the ITAC range for Illinois schools during the study period. Similar to what has been found elsewhere, the academic qualifications of Illinois teachers varied widely across schools in the state. For example, in Illinois schools that ranked approximately two standard deviations below average on the ITAC scale, an average of about 13% of the teachers in each school failed the Basic Skills licensure test on their first attempt; this compares to 1.6% of the teachers in schools with average ITAC scores and just 0.1% of the teachers in schools with two standard deviation above-average ITAC scores.

Three school context variables are used to examine changes in the distribution of teachers across schools with different characteristics. These variables include school locale, the poverty level of the school, and the percentage of minority (i.e., non-white) students in the school. Differences by school performance level are not considered because a consistent measure of student performance was not available for all schools throughout the six-year study period.⁴ School locale is based on U.S. Census definitions of the population density where the school is located. The eight locale types provided in the CCD files were collapsed into four categories: urban, suburban, town and rural. The locale type of each school in 2001 was used to identify its locale throughout the period to avoid changes in classification due to definitional changes in the CCD. School poverty is based on the percentage of each school's students who were eligible for the federal free or reduced-price lunch program. The percentage of minority students captures the percentage of non-white students enrolled in each school. Quartiles were defined for these latter two indicators based on the relative concentration of low-income or minority students in the schools in each year. The top and bottom

⁴ In a previous study using just 2003 data, we found substantial disparities in teacher qualifications between low-performing and high-performing schools (DeAngelis et al., 2005).

quartiles were further split to enable an examination of the top and bottom deciles of schools on the student-based indicators.⁵

Table 1.

Component Averages in Schools at Select Points in the ITAC Range

ITAC Component	Approximate ITAC Level ^a				
	-2.0	-1.0	0.0	1.0	2.0
% of Teachers Not Fully Certified	10.26	4.86	1.60	0.97	0.52
% of Teachers that Failed the Basic Skills Test on Their First Attempt	12.93	6.78	1.64	0.48	0.11
Teachers' Mean ACT Composite Score	17.73	19.22	20.85	23.01	25.06
Teachers' Mean ACT English Score	17.74	19.39	21.42	23.73	26.25
Teachers' Mean Undergraduate College Competitiveness Ranking ^b	2.73	2.86	3.00	3.25	3.54
N	303	783	2552	1325	127

^a Each approximate ITAC score includes schools with values within ± 0.1 standard deviations of the given ITAC level. ^b Barron's college rankings range from a low of 1 to a high of 6 with 1=Non-Competitive, 2=Less Competitive, 3=Competitive, 4=Very Competitive, 5=Highly Competitive, and 6=Most Competitive.

To address our third research question, we examine changes in the utilization and qualifications of new versus experienced teachers across schools from 2001 to 2006 and consider what federal, state, and local policies likely influenced those changes.

Because population data are used in this study, tests of statistical significance are not necessary. All differences across teachers and schools reflect actual differences during the period under examination.

Results

In this section, we first present changes in teachers' academic qualifications across Illinois schools overall, then focus more closely on changes in the distribution of teachers across different types of schools. In addition to documenting whether schools' ITAC scores improved during the six-year period, a primary interest is in determining whether Illinois made progress in reducing inequities in the distribution of teachers across its schools. We end the section with a look at what policies appear to have contributed to these changes in Illinois.

Statewide Change

At the state level, the average ITAC for all schools in Illinois declined from 2001 to 2002, but increased slightly thereafter (Table 2). The overall statewide change in the level of teacher qualifications was very small, however, with a 2001 to 2006 improvement of just 0.04 standard deviations.

⁵ The average percentage of low-income students in schools statewide in each decile/quartile is as follows: 1.7 (lowest 10%), 8.0 (11th to 25th percentile), 20.7 (2nd quarter), 41.7 (3rd quarter), 74.8 (75th to 89th percentile), and 95.9 (highest 10%). The corresponding percentages of non-white students are as follows: 0.3 (lowest 10%), 2.3 (11th to 25th percentile), 9.9 (2nd quarter), 37.8 (3rd quarter), 84.3 (75th to 89th percentile), and 99.7 (highest 10%).

Table 2.
Average ITAC Scores Overall and at Select Points in the ITAC Range, Statewide by Year

	2001	2002	2003	2004	2005	2006	Difference 2006 - 2001
Overall Average	0.00	-0.03	0.00	0.01	0.01	0.04	+0.04
10 th Percentile	-1.32	-1.37	-1.28	-1.21	-1.17	-1.12	+0.20
25 th Percentile	-0.47	-0.49	-0.48	-0.45	-0.46	-0.43	+0.04
50 th Percentile	0.14	0.12	0.12	0.11	0.10	0.11	-0.03
75 th Percentile	0.64	0.62	0.62	0.60	0.59	0.62	-0.02
90 th Percentile	1.09	1.09	1.07	1.04	1.03	1.05	-0.04
Standard Deviation	1.02	1.06	1.00	0.95	0.94	0.91	-0.11

Note: Average ITAC scores and differences in ITAC scores are in standard deviation units.

Because averages can mask what occurs at different points in a distribution, we also report changes at select points in the range of ITAC scores. As shown in Table 2, the average academic qualifications of teachers in Illinois schools with the lowest ITAC scores (i.e., those in the bottom 10th percentile of the ITAC range) improved substantially more than those of teachers in schools at the middle and high ends of the distribution (i.e., the 50th percentile and above). In fact, the average qualifications of teachers in schools with average to above average ITAC scores declined slightly during the six-year period. Thus, it appears that the small statewide improvement in the level of teacher qualifications between 2001 and 2006 resulted mainly from positive changes that occurred in schools with the least academically qualified teachers.

Changes by School Type

The small statewide improvement conceals more noteworthy changes that occurred among different types of schools. Here, schools are first categorized along three separate criteria: locale, poverty level, and percent minority students. We then examine schools by poverty level and percent minority students within locale type to get a clearer sense of the where the changes occurred.

Locale. We separate schools in the Chicago public school district (Chicago) from other urban schools in the state due to the fact that Chicago schools alone constitute roughly 57% of all urban schools in Illinois. Moreover, singling out Chicago enables us to compare more directly our results to those reported by Boyd, Lankford, et al. (2008) for New York City.

Focusing first on ITAC levels, Chicago schools registered the lowest average ITAC scores of any locale in each year of the study (Figure 1). On average, teacher qualifications in Chicago schools were more than one standard deviation lower than they were in schools in all other locales. Non-Chicago urban schools in Illinois also registered consistently lower average ITAC scores than schools in suburban, town, and rural areas, though the difference in average teacher qualifications between non-Chicago urban schools and schools in non-urban locales was not nearly as great as it was for Chicago schools.

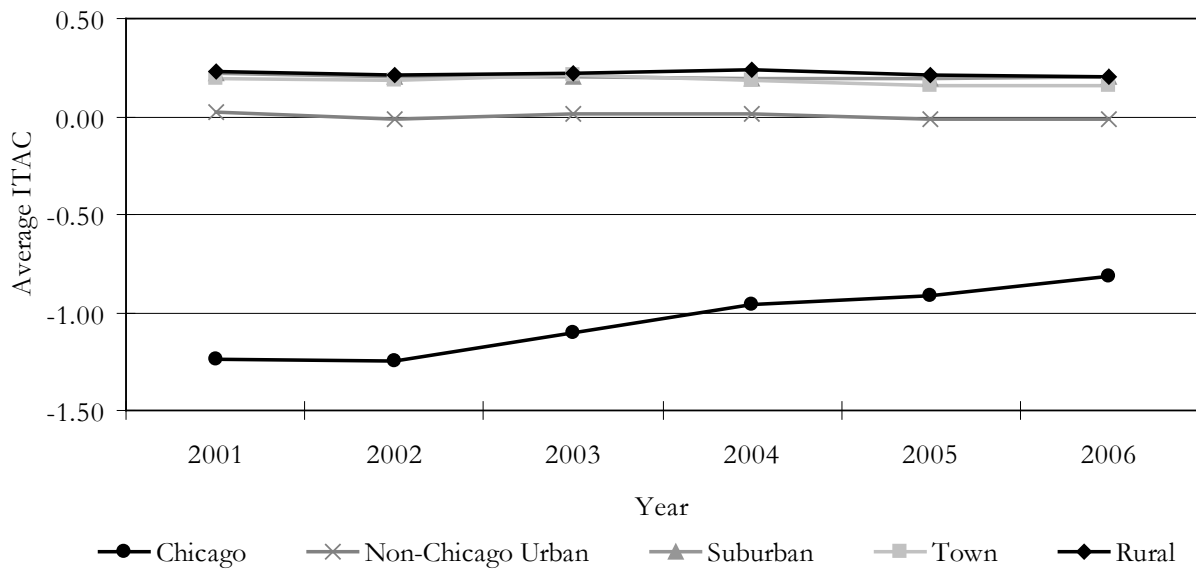


Figure 1. Average ITAC Scores by School Locale Type and Year

From 2001 to 2006, the average ITAC scores of schools in all non-Chicago locales declined marginally. Chicago's ITAC, in contrast, increased markedly from -1.24 standard deviations in 2001 to -0.81 in 2006. This substantial improvement narrowed the gap in average teacher qualifications between Chicago schools and schools in non-urban locales in Illinois by approximately 30% during the six-year period.

