Examining the Distribution and Impact of Teacher Quality in Illinois

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Executive Summary

In a previous Illinois Education Research Council (IERC) policy research report, *The Distribution of Teacher Quality in Illinois* (IERC 2005-1), we introduced the Illinois Teacher Quality Index (TQI). The TQI is a school-level indicator of teacher quality that describes a school's concentration of certain teacher attributes that research suggests are associated with student performance. In this report, we continue our exploration of the TQI, its distribution, and its relationship to student performance outcomes.

Our analysis found a very strong negative relationship (r=-.63) between TQI and the percent of students with free/reduced lunches (FRL), our measure of schools' poverty. The relationship between TQI and poverty continues across all poverty levels. The correlation between TQI and school percent minority (-.58) is not quite as high, but still substantial. However, the relationship is not evident once percent minority falls below about 50%. The teacher-sorting process seems to be related consistently to school poverty, but is dramatically apparent as well in schools that are more than 90% minority.

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TQI and School Performance

We were interested in knowing whether schools with higher TQIs had better performance outcomes. We examined the relationship between TQI and school poverty and minority status separately, and found that TQI made a difference in school achievement—especially for high-poverty and high-minority schools. In order to look further into this poverty/minority/TQI interrelationship, we examined TQI and the performance of high minority/high poverty (HH) schools and low poverty/low minority (LL) schools directly. We found that both HH and LL schools continue to exhibit stronger school performance when they have higher school TQIs. Importantly, the strongest relationship between TQI and the performance continues

TQI matters, and matters most for the most disadvantaged schools.

to be demonstrated in the most disadvantaged schools—those that are both high poverty and high minority. The average percentage of elementary/ middle school students in HH schools meeting or exceeding state standards went up seven percentage points (for a 23% improvement) when TQIs moved from the lowest to the next TQI quartile. For HH high schools, the increase was 14 percentage points from the lowest to the middle-high quartile—more than doubling the success rates for these schools. In short, TQI matters, and matters most for the most disadvantaged schools.

Because we have several variables that are interrelated, we also did a regression analysis to measure the independent effects of school poverty status, minority status and TQI on performance outcomes. We confirmed that TQI has an independent relationship to school performance, even after taking into account the minority and poverty level of the school. Its influence is most important at the high school level, where an increase of one unit (1.0) in TQI (in this case that is one standard deviation) is related to an increase of 5.9 percentage points in the percent of students meeting or exceeding the Prairie State

Achievement Examination (PSAE) benchmark, on the average. For middle schools this improvement is about 2.9 percentage points, and for elementary schools 1.3 percentage points.

A one-unit (1.0) increase in TQI is related to an increase in high school performance of about 6 percentage points.

Regions of the State

The common assumption is that high-poverty schools are in urban or rural areas, but this does not hold completely in Illinois. While 80% of schools in the top 10% based on poverty are in Chicago, and another 8% are in other urban areas, about 10% are in what the Census classifies as suburban areas. Schools in the 50–89% poverty category are quite broadly distributed among Chicago, other urban areas and suburban areas. Looking at the least-poor schools, those with less than 10% poverty, almost none are located in Chicago (0.2%) or other urban areas (3%), while 72% are in suburban areas, and 24% are in rural areas. Most of the highest minority schools (99-100%) are in Chicago (80%), but 14% are in suburban areas. Like poverty, school minority concentration is not strictly an urban phenomenon in Illinois.

Schools with at least 90% poverty or minority status have much lower TQIs, on the average, whether they are located in Chicago, other urban areas, or a suburban area. But in addition, Chicago schools' TQIs, on average, are lower than schools with similar percent poverty or percent minority in other locales. In contrast, the least-poor schools have the highest school TQIs, on the average, independent of locale. High poverty and high minority schools are much more likely to have lower TQIs, no matter where they are located in the state.