Improvements in four of the five components of ITAC contributed to Chicago's results (see Appendix A). The one component of ITAC for which Chicago schools were most disadvantaged relative to all other school types, namely the percentage of teachers without full certification, improved most dramatically, declining by over 70% during the six-year period. The mean ACT scores of Chicago teachers also improved by more than half of a point (about 0.3 standard deviations). While non-Chicago urban and suburban schools registered similar trends in their percentages of not-fully certified teachers, the magnitude of their improvements was far less than it was in Chicago schools, perhaps due to there being less room for improvement in those locales. Like Chicago, schools in all other locale types registered some improvement in the average ACT composite scores of their teachers.

Poverty level of the school. Similar to what has been reported in studies of other states (Betts et al., 2000; Clotfelter et al., 2006; Lankford et al., 2002; Peske & Haycock, 2006), there exist large disparities in teacher qualifications across Illinois schools based on student poverty level. As Figure 2 shows, the greater the percentage of low-income students in a school, the lower the average academic qualifications of its teachers. The disadvantage was particularly large for schools in the highest poverty quartile in Illinois (i.e., the 75th to 89th percentile and the highest 10% categories), where average ITAC scores ranged from approximately one half to more than one standard deviation below the third quartile schools.

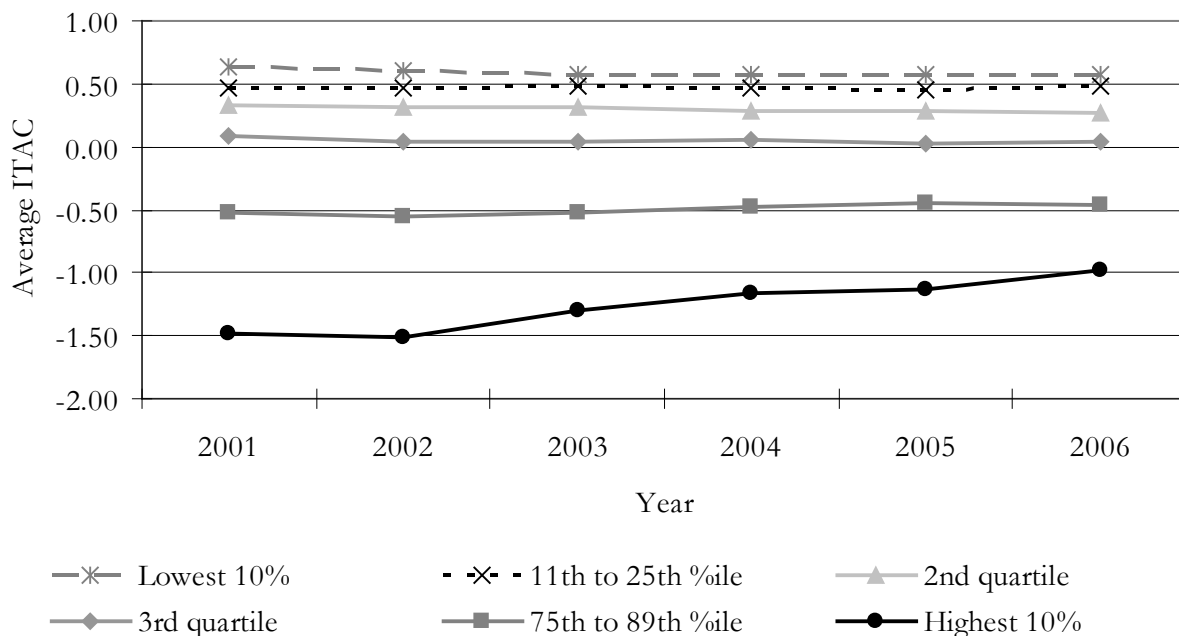


Figure 2. Average ITAC Scores by School Poverty Category and Year

Although this pattern of inequity persisted throughout the study period, considerable improvement in schools serving the poorest student populations (highest 10%) coupled with a slight decline in scores among schools with the wealthiest student populations (lowest 10%) reduced the gap in teacher qualifications by about 26%. Among schools in the highest poverty decile, improvements in all five components of ITAC contributed to the change (Appendix A). Again, the most marked improvement was found in the percentage of not-fully certified teachers, which declined from an average of 12.0% to an average of 3.8% of teachers in schools in this poverty category. These schools also experienced the greatest increases in average ACT scores of teachers, thereby reducing the difference in ACT composite scores between the highest and lowest poverty schools from 3.3 points to 2.7 points. Schools in the 75th to 89th percentile of student poverty also improved, although to a lesser extent than schools in the highest decile of student poverty.

Percent Minority Students. The distribution and trends by percent minority students are generally similar to those found for school poverty (Figure 3). Specifically, Illinois schools serving large proportions of minority students had substantially lower ITAC averages than other schools in the state. In contrast, though, to the results by school poverty level, disparities in average ITAC scores among schools with minority concentrations in the first, second, and third quartiles were fairly small (less than 0.2 standard deviations). It is not until one considers schools in the top quartile (i.e., Illinois schools that serve, on average, more than 84% non-white students) that stark differences in teacher qualifications appear. But again, significant improvements in teacher qualifications in these predominately minority schools (especially those in the highest 10% statewide, which served on average more than 99% non-white students) coupled with small declines for schools serving predominately non-minority students resulted in a substantial reduction in the teacher qualifications gap between 2001 and 2006.

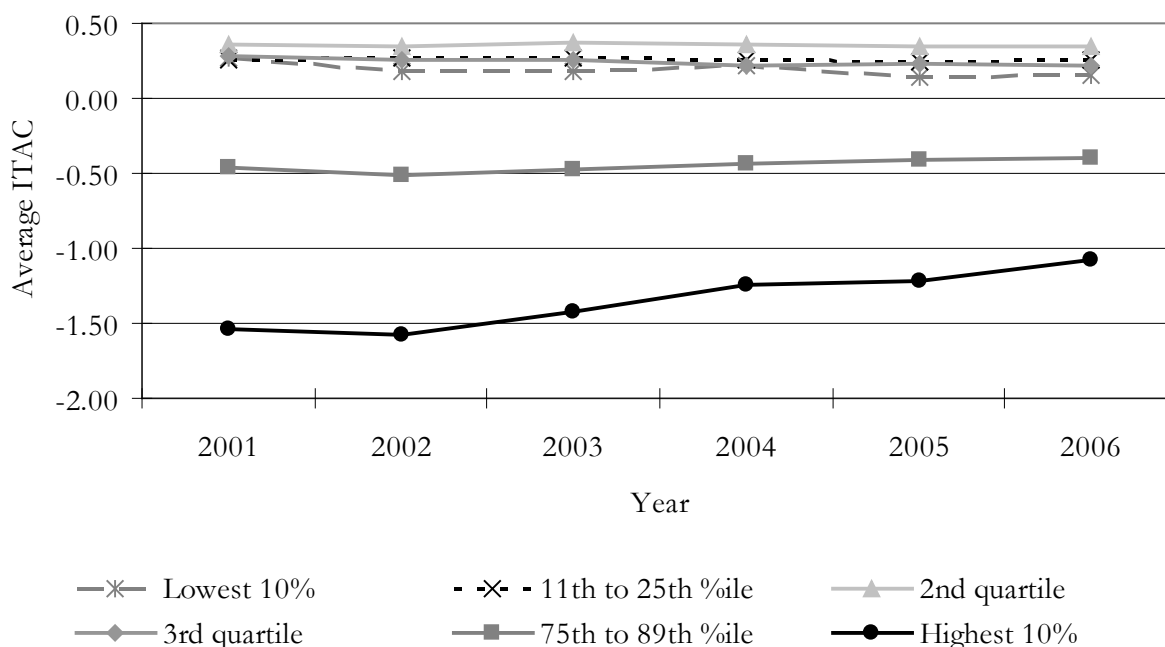


Figure 3. Average ITAC Scores by School Minority Category and Year

Student Demographics by Locale. Did improvements in teacher qualifications in high poverty and high minority schools occur across the state or were the improvements restricted to schools in Chicago? In this section, we combine school locale with the student demographic categories to examine this question.

Looking first at ITAC levels, average teacher qualifications in Chicago schools at each poverty and minority level were generally lower than those in schools with similar student characteristics in other locales (Table 3). Only the relatively small number ($N=24$) of highest minority schools (i.e., top decile statewide) in non-Chicago urban areas employed teachers with lower academic qualifications than the corresponding Chicago schools during the timeframe of this study. The results, however, also confirm that schools with high concentrations of low-income or minority students had lower average ITAC scores regardless of their location; that is, the unequal distribution of teacher qualifications across schools with different student characteristics was not strictly a Chicago or an urban school issue. In suburban Illinois schools, for example, the average differences in teacher qualifications between the decile of schools with the lowest percentage of low-income students and the decile of schools with the highest percentage of low-income students were 2.1 and 1.7 standard deviations in 2001 and 2006, respectively. These disparities among suburban schools were greater than those found among Chicago schools and among non-Chicago urban schools.

In terms of changes in teacher qualifications, Chicago schools showed noteworthy average improvements from 2001 to 2006 in all but its most economically-advantaged schools, none of which fell into the top quartile statewide. Moreover, the improvements were greatest in its highest poverty and highest minority schools, which resulted in a more equitable distribution of teacher qualifications across schools within Chicago itself.

Across non-Chicago locales, inequities in teachers' academic qualifications between the most and least economically-disadvantaged schools also narrowed between 2001 and 2006, in large part

due to improvements in the qualifications of teachers in the highest poverty schools. Across rural Illinois schools, for example, the difference in average ITAC scores was reduced by almost 30%. The results were less positive, however, for the highest minority schools statewide that were in locales outside of Chicago (about 23% of such schools). Average teacher qualifications in all non-Chicago locales registered small to moderate declines, and the gaps among schools serving the highest and lowest percentages of minority students actually increased in non-Chicago urban and town locales (Table 3).

In sum, Chicago schools in general, and its highest poverty and highest minority schools in particular, made the most progress in improving teacher qualifications during this six-year study period. Improvements in teacher qualifications in Illinois were not restricted to Chicago schools, although the results were more mixed in non-Chicago locales. High poverty schools in most locales outside of Chicago benefitted from small to moderate improvements in teacher qualifications during the period. Coupled with slight declines in ITAC in some low poverty schools, the gap in teacher qualifications between high and low poverty schools in all locales in Illinois narrowed. The same was not true, however, for the highest minority schools, where average teacher qualifications declined across all locales and disparities with low minority schools widened in urban and town areas.

Explaining the Changes

As Loeb and Miller (2006a) noted, it is challenging to attribute changes in teacher qualifications to any one policy given the web of policies that were being implemented around this time. Nonetheless, we believe it is instructive to consider some of the changes reported in the previous section in more detail to provide some sense of what likely prompted those changes. Before doing so, we describe the specific policy changes that took place in Illinois.

Illinois Policy Context. Whereas some policy changes in Illinois were made in direct response to the highly qualified teacher and equity provisions of NCLB, others were instituted independent of the federal action. In 1997-98, for example, Illinois began issuing alternative teaching certificates in an effort to combat teacher shortages in specific subject areas and/or schools. To qualify, individuals had to possess a Bachelor's degree or higher from an accredited higher education institution, have five or more years of work experience, and have passed the requisite teacher licensure tests (i.e., basic skills and content tests). The work experience requirement was waived for those wanting to teach in Chicago due to more acute shortages in that district. Additional alternative route options were offered starting in 1999, which generally targeted individuals with academic backgrounds in high needs subjects and/or individuals willing to serve in high needs schools (Illinois Association of School Boards, 2002; ISBE, 2007). Teach for America (TFA), a prominent national alternative certification program that recruits recent college graduates with strong academic backgrounds to teach in high needs schools in urban and rural areas (TFA, n.d.), is one of a number of such programs that began in Illinois. TFA started placing teachers in Chicago schools in 2000 and by 2008, a total of about 750 TFA teachers had served in the District (Kimball, 2008). In contrast, though, to New York City where the percentage of alternatively certified teachers increased dramatically between 2000 and 2005 (Boyd, Lankford, et al., 2008), no more than about 10% of newly hired teachers in Chicago and no more than about 2% of new teachers in non-Chicago locales each year during our study period were alternatively certified. Teachers entering through an approved alternative route in Illinois are considered highly qualified for NCLB purposes. Moreover, there is some evidence that alternative route teachers tend to have stronger academic qualifications than both traditionally certified and not-fully certified teachers (Boyd et al., 2006). Thus, we expect this change in Illinois' certification policies to have had a positive impact on new teacher qualifications during this study, especially in Chicago where more of such teachers had been hired.

Table 3.

Average ITAC Scores Across School Locale Types by Poverty Level and Percent Minority Students, 2001 and 2006

	Chicago			Non-Chicago Urban			Suburban			Town			Rural		
	2001	2006	Diff. 2006 - 2001	2001	2006	Diff. 2006 - 2001	2001	2006	Diff. 2006 - 2001	2001	2006	Diff. 2006 - 2001	2001	2006	Diff. 2006 - 2001
<i>Poverty Level (% FRL)</i>															
First Quartile															
Lowest 10%				0.51	0.57	+0.06	0.67	0.64	-0.03				0.48	0.38	-0.10
11 th to 25 th %ile				0.66	0.49	-0.17	0.50	0.53	+0.03	0.56	0.49	-0.07	0.41	0.41	0.00
Second Quartile	-0.16	-0.18	-0.02	0.57	0.53	-0.04	0.31	0.26	-0.05	0.37	0.31	-0.06	0.32	0.23	-0.09
Third Quartile	-0.30	-0.17	+0.13	0.23	0.16	-0.07	-0.04	-0.01	+0.03	0.22	0.14	-0.08	0.04	0.03	-0.01
Fourth Quartile															
75 th to 89 th %ile	-0.99	-0.68	+0.31	-0.29	-0.26	+0.03	-0.54	-0.56	-0.02	-0.07	-0.07	0.00	0.06	0.08	+0.02
Highest 10%	-1.56	-1.07	+0.49	-0.82	-0.74	+0.08	-1.42	-1.07	+0.35						
GAP*	-1.40	-0.89		-1.33	-1.31		-2.09	-1.71		-0.63	-0.56		-0.42	-0.30	
<i>Percent Minority Students</i>															
First Quartile															
Lowest 10%							0.47	0.35	-0.12	0.21	0.12	-0.09	0.26	0.15	-0.11
11 th to 25 th %ile				0.26	0.14	-0.12	0.38	0.45	+0.07	0.19	0.21	+0.02	0.24	0.20	-0.04
Second Quartile				0.09	0.21	+0.12	0.47	0.44	-0.03	0.25	0.22	-0.03	0.21	0.29	+0.08
Third Quartile	-0.43	-0.27	+0.16	0.29	0.22	-0.07	0.36	0.31	-0.05	0.13	0.08	-0.05	0.23	0.24	+0.01
Fourth Quartile															
75 th to 89 th %ile	-0.80	-0.51	+0.29	-0.20	-0.16	+0.04	-0.39	-0.42	-0.03	-0.01	-0.48	-0.47	0.09	0.03	-0.06
Highest 10%	-1.64	-1.11	+0.53	-1.88	-2.05	-0.17	-0.97	-1.01	-0.04						
GAP*	-1.21	-0.84		-2.14	-2.19		-1.44	-1.36		-0.22	-0.60		-0.17	-0.12	

* GAP indicates the difference in ITAC scores between the highest and lowest poverty/minority categories with available data.