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The Role of the District in the Distribution of School TQI

Districts play an important intermediary role in the recruitment of teachers and the allocation of resources, and most districts do not consist of a homogeneous array of schools. We looked at larger districts (those with at least 10,000 elementary/middle school students) and found that in districts with large proportions of very-high poverty and very-high minority schools, there are larger percentages of schools with very low TQIs, resulting not only in lower average teacher quality in the district, but also in a larger span between the schools with the most-qualified and least-qualified teachers, as measured by the TQI. The gap between the highest TQI schools and the lowest TQI schools within these large districts widens as the percentage of high-minority or high-poverty schools rises. Districts with larger proportions of high-poverty or high-minority schools generally have a broader range of school TQIs. But there are some exceptions that may provide insight about how to organize the teacher-sorting process so that it leads to more equitable distribution. We hope to continue the analysis of within-district distribution differences as the next phase of our research.

Strategies for Change

We have shown that schools that serve large proportions of poor and minority students are likely to demonstrate stronger school academic performance outcomes when their cadre of teachers, on the average, have more of the positive attributes and fewer of the negative attributes that are measured by the TQI. And TQI is related to school performance even after taking account of school demographics. This finding does not lead to a simple solution to closing the achievement gap, because we know that teachers usually take advantage of a competitive labor market to seek out what they perceive to be supportive teaching opportunities—and this often means that less-poor, less-intensely minority schools can attract better teachers. This sorting process takes place even within districts, and leaves the most disadvantaged schools with the fewest opportunities to select the most capable teachers—and yet the data provided in this report show that this is exactly where the effects of a stronger cadre of teachers manifest themselves most strongly. What strategies might contribute to improving teacher quality in high poverty/high minority schools?

➢ *Every school should be a place where high quality teachers want to teach.*

- **Community and state support.** Communities and the state need to ensure that every school building is safe, clean and fully equipped for 21st century learning. Illinois has the second largest funding gap among the states between its highest-funded districts and its lowest-funded districts. Not only is the funding gap large, but Illinois ranks in the bottom third of states in funding to its high-poverty schools. The state needs to address this funding challenge if it wants to provide the opportunity for all of its children to reach their fullest potential.

- **District and school leadership.** District leaders need to ensure that school leadership is conducive to high expectations for teaching and learning. Teachers who are competitive in the teacher labor market are not going to stay at schools where they are not treated with the professional regard they deserve or where their high expectations are undermined by a less-demanding learning culture.

➢ *Every teacher should be a person that a school wants to hire and retain, and a parent wants in their child's classroom.*

- **Rigorous training.** Teacher education programs need to set high expectations for the academic achievement of all of their students. Content expertise, particularly for middle and high schools grades, needs to be rigorously developed and maintained.

- **In-service support.** Schools and districts need to strengthen in-service content and pedagogical support to teachers in key disciplines.

➢ *Human resources policies should place a priority on getting and keeping high quality teachers in the most needy schools.*

- **Hiring and retention.** Schools and districts should consider teachers' own academic success as one of the essential criteria for recruitment. We acknowledge that the TQI does not capture all (or perhaps much) of what distinguished a good teacher from a mediocre teacher, or an excellent teacher from a good teacher, but research does suggest that teacher academic preparation matters. Schools need a critical mass of teachers with strong content and pedagogical expertise to build the disciplinary teams that all schools need.

- **Placement and transfer practices.** Districts and teacher unions have a responsibility to examine hiring and seniority rules, and budget allocations, that may hinder some schools from building the cadre of talented teachers that they especially need to meet the special needs of high-poverty, high minority schools within districts. This may include providing financial incentives for high quality teachers to teach in disadvantaged schools.

The solutions are not easy, but our students deserve nothing less than our all-out effort to improve the quality of their schools. This report sheds some new light on the challenges and potential solutions.

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Introducing the Teacher Quality Index

In a previous Illinois Education Research Council (IERC) policy research report, *The Distribution of Teacher Quality in Illinois* (DeAngelis, Presley and White, IERC 2005-1), we introduced the Illinois Teacher Quality Index (TQI). The TQI is a school-level indicator of teacher quality that describes a school's concentration of certain teacher attributes that research suggests are associated with student performance. In this report, we continue our exploration of the TQI, its distribution, and its relationship to student performance outcomes.