Note: Average ITAC scores and differences in ITAC scores are in standard deviation units. Average ITAC scores are not reported in cells containing five or fewer schools.

In addition, just prior to the passage of NCLB, Illinois raised the passing standard on its Basic Skills licensure test, which prospective teachers were required to pass prior to obtaining initial certification, from an approximate ninth grade level of education to an approximate college sophomore level of education (ISBE, 2001). The intent of the change was to improve the basic academic qualifications of new entrants by restricting those with sub-college level academic skills from entering the profession. The State raised this entry bar even further when it passed a law, effective starting in 2002-03, requiring prospective teachers to pass the Basic Skills licensure test before being admitted to a teacher education program (Illinois School Code, 2002). Although the effects of this second change are not evident in this study due to the timing of the change, we expect it will have a greater long-term impact on improving the academic skill level of new entrants because the prior policy, which required prospective teachers to take the test during or after the completion of their teacher education program, did not prevent those who had not passed the Basic Skills test from entering the profession with a sub-standard certificate. In fact, more than one third of the not-fully certified teachers in Illinois each year during our study had failed the Basic Skills test on their first attempt compared to no more than 3% of teachers who obtained full certification.

In direct response to NCLB's highly qualified teacher provisions, ISBE began requiring all new teachers (i.e., those certified on or after July 1, 2002) of core subjects in Title I programs to be highly qualified, as of the start of the 2002-03 school year. In addition, ISBE revised its regulations to bring its certification and licensure policies into line with the federal highly qualified teacher requirements and issued guidelines to districts regarding the qualifications that new and current teachers in Illinois had to possess in order to achieve compliance by the original 2005-06 deadline (ISBE, 2003; Sack, 2002). In that process, ISBE determined that holders of Type 39 certificates, which are issued in Illinois to substitute teachers for 90-day periods except in Chicago where such teachers are allowed to serve for indefinite periods of time, would not be considered highly qualified. At the beginning of our study in 2001, 6.5% of all Chicago teachers held Type 39 certificates, whereas between 0.3 and 0.6% of teachers in non-Chicago locales held such certificates. In the highest poverty and highest minority schools in Chicago, even greater percentages of teachers (8.0% and 9.4%, respectively) were Type 39 certified. Transitional bilingual (referred to as Type 29) certificate holders also were deemed not highly qualified under NCLB. However, in contrast to Type 39 certificants, the State provided a means for Type 29 teachers who were making progress toward fulfilling a number of requirements, including the passage of the state licensure tests and the completion of an approved teacher education program, to be considered highly qualified (ISBE, 2003).⁶ Again, a substantially greater percentage of Chicago teachers (4.0%) than non-Chicago teachers (0.8 to 1.2% in suburban and non-Chicago urban schools, respectively) held Type 29 certificates in 2001. The State also indicated that it would limit considerably the use of Type 29 and 39 certificates for new teachers due to NCLB. Given Chicago's greater reliance on such teachers, these changes were expected to have the greatest impact on both existing and newly hired teachers in that district (Sack, 2002).

To comply with NCLB's equity mandate, the Illinois State Board of Education developed a plan for ensuring the equitable distribution of highly qualified teachers and submitted it in mid-2006,

⁶ For the purposes of this study, Type 29 certificate holders were considered not-fully certified since we had no way of determining who was working to complete the additional requirements. The same is true for provisional certificate holders, whom the State deemed highly qualified provided they pass the required licensure tests within nine months of obtaining their provisional certification. We considered them to be not-fully certified until the provisional label was dropped from their certification status in our dataset. As a result, our not-fully certified figures are conservative in that they include some teachers with provisional and Type 29 certificates who were considered highly qualified by the State.

the first time following the passage of NCLB in 2001 that the U.S. Department of Education required states to address how they would remedy disparities in the distribution of non-highly qualified, inexperienced, and out-of-field teachers across schools (Loeb & Miller, 2006a; Peske, Crawford, & Pick, 2006). As Peske et al. noted, the equity provisions of NCLB extend the highly qualified teacher provisions by requiring states to eliminate disparities based on both the minority status and the poverty status of students in schools; in contrast, the highly qualified teacher provisions, where more attention was placed during the early years of NCLB, focused only on the poverty status of students. After two rounds of revisions, Illinois' equity plan was approved by the Department in December 2006 (ISBE, 2006). As part of this plan, all districts in the State are required to identify and document in an annual report their own strategies to promote an equitable distribution of teachers across their schools. Four general areas cited by the State where districts might focus their efforts to improve teacher distribution included: recruitment to increase the number of experienced, highly qualified teachers; reassignment of existing teachers; improvement of school climate conditions in hard-to-staff schools; and financial incentives to entice experienced, highly qualified teachers to work in specific schools (ISBE, 2006). In addition, the State enumerated a number of strategies that it would implement or expand in order to eliminate inequities in students' access to highly qualified teachers, such as strengthening principal and teacher preparation and professional development, expanding support for teachers in high needs schools to obtain National Board certification, conducting annual working conditions surveys, eliminating funding inequities among districts, and expanding scholarship programs to support aspiring teachers for positions in high needs subjects and schools. Illinois' equity plan was not finalized until after the end of this study period and many of the State's strategies were not scheduled to take effect until after the 2005-06 academic year. Thus, although the development of the plan was started during the study period and local districts were required to document their progress toward meeting the NCLB provisions by the end of 2005-06 (ISBE, 2006), we expect that it had only minimal impact on our results.

It is beyond the scope of this study to document all of the changes to policy and practice made by Illinois districts between 2001 and 2006. However, we believe it is important to describe the changes made in Chicago given the magnitude of the improvements in ITAC that occurred in that district. Before NCLB was passed, Chicago had already embarked on its own initiative to elevate the caliber of its teachers and principals. In 2001, then Chief Executive Officer Arne Duncan brought together a working group comprised of a broad cross-section of local stakeholders to develop a district improvement strategy. The resulting Education Plan of 2002 included a Human Capital Initiative (now referred to as the Talent Attraction and Development Initiative) as one of three core strategies for improving instruction and student learning in the District (see Kimball, 2008, for a detailed descriptive case study of this initiative). The goals of the human capital component of this broader plan were to attract, develop, and retain high quality teachers and principals. In many ways, Chicago's goals complemented in spirit but not detail those of NCLB. To accomplish its goals, the District identified three major focus areas for improvement: recruitment, district human resource operations, and talent management (Kimball, 2008). Of particular relevance to this study are the changes to teacher recruitment made during the period.

With initial emphasis placed on teacher recruitment and hiring, the District sought to expand and improve the qualifications of the pool of candidates for each teaching vacancy so that building principals, who generally were responsible for filling open positions, could be more selective in hiring. A number of strategies were used to bolster recruitment and prospective teacher quality, including a new marketing campaign that branded Chicago as a premier, reform-oriented district; the creation of new pipeline programs, such as highly selective summer internship programs, to attract

and introduce talented pre-service teachers to the District; the development of stronger relationships with local universities and alternative certification programs with a particular emphasis on increasing teacher supply in needed skill areas; the utilization of job fairs to bring together building principals and prospective teachers; and targeted outreach to select teacher preparation programs, most within a 500 mile radius of Chicago (CPS, 2006; Kimball, 2008). Kimball reported that each of the three to four job fairs per year alone tended to attract 2,000 to 3,000 applicants, more than half of the total number of applications the District used to attract in an entire year. In addition, the District worked to streamline the application process and allowed teachers in high need subjects to apply for a three-year waiver of the District's residency requirement (Kimball, 2008). The District also developed web-based technologies to enable interested candidates to attend information sessions and "Discover CPS Tours" on-line (CPS, 2006; Kimball, 2008). Though a 2007 study by The New Teacher Project (TNTP) indicated that late hiring was causing the District to lose well-qualified applicants to other districts, these changes to its recruitment efforts overall had a substantial effect during the study period, resulting in a surge in the number of applicants from roughly 2 applicants per hire in 2002-03 to about 10 applicants per hire in 2005-06 (CPS, 2006; TNTP, 2007). This dramatic increase enabled Chicago school principals to be much more selective in hiring than they had been previously, as evidenced by steady improvements in the academic qualifications of new teachers in the District (CPS, 2006; DeAngelis & Presley, 2007; TNTP, 2007).