Measuring Teacher Quality[1]

The TQI is composed of six different school-level measures that have been shown in previous research to make a difference for student performance (see IERC 2005-1, pp. 4-5 for a summary of this work): teachers' average ACT composite score, teachers' average ACT English score, percent of teachers failing the Basic Skills Test on their first attempt, percent of teachers with emergency or provisional certification, teachers' average undergraduate college competitiveness ranking, and percent of teachers with three or fewer years of experience.[2] These measures are combined using a statistical procedure called principal components analysis (PCA) to produce a school-level TQI score. These measures, and the weights derived by PCA for each, appear in Table 1 below. Elements in the table with a negative weight decrease a school's TQI and those with a positive weight increase the TQI, while those farther away from zero contribute more than those weighted closer to zero. (For a full description of how the TQI was created, please see IERC 2005-1.)

Table 1.
Components of the TQI

TQI Component	Weight
Teachers' average ACT composite score	0.861
Teachers' average ACT English score	0.859
% of teachers failing the Basic Skills Test on their first attempt	-0.691
% of teachers with emergency or provisional certification	-0.577
Teachers' average undergraduate college competitiveness ranking	0.520
% of teachers with three or fewer years of experience	-0.044

[1] We acknowledge Karen DeAngelis who was previously Assistant Director, IERC, for the design of the TQI. She is now Assistant Director for Evaluation, Cornerstone: The Center for Advanced Learning, at Washington University in St. Louis.

[2] The IERC has ACT composite scores for about 80% of Illinois' teachers with five or fewer years of teaching experience (as of 2002-2003, the year that is used for this analysis). These percentages drop to 65, 50, 30 and one percent for teachers with 6–10, 11–15, 16–20, and 20 or more years of experience, respectively. Thus the average ACT score for a school with more experienced teaching staff is likely to be somewhat less representative than that for a school with a less experienced teaching staff.

Schools with high TQI scores have higher concentrations of teachers with the attributes shown to be positively related to student achievement, and lower concentrations of those found to have a negative relationship with student achievement. By design, the average TQI for all schools in the state is zero, so schools with negative TQI scores have below average overall teacher quality while those with positive TQI scores have above average teacher quality. Figure 1 shows the overall distribution of school TQI scores throughout the state.

On average, high schools have slightly higher teacher quality indices than elementary schools. As Table 2 shows, this is because teachers in high schools have higher average ACT composite scores, are less likely to have failed the Basic Skills Test on their first attempt, are less likely to hold emergency or provisional credentials, and tend to graduate from more competitive colleges.[3]

Figure 1.
TQI Distribution
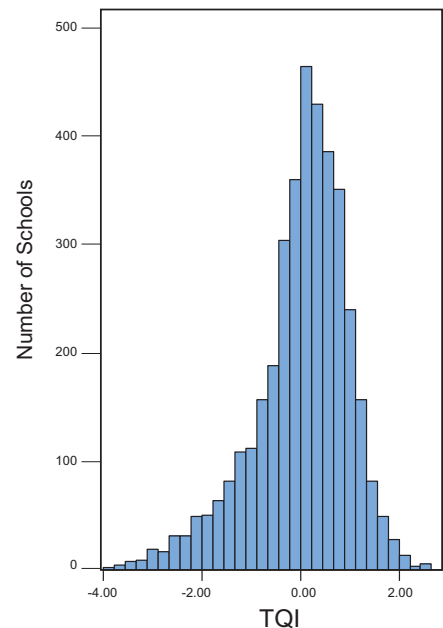
Table 2.
Average Teacher Attributes

	All Schools	Elementary / Middle	High Schools
Number of Teachers (2002-2003)	140,668	99,600	41,068
Teachers' average ACT composite score	21.5	21.0	22.8
% of teachers who failed Basic Skills Test on first attempt	4.2%	4.6%	3.1%
% of teachers with emergency or provisional credentials	2.4%	2.6%	1.9%
Teachers' average undergraduate college competitiveness ranking	3.1	3.0	3.2
% of teachers with three years or fewer of teaching experience	18.5%	18.5%	18.4%

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[3] Past research corroborates these findings. In *Paths to Teaching* (IERC.2001.1) the IERC analyzed a national data set and found that high school teachers are more similar to non-teaching college graduates than to elementary grade teachers. Middle-grade teachers fall between the two groups.