In addition, similar to New York City where beginning teacher salaries increased considerably (over 17% in three years) during the early 2000s (Boyd, Lankford, et al., 2008), beginning salaries for new, inexperienced teachers with BA degrees in Chicago increased by 4% per year from 2004 to 2006, roughly double the average annual increase from 2001 to 2003 (ISBE, n.d.). As in New York City, these increases likely contributed to the District's ability to recruit more academically talented teachers (Figlio, 2002). Also similar to New York City, Chicago did not use targeted financial incentives to fill vacancies in shortage areas or in high needs schools, which might have helped to explain some of the improvements in teacher distribution found in the District. However, the District did exert more centralized control over hiring in NCLB-designated probationary and persistently failing schools (Kimball, 2008). Moreover, the District's hiring policies, which have been described as "among the most progressive" of urban districts studied by The New Teacher Project (TNTP, 2007, p. 20), provided principals with more flexibility in hiring than what is typical in urban settings; more specifically, Chicago's policies enabled principals to consider voluntary transfers and involuntarily reassigned teachers alongside all other applicants during the hiring process rather than giving internal candidates priority. Principals in districts without such flexibility are often forced to hire poor performing teachers and/or teachers that are a bad fit for their schools (Levin, Mulhern, & Schunck, 2005). While more centralized control over hiring in some schools and flexibility in hiring overall likely contributed to the District's progress in reducing inequities in teacher qualifications across schools, Chicago's teacher reassignment policy somewhat counteracted these efforts by rewarding seniority over performance, with not-fully certified teachers eliminated first when reassignment is necessary, followed by fully certified teachers with the lowest seniority level (TNTP, 2007). Only a very small percentage of Chicago teachers are reassigned each year (about 1-3% between 2005 and 2007), yet principals generally regard the reassignment policy as negatively affecting their ability to retain some of the effective teachers that they recruit to their schools (TNTP, 2007).

Linking Changes to Policy. Research shows that both the initial match of teachers to schools and existing teachers' decisions to change schools or leave the profession determine the average characteristics of teachers in a school and contribute to disparities in the distribution of teachers across schools (Boyd, Lankford, Loeb, & Wyckoff, 2002; Boyd, Lankford, et al., 2008). Here, we

examine how changes in the characteristics of existing and new teachers in Illinois contributed to our results and consider what policies likely prompted those changes.

The only component of ITAC that is associated directly with the highly qualified teacher provisions of NCLB is the percentage of not-fully certified teachers in each school. Full state certification is a central element of achieving highly qualified teacher status, which all teachers of core subjects were required by NCLB to meet by the end of this study period (Loeb & Miller, 2006a).⁷ In our analyses of the changes in ITAC in the previous section, we found that the overall percentages of not-fully certified teachers declined between 2001 and 2006 in the locales and school types that relied most heavily on such teachers, most notably Chicago. As Figures 4 and 5 indicate, both experienced teachers (i.e., those with more than three years of experience) and newly hired teachers contributed to these declines. In Figure 4, we track the earliest cohort of experienced teachers (i.e., experienced teachers in 2001) through 2006 to show the trend for a static group of such teachers (the later cohorts show similar results). In each locale, the percentages of experienced teachers who were not fully certified declined between 2001 and 2006. The drop was most dramatic in Chicago schools, although non-Chicago urban schools registered a substantial percentage decline as well. By 2006, the percentages of not-fully certified experienced teachers across locales had nearly converged at 1% or less.

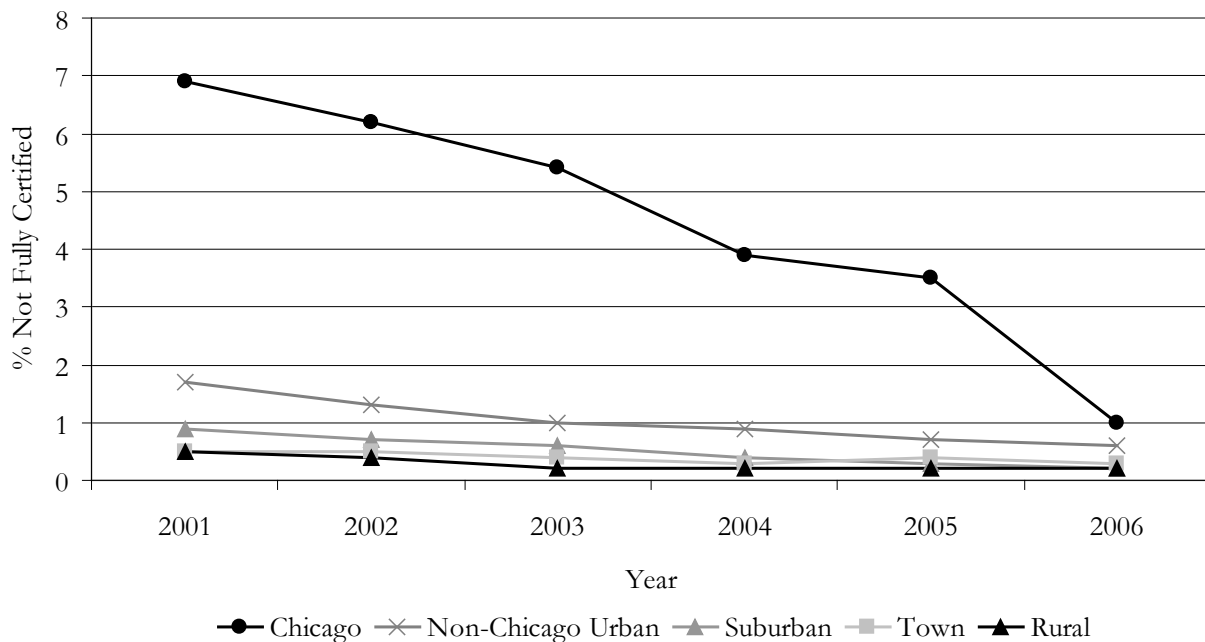


Figure 4. Trends in the Percentage of Not-Fully Certified Experienced Teachers in 2001 Cohort by School Locale Type

⁷ We recognize that NCLB's highly qualified teacher requirements extend beyond full state certification to include teachers' demonstrated knowledge of core subject assignments. Unfortunately, only teachers' certification status was available for all teachers at the time of this study. ISBE's system to collect current teachers' HOUSSE information was not functioning until September 2006.

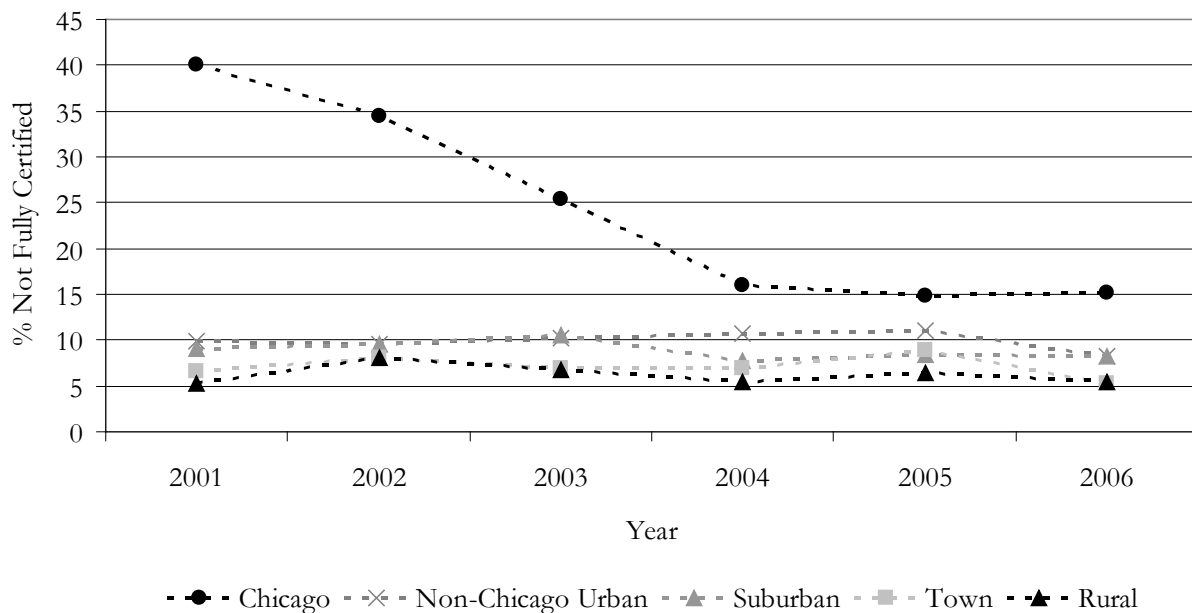


Figure 5. Trends in the Percentage of Not-Fully Certified New Teachers in Each Year by School Locale Type

As described earlier, ISBE determined that teachers holding Type 39 (long-term substitute) certificates would not be considered highly qualified for NCLB purposes, and those holding Type 29 (Transitional Bilingual) certificates had to meet additional requirements to be considered highly qualified. Approximately two thirds of the decline in the percentages of not-fully certified teachers in non-Chicago urban and suburban areas, and over 90% of the decline in Chicago, was due to declines in the percentages of teachers holding one of those two types of certificates, the majority of whom had either left the system or earned full certification by 2006. Very few experienced teachers in town and rural locales held those certificate types so this change in policy had much less of an impact in those areas.