> ➤ *TQI quartiles*

For this report, we divide the population of Illinois schools into quartiles based on their TQIs. (More information on the TQI scale is provided in the Technical Appendix.) In addition, we isolate the lowest 10% of TQIs within the bottom quartile to examine these schools in more detail. We use these school TQI groupings throughout the report. Table 3 shows how teacher characteristics differ among the TQI quartiles and in the bottom 10%.

Table 3.
Average School Level Teacher Attributes by School TQI Quartile

TQI Component	Highest Quartile	Middle-High Quartile	Middle-Low Quartile	Lowest Quartile 11-25%	Lowest Quartile 0-10%
Teachers' average ACT composite score	23.1	21.6	20.6	19.6	18.2
Teachers' average ACT English score	23.7	22.3	21.2	19.9	18.4
% of teachers who failed the Basic Skills Test on first attempt	0.6%	1.0%	2.5%	6.0%	16.0%
% of teachers with emergency or provisional credentials	0.4%	0.7%	1.0%	3.0%	10.0%
Teachers' average undergraduate college competitiveness ranking	3.3	3.1	3.0	2.9	2.8
% of teachers with three or fewer years of teaching experience	16.5%	17%	18%	19%	18%

Table 3 shows consistent patterns for ACT scores, the percent of teachers who failed the Basic Skills Test on the first attempt, the percent of teachers with emergency or provisional credentials, and teachers' average undergraduate college competitiveness rankings, with top quartile schools having greater concentrations of the positive components and lower concentrations of the negative components than lower-quartile schools. In top quartile schools, the average school ACT for teachers is 23.1, less than 1% failed the Basic Skills Test on their first attempt, and just 0.4% are not fully certified.[4] In the lowest 10% of schools, in contrast, the average ACT is 18.2, 16% of teachers failed the Basic Skills Test on their first attempt, and 10% hold emergency or provisional certification.

Finally, we note that years of experience is quite similar across all groups (and it had only a small weight in the TQI). This means that the proportion of inexperienced teachers at a school does not contribute much to variations in TQI.

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[4] The highest possible ACT score is 36. For a frame of reference, the average ACT score for highly competitive colleges is 27-28. The average ACT score for all Illinois test takers in 2002 was 20.1.

School Demographic Characteristics and TQI

Prior research has shown that high-minority, high-poverty schools are less likely to have teachers with the positive characteristics and more likely to have teachers with the negative characteristics that we used to create the TQI (see IERC 2005-1 for a review of this literature). We were interested to see the extent to which this was true in Illinois.

The Distribution of Schools by Poverty and Minority Status

For this analysis, we divided schools into groups based on the proportion of their students with free/reduced lunches (FRL), our measure of schools' poverty, and the proportion of their students who were minority. The two distributions are shown in Figure 2 and Figure 3. Over a quarter (28%) of Illinois schools are either at least 50% poverty or 50% minority, with 11% and 15% respectively in the 90%+ categories.