After years of relying on Type 39 certificates (and Type 29 certificates to a lesser extent) to help fill vacant positions, Chicago schools were required to limit their use following the passage of NCLB. As a result, the number of new Chicago teachers who were hired with those certificate types declined by over 80% from 2001 to 2006, resulting in a substantial decline in the percentage of new teachers who entered the District not fully certified (Figure 5). To compensate, Chicago schools increased their employment of both traditionally certified new teachers (from about 58% of new hires in 2001 to over 75% by 2004) and alternatively certified new teachers, although teachers in this latter category constituted a relatively small fraction — no more than about 10% — of new hires each year. High minority and high poverty schools in the District benefitted most from these changes, which contributed to the narrowing of the gap in ITAC across Chicago schools (Figure 6).

In non-Chicago locales where the employment of not-fully certified new teachers was much less prevalent than in Chicago, even within the highest poverty and highest minority schools, the utilization of such teachers was more variable over time, but ultimately decreased below 2001 levels in all but rural schools (Figure 5). Overall, there was some convergence in the numbers of not-fully certified teachers between the highest and lowest poverty and minority schools in non-Chicago urban and suburban locales, although not nearly to the extent as in Chicago. In town and rural

locales, differences in the numbers of not-fully certified new teachers by poverty and minority quartile were very small throughout the period. The 1 to 2% of new teachers in these locales who entered through alternative routes made up for much of the overall small declines in not-fully certified teachers.

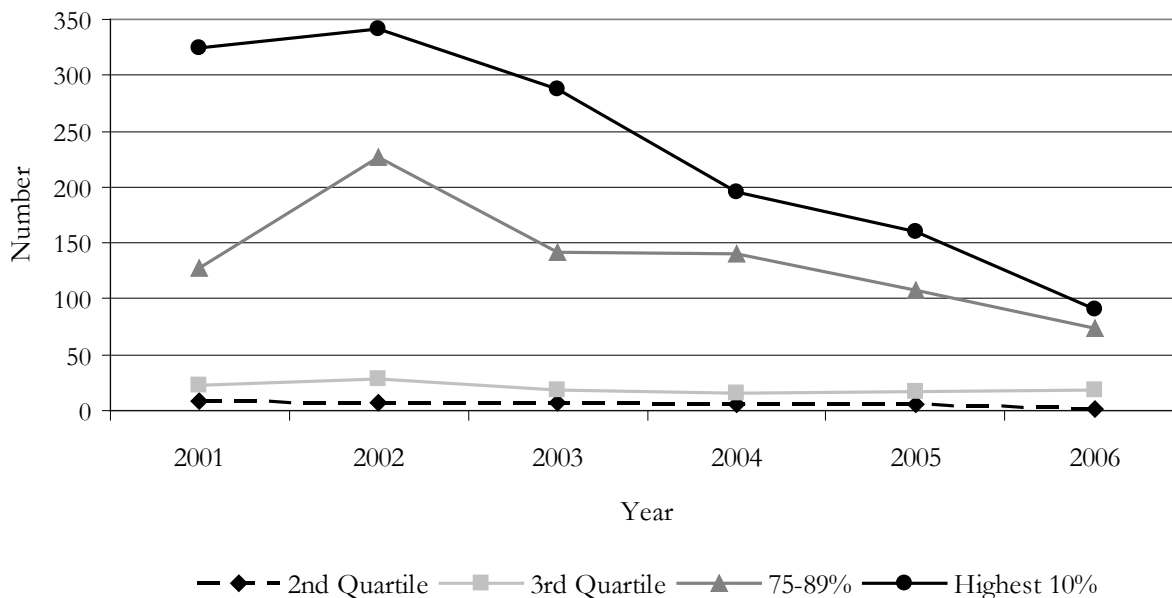


Figure 6. Trends in the Number of Not-Fully Certified New Teachers in Chicago by School Poverty Quartile

While NCLB required districts in Illinois to eliminate the use of not-fully certified teachers, state and local policies, including the introduction of alternative certification routes in Illinois in 1999 and Chicago's human capital efforts, complemented and supported NCLB and enabled schools, especially those in Chicago, to make considerable progress toward this goal. By our estimates, the decline in the percentage of not-fully certified teachers in Chicago, where the largest change in that component of ITAC occurred, accounted for just under half (about 46%) of its 0.43 standard deviation improvement in ITAC. This percentage was slightly higher (over 48%) in Chicago's highest poverty and highest minority quartile schools. The decline in not-fully certified experienced teachers and the decline in hiring of not-fully certified new teachers in Chicago contributed about equally to this improvement.⁸

Aside from the State's decision to increase the passing score on the Basic Skills test, no other policy change explicitly targeted the academic qualifications of Illinois teachers. Nonetheless, the other component of ITAC that improved most significantly between 2001 and 2006 was the mean ACT composite scores of teachers. Looking more closely at changes in this component for experienced versus new teachers (Figure 7), we see that the ACT composite scores of the 2001 cohort of experienced teachers declined slightly in all locales from 2001 to 2006 as some of those teachers left the profession or moved across schools.⁹ Although not shown, the same trends were

⁸ We estimated these percentages by determining what the increases in ITAC in Chicago overall and in its highest poverty and minority schools would have been had only the percentage of not-fully certified teachers changed between 2001 and 2006.

⁹ Town and rural school teachers are excluded in an effort to simplify Figure 6. The trends in those locales were qualitatively similar to those in the locales shown.

found across locales for these teachers' mean ACT English scores and their mean college competitiveness rankings as well. The greatest decline in the mean ACT composite score among experienced teachers occurred in Chicago (-0.17 points), which actually widened the already existing gap in ACT scores between experienced teachers in Chicago and other locales. This pattern of slight decline in the qualifications of experienced teachers was not restricted to the most disadvantaged schools in the state, although low and high poverty suburban schools and low minority non-Chicago urban and low minority suburban schools actually registered increases during this period. In general, the declines in experienced teachers' qualifications tended to be greatest in the highest minority schools in locales outside of Chicago where overall declines in ITAC occurred. These trends suggest that suburban and low minority non-Chicago urban schools in Illinois may have benefitted at the expense of high minority schools in those locales, although more research is needed to determine whether the movements of experienced teachers across locales and/or school type are responsible for these changes. In general, our results largely correspond with those other studies, which show that more academically skilled teachers tend to leave the profession at higher rates than less academically skilled teachers or move to schools with lower percentages of disadvantaged students (Boyd et al., 2005; DeAngelis & Presley, 2007; Hanushek et al., 2004; Lankford et al., 2002; Scafidi et al., 2007).