Figure 2.
Percent Poverty
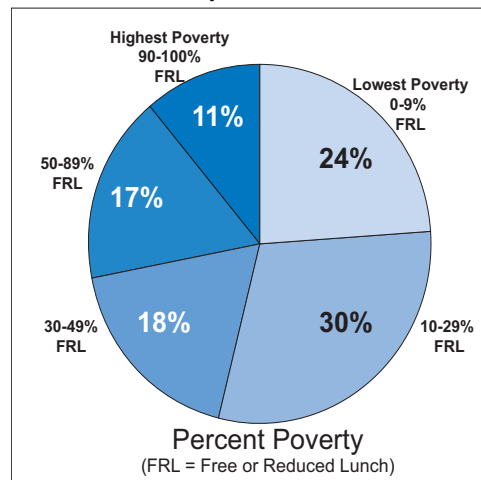
Figure 3.
Percent Minority
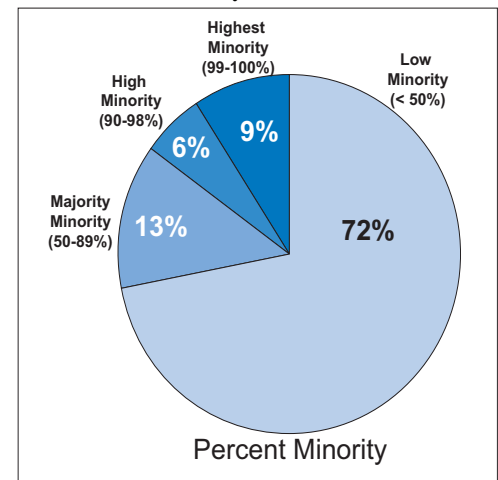
In Illinois, as throughout the country, schools that are high minority are also likely to be high poverty. Table 4 shows the relationship between these two school characteristics for Illinois public schools. Only three low minority schools (0.1% of such schools) fall into the highest school poverty category, while 263 of the highest minority schools (73% of such schools) do so. Just 28 schools that are 90% or more minority (high or highest minority) are less than 50% poverty.

Table 4.
Distribution of Schools by School Percent Minority and Percent Poverty

Minority Category	Poverty Category					
	0 - 9.9% FRL Lowest Poverty	10 - 29.9% FRL	30 - 49.9% FRL	50 - 89.9% FRL	90 - 100% FRL Highest Poverty	Total
Low minority	894	1,063	586	205	3	2,751
Majority minority	16	75	99	257	35	482
High minority	4	6	12	109	102	233
Highest minority	0	1	5	93	263	362
Total	914	1,145	702	664	403	3,828

➢ *School Demographics and TQI*

Our analysis found a very strong negative relationship (r=-.63) between TQI and schools' poverty. Figure 4 shows the distribution of school TQIs across five school poverty categories. The correlation between TQI and poverty continues across all of the school-poverty categories, showing a consistently negative relationship between TQI and poverty.

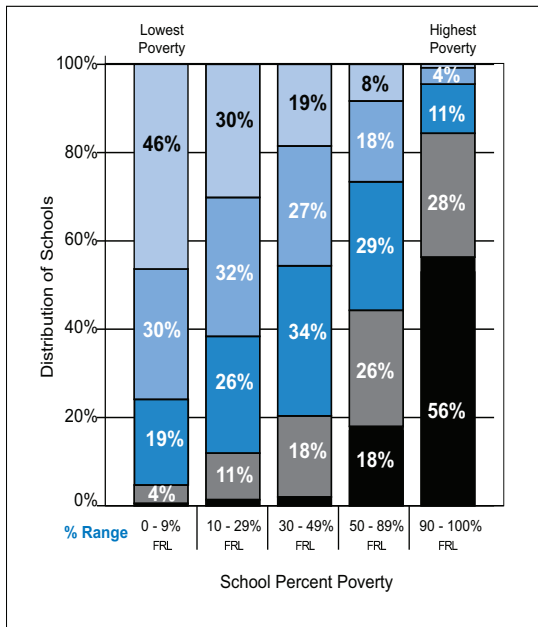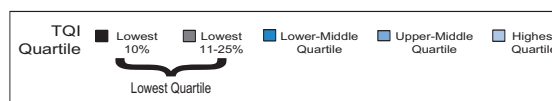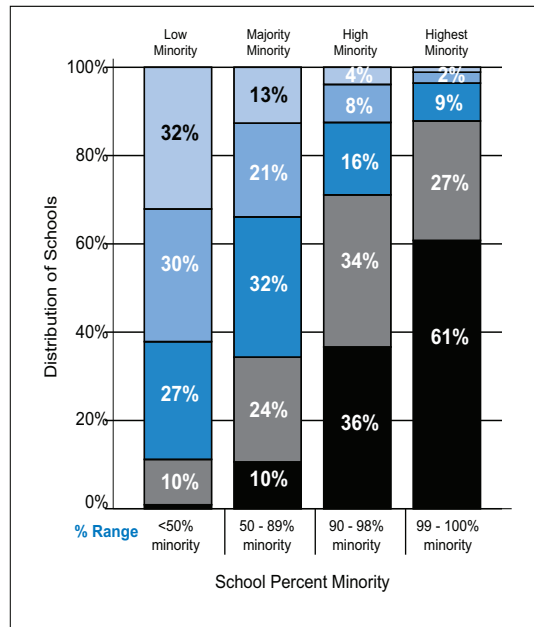**Figure 4.**
TQI by School Percent Poverty

Figure 5.
TQI by School Percent Minority

The correlation between TQI and school percent minority (-.58) is not quite as high as percent poverty, but still substantial. Examining the TQI distribution by school minority categories, we found that, for schools above about 50% minority, TQI generally decreases as the concentration of minority students increases. For schools below about 50% minority, there was little variation in the distribution of TQI when percent minority varied. So we grouped all schools that were less than 50% minority into one category, labelled "low minority." Most low minority schools have TQIs above the bottom quartile (Figure 5 on the previous page). Two-thirds of majority-minority (50%–89%) schools are above the bottom quartile. It is only when we move to high (90%–98%) and highest (99%–100%) minority schools that we see the predominance of TQIs in the bottom quartile, and even more strikingly, in the lowest 10%. Finally, we can see in Table 5 that schools that are both in the highest minority and in the highest poverty categories are the most likely to have the lowest school TQIs.

Schools that are both in the highest minority and highest poverty categories are most likely to have the lowest school TQIs.

Table 5.
Average TQI by School Percent Minority and Percent Poverty

Minority Category	Poverty Category					
	0 - 9.9% FRL Lowest Poverty	10 - 29.9% FRL	30 - 49.9% FRL	50 - 89.9% FRL	90 - 100% FRL Highest Poverty	Total
Low minority	0.58	0.34	0.13	-0.04	—	0.35
Majority minority	-0.03	0.13	-0.09	-0.34	-0.65	-0.23
High minority	—	—	-0.93	-0.88	-1.37	-1.08
Highest minority		—	—	-1.40	-1.69	-1.60
Total	0.57	0.32	0.08	-0.48	-1.51	0.00

— = fewer than 10 schools

School Poverty Status, TQI and School Performance

The performance of schools with higher concentrations of poverty are more dependent on those attributes of their teachers that are measured by the TQI than are schools with fewer children in poverty.

Table 6, on the next page, shows that average performance of elementary/middle schools on the Illinois Standards Achievement Test (ISAT) improves most for schools in the highest two poverty categories as TQI increases. This suggests that the performance of schools with higher concentrations of poverty are more dependent on those attributes of their teachers that are measured by the TQI than are schools with fewer children in poverty. Looking across the rows in Table 6, however, we can see that school ISAT performance increases even more as school poverty decreases in each of the TQI categories. That is, higher TQI helps, but does not level the playing field with regard to challenges that schools with high poverty face.

Table 6.
Average School Percent of Students Meeting or Exceeding ISAT State Standard by School Poverty and TQI (Elementary/Middle Schools)

TQI Quartile	Poverty Category					
	0 - 9% FRL Lowest Poverty	10 - 29% FRL	30 - 49% FRL	50 - 89% FRL	90 - 100% FRL Highest Poverty	Total
Highest	83.5	73.1	65.3	56.4	– (N=3)	75.2
Middle-High	79.6	72.4	66.4	53.8	42.9	70.3
Middle-Low	79.5	70.9	64.9	53.2	38.4	65.8
⎰ Lowest 11-25%	77.8	72.0	64.3	48.2	34.3	55.6
⎱ Lowest 10%	– (N=4)	69.5	55.5	43.8	31.4	37.9
Total	81.0	72.1	65.0	50.5	33.4	64.0
Point change (lowest to highest)	5.7	3.6	9.8	12.6	11.5	11.2
Percent improvement	7%	5%	18%	29%	37%	30%

Higher TQI helps, but does not level the playing field with regard to challenges that schools with high poverty face.