During the same timeframe, the average ACT composite scores of new teachers increased and exceeded the scores of experienced teachers as schools hired new teachers with increasingly higher scores (Figure 7).¹⁰

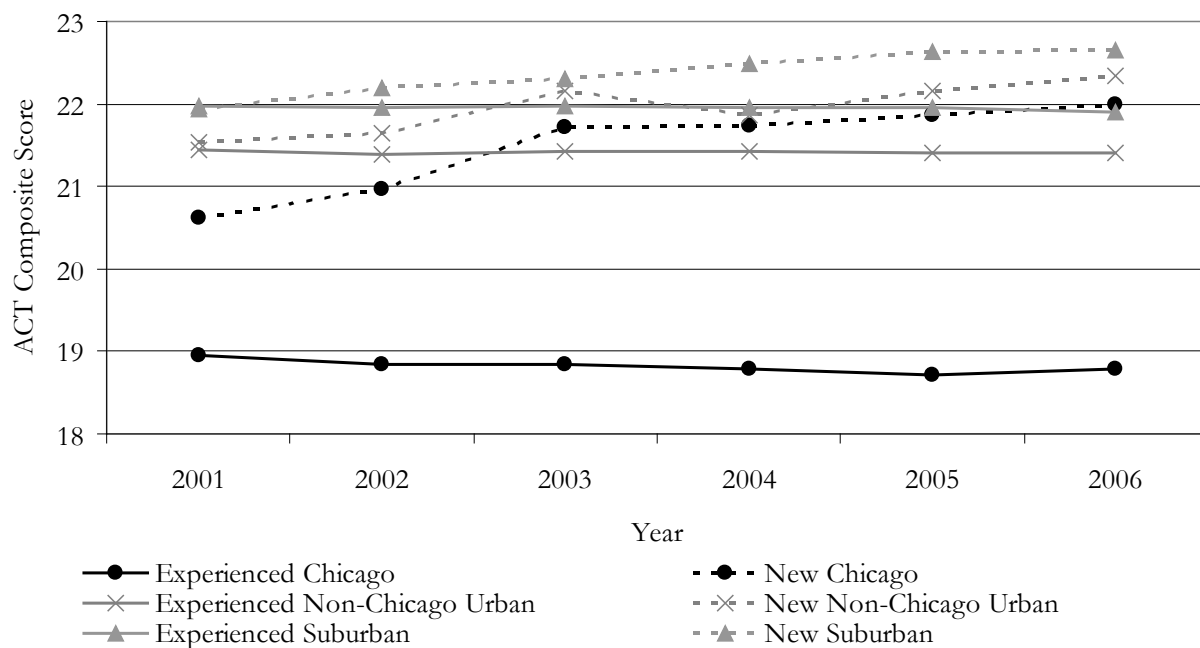


Figure 7. Trends in ACT Composite Scores for Experienced Teachers in 2001 Cohort and New Teachers in Each Year by School Locale Type

¹⁰ The average composite score of all Illinois students who took the ACT exam increased by 0.5 points between 1994 and 2001 from 21.1 to 21.6. This exceeded the national increase of 0.2 points during that period (data compiled from the ACT website: www.act.org/news/data.html). The gains in average ACT composite scores among new teachers documented in this study reflect to some extent this broader trend in ACT scores at the state level.

The improvement in new teachers' ACT scores was especially pronounced in Chicago, where new teachers' ACT scores exceeded experienced teachers' scores at the beginning of the period, even before nearly all of the policy changes, and increased more markedly thereafter. Thus, the overall improvement in mean ACT composite scores was driven by the hiring of new teachers with stronger academic skills.

Illinois schools that registered the most marked improvements in ACT composite scores and ITAC scores more generally, namely Chicago schools and the highest poverty and highest minority schools overall, were also the ones that registered the greatest increases in the employment of inexperienced teachers (Table 4). In Chicago, for example, the percentage of teachers with no more than three years of experience increased by nearly 20% from an average of 17.4% of teachers in each school in 2001 to an average of 20.8% in 2006. Similarly, the average percentage of inexperienced teachers in the highest poverty and highest minority schools in Illinois rose by about 24%, but declined in most other school types. This increasing reliance on inexperienced teachers by the most disadvantaged schools proved beneficial with regard to their teachers' qualifications because new teachers tended to bring with them stronger academic qualifications, on average, than those possessed by experienced teachers in those schools.

Table 4.
Percentage of Inexperienced Teachers by School Type, 2001 and 2006

	2001	2006	Difference 2006 - 2001	Percentage Change
<i>Locale</i>				
Chicago	17.4	20.8	+3.4	+19.5
Non-Chicago Urban	18.9	16.2	-2.7	-14.3
Suburban	20.1	18.4	-1.7	-8.5
Town	13.8	13.2	-0.6	-4.3
Rural	17.6	15.3	-2.3	-13.1
<i>Poverty Level (% FRL)</i>				
First Quartile				
Lowest 10%	19.6	17.4	-2.2	-11.2
11 th to 25 th %ile	18.4	17.1	-1.3	-7.1
Second Quartile	17.2	16.0	-1.2	-7.0
Third Quartile	16.4	16.5	+0.1	+0.6
Fourth Quartile				
75 th to 89 th %ile	19.0	20.4	+1.4	+7.4
Highest 10%	17.9	22.2	+4.3	+24.0
<i>Percent Minority Students</i>				
First Quartile				
Lowest 10%	17.4	14.5	-2.9	-16.7
11 th to 25 th %ile	16.0	13.7	-2.3	-14.4
Second Quartile	17.4	16.8	-0.6	-3.4
Third Quartile	18.7	18.1	-0.6	-3.2
Fourth Quartile				
75 th to 89 th %ile	21.6	21.4	-0.2	-0.9
Highest 10%	17.9	22.3	+4.4	+24.6

NCLB did not directly target these academic qualifications of teachers, however the federal policy prompted Illinois to address teachers' certification status, which is related to their academic characteristics. On average, teachers who entered through alternative routes in Illinois during our study period possessed stronger academic qualifications than both traditionally certified and not-fully certified new teachers. Similarly, traditionally certified teachers' qualifications generally were stronger than those of not-fully certified teachers except for the college competitiveness component of ITAC (Table 5). So, policies that influenced the substitution of fully certified teachers for those without full certification, including the introduction of alternative route programs in Illinois, the State's response to NCLB that limited the use of Type 39 and Type 29 certified teachers, and Chicago's efforts to recruit talented new teachers, had a positive effect on the academic qualifications of teachers in Illinois schools that relied most heavily on these new teachers.

Table 5.

Trends in the Academic Qualifications of New Illinois Teachers by Certification Type, 2001–2006

	Traditionally Certified	Alternatively Certified	Not-Fully Certified
Average ACT Composite Score			
2001	21.7	22.6	21.1
2002	21.9	25.6	20.8
2003	22.1	24.7	21.4
2004	22.1	25.7	21.6
2005	22.3	25.2	21.6
2006	22.2	23.7	22.1
Average ACT English Score			
2001	21.9	23.3	21.3
2002	22.1	26.6	20.9
2003	22.2	24.5	21.4
2004	22.2	25.3	21.7
2005	22.3	24.5	21.6
2006	22.3	23.4	22.0
Average College Ranking			
2001	3.13	4.32	3.23
2002	3.13	3.26	3.24
2003	3.13	3.56	3.27
2004	3.16	3.58	3.35
2005	3.21	4.10	3.33
2006	3.18	3.56	3.22
% Failed Basic Skills Test			
2001	2.99	0.00	12.97
2002	4.18	2.33	19.29
2003	4.97	0.00	22.12
2004	6.49	0.00	22.11
2005	7.24	0.00	25.68
2006	6.35	20.0	28.95

Although we cannot separate the effects of Chicago's comprehensive efforts to improve its teacher corps from the effects of NCLB and other policy changes at the state level in Illinois during this period, the large and generally consistent improvements in teacher qualifications in Chicago compared to the smaller, less consistent improvements in other locales suggest that district policies in Chicago played an important role in its outcomes. To get a better sense of the potential impact of district-level policies, we examined more closely changes in ITAC in schools in individual districts in non-Chicago urban and suburban locales, where, like Chicago, average teacher qualifications in the highest-poverty schools improved overall. In doing so, we found only eight districts — three non-Chicago urban districts and five suburban districts, all of which were substantially smaller than Chicago — that had success rates similar to Chicago in terms of improving the ITAC scores of high poverty schools in their districts (i.e., more than 70% of their high poverty schools improved). In the vast majority of districts, less than half, on average, of the highest poverty schools improved. While further study is needed to identify and assess the possible contribution of local policies in those other eight districts, these findings support the proposition that district commitment to change is an essential ingredient for the successful implementation of state and federal efforts.

Discussion

Although the overall level of teacher qualifications in Illinois showed only a slight uptick from 2001 to 2006, more significant improvements occurred in the state's most disadvantaged schools. Chicago schools in general, and its highest minority and highest poverty schools in particular, experienced the greatest gains in the qualifications of its teachers. These results for Chicago coincide closely with those found for New York City, where the distribution of teachers also became more equal between 2000 and 2005 (Boyd, Lankford, et al., 2008).

Positive changes in teachers' academic qualifications in Illinois, however, were not restricted to the state's largest urban district. High poverty schools in most locales outside of Chicago also benefitted from small to moderate average improvements. Coupled with slight declines in teacher qualifications in some low poverty schools, the gap in teacher qualifications between high and low poverty schools narrowed across the state. In contrast, average teacher qualifications in the highest minority schools in non-Chicago locales declined, and disparities between the highest and lowest minority schools in urban and town locales actually widened. While these schools constituted only a small fraction (about 12%) of the highest minority schools in the state, their lack of progress is troublesome. States' equity plans under NCLB, the only piece of the federal legislation that targeted inequities in teacher distribution based on students' minority status, were not submitted until mid-2006 (Loeb & Miller, 2006a; Peske et al., 2006). The fact that the distribution of inexperienced teachers across Illinois schools, which also is targeted by NCLB's equity provisions, failed to improve as well during this six-year study suggests that the lack of pressure placed on states and districts to address the equitable distribution of teachers may have contributed to these findings. Alternatively, it may be that there were important differences between high poverty schools with relatively low minority student populations and the highest minority schools in some Illinois locales that limited the latter schools' access to more academically skilled teachers. For example, the highest minority schools in non-Chicago urban areas began the period with the lowest average teacher qualifications of any school type in Illinois and those schools stagnated even further during the six-year period, whereas high poverty schools in those areas improved. Perhaps other policies, such as NCLB's accountability policies that require schools to demonstrate annual progress for subgroups of students, made high minority schools even less desirable for well-qualified teachers. Further study

is needed to assess the conditions in those schools and communities that contributed to these results.

The two attributes of Illinois' teachers that changed most dramatically were their certification status and ACT scores. In Chicago, for example, the average percentage of teachers in schools who were not fully certified declined by over 70% from 11.1% in 2001 to 3.2% in 2006. The employment of new teachers with stronger academic skills and reductions in the employment of new and experienced teachers without full certification both contributed to the changes in these attributes. This differs somewhat from Boyd, Lankford, et al.'s (2008) findings for New York City, where most of the improvements were driven by the qualifications and distribution of newly hired teachers. Moreover, Chicago schools increased their utilization of alternatively certified new teachers during the six-year study period, but the role that such teachers played in helping to fill vacant positions was more limited than it was in New York City.

Our results indicate that a number of policies, including NCLB's highly qualified teacher provisions, the introduction of alternative route programs in Illinois, and Chicago's comprehensive efforts to recruit talented new teachers, together had a positive impact on the level and distribution of teacher quality across some schools in Illinois, at least as measured by the academic background and preparation indicators used in this study. While it is not possible to disentangle the effects of the federal, state, and local policies that were implemented during this period, the fact that only Chicago and a handful of other districts were able to improve teacher qualifications in the majority of their most disadvantaged schools suggests that district policies played an important role during this time. Illinois has a long way to go before disparities in teacher qualifications across its schools are eliminated so additional efforts aimed at supporting and improving districts' capacity to address the recruitment and sorting of highly qualified teachers seem warranted.

Our results also indicate that NCLB's goal to simultaneously eliminate disparities across schools in teacher qualifications and teacher inexperience levels is placing competing demands on some schools. Illinois schools that registered the most marked improvements in teacher qualifications during the six-year period of this study were also the ones that became more reliant on inexperienced teachers. These new teachers tended to enter the profession with stronger academic qualifications, on average, than those possessed by experienced teachers in their schools. Yet, as noted earlier, research shows that both teachers' academic qualifications and their years of experience in the classroom affect student achievement, thereby posing a dilemma for schools like those in this study that appear unable to improve teacher qualifications and experience levels simultaneously. The recent study by Boyd, Lankford, et al. (2008) provides some guidance for schools and policy makers faced with this tradeoff. In that study, they estimated the average difference in effectiveness between teachers with top versus bottom quintile academic qualifications in the highest poverty schools in New York City to be about 0.11 standard deviations, roughly twice the average effect size of having an experienced versus a first-year teacher. This suggests that greater emphasis in the short term might be placed on recruiting more academically qualified teachers. Longer term, these schools will need to find ways to retain these teachers so that their students reap the benefits of both more academically skilled and more experienced teachers over time. Unfortunately, research on teacher attrition indicates that this will not be easy since teachers with strong academic backgrounds have been found to be less likely than those with weaker academic backgrounds to remain teaching in high poverty, high minority, and/or low performing schools (see, e.g., Boyd et al., 2005; DeAngelis & Presley, 2007).

Finally, it is important to keep in mind that the teacher qualifications considered in this study account for just a portion of the variation in actual teacher and teaching quality that exists across schools. Nonetheless, differences in these qualifications have been found to have a substantive, policy-relevant impact on student outcomes and, hence, should continue to be targeted by policy

makers and administrators. At the same time, there are clearly other, less easily measurable attributes of teachers that account for a significant portion of the differences in teacher effectiveness. Much more research is needed to identify what those are and to understand how those are distributed across schools.

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Appendix A.

ITAC Scores and Component Averages by School Type, 2001 and 2006

	ITAC		% Not-Fully Certified		% Failed Basic Skills Test		Mean ACT Composite Score		Mean ACT English Score		Mean College Competitiveness	
	2001	2006	2001	2006	2001	2006	2001	2006	2001	2006	2001	2006
<i>Locale</i>												
Chicago	-1.24	-0.81	11.13	3.24	10.06	9.85	19.11	19.74	19.57	20.08	2.93	2.92
Non-Chi. Urban	0.02	-0.01	2.50	2.46	3.01	3.66	20.93	21.03	21.59	21.53	3.08	3.05
Suburban	0.22	0.20	2.10	2.05	1.88	2.81	21.41	21.51	22.03	21.94	3.06	3.07
Town	0.19	0.16	0.77	1.16	0.63	1.52	21.12	21.23	21.76	21.72	3.04	3.02
Rural	0.23	0.21	0.98	1.02	0.83	1.63	21.26	21.39	21.89	21.82	3.04	3.03
<i>Poverty Level (% FRL)</i>												
First Quartile												
Lowest 10%	0.63	0.58	0.64	0.80	0.71	1.88	22.05	22.17	22.78	22.61	3.19	3.19
11 th to 25 th %ile	0.47	0.49	0.81	0.97	0.91	1.58	21.82	22.01	22.40	22.40	3.12	3.14
Second Quartile	0.33	0.26	1.00	1.40	0.91	1.91	21.54	21.55	22.07	22.00	3.07	3.06
Third Quartile	0.08	0.05	1.49	1.47	1.38	2.42	20.93	21.06	21.69	21.58	3.01	3.00
Fourth Quartile												
75 th to 89 th %ile	-0.53	-0.46	5.35	3.95	5.52	6.61	20.06	20.35	20.72	20.76	2.96	2.98
Highest 10%	-1.48	-0.99	12.01	3.77	11.37	10.68	18.74	19.45	19.15	19.76	2.88	2.89
<i>Percent Minority Students</i>												
First Quartile												
Lowest 10%	0.26	0.15	0.85	1.00	0.65	1.79	21.40	21.32	22.02	21.73	3.00	3.00
11 th to 25 th %ile	0.26	0.25	0.59	0.97	0.69	1.33	21.29	21.45	21.92	21.93	3.04	3.04
Second Quartile	0.35	0.34	0.63	0.96	0.66	1.64	21.48	21.65	22.11	22.12	3.09	3.09
Third Quartile	0.28	0.22	1.57	1.59	1.45	2.55	21.41	21.48	22.07	21.94	3.09	3.08
Fourth Quartile												
75 th to 89 th %ile	-0.46	-0.40	6.32	4.46	5.60	6.82	20.36	20.64	20.92	20.95	2.98	2.96
Highest 10%	-1.54	-1.08	11.22	3.66	11.67	11.02	18.55	19.20	18.96	19.49	2.88	2.90

Note: Average ITAC scores and differences in ITAC scores are in standard deviation units.

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