At the high school level, the impact of higher TQI is even more evident for higher-poverty schools (Table 7). For schools with at least 50% poverty, the percent of students meeting or exceeding state Prairie State Achievement Examination (PSAE) standards increases from 13.7% to 32.5% (up 18.8 points, or 137%) as TQI moves from the lowest quartile to the second-highest quartile. (There were too few highest-poverty high schools with TQIs in the top quartile for analysis.)

Table 7.
Average School Percent of Students Meeting or Exceeding PSAE State Standard by School Poverty and TQI (High Schools)

TQI Quartile	Poverty Category				
	0 - 9% FRL Lowest Poverty	10 - 29% FRL	30 - 49% FRL	50 - 100% FRL Highest Poverty	Total
Highest	66.4	57.5	50.6	– (N=7)	60.5
Middle-High	60.1	54.9	49.7	32.5	52.6
Middle-Low	58.0	50.7	45.4	27.0	45.5
Lowest	– (N=1)	50.8	– (N=6)	13.7	25.2
Total	64.5	55.1	47.6	23.5	52.4
Point change (lowest to highest)	8.3	6.8	5.2	18.8	35.3
Percent improvement	20%	13%	11%	137%	140%

Because of the small number of high schools in many cells, we combined some categories in this table.

School Minority Status, TQI and Performance

We now turn to the relationship between school racial/ethnic composition, TQI and school performance. We can see in Table 8 that the average school ISAT performance increases as TQI quartile increases. Average school performance increases by about 7 percentage points or 22% in the highest minority schools with TQIs in the higher quartiles compared to those with TQIs in the lowest quartile. We provide the average school performance of the 11 highest-minority schools with higher TQIs, and note that there do not appear to be performance gains over schools with TQIs in the middle-low quartile. Given the small number of schools in this group, it leaves open the question whether we could reasonably expect performance gains, on the average, if more highest-minority elementary/middle schools had higher school TQIs.

We also see in Table 8 that low minority elementary/middle schools whose TQIs fall into the lowest 10% still have average school ISAT performance that exceeds majority minority schools with TQIs in the highest quartile (68.5% vs 63.3%). Additional analyses showed that the former schools are "less poor" on the average than the latter schools, with an average poverty rate of 28% compared to 40%. We explore high poverty/high minority schools further in the next section of this report.

Table 8.
Average School Percent of Students Meeting or Exceeding ISAT State Standard by School Percent Minority and TQI (Elementary/Middle Schools)

TQI Quartile	Minority Category				Total
	Low Minority <50%	Majority Minority 50-89%	High Minority 90-98%	Highest Minority 99-100%	
Highest	76.6	63.3	– (N=6)	N=11 38.0	75.2
Middle-High	72.9	56.3	47.7		70.3
Middle-Low	70.1	54.9	45.9	38.4	65.8
Lowest 11-25%	68.9	53.9	42.4	31.5	55.6
Lowest 10%	68.5	49.8	39.5	31.2	37.9
Total	72.6	55.3	42.5	32.0	64.0
Point change (lowest to highest)	8.1	13.5	8.2	6.8	11.2
Percent improvement	12%	27%	21%	22%	30%

At the high school-level, the effect of school TQI is again more evident (Table 9). The proportion of students meeting/exceeding the PSAE standards increased by 14.7 to 16.8 percentage points as the TQI quartile increased for all of the school minority categories. However, the percent improvement is most dramatic for high/highest -minority schools, with an improvement of 161%, from the lowest TQI quartile to the second highest quartile. (There are not enough high/highest-minority high schools with TQIs in the highest quartile for analysis).

Table 9.
Average Percent of Students Meeting or Exceeding PSAE State Standard by School Percent Minority and TQI (High Schools)

TQI Quartile	Minority Category			Total
	Low Minority <50%	Majority Minority 50-89%	High/Highest Minority 90-100%	
Highest	61.2	49.2	– (N=2)	60.5
Middle-High	55.4	44.0	26.6	52.6
Middle-Low	51.8	32.4	23.9	45.5
Lowest	46.5	– (N=6)	10.2	25.2
Total	57.6	38.1	16.8	52.4
Point change (lowest to highest)	14.7	16.8	16.4	35.3
Percent improvement	32%	52%	161%	140%

Because of the small number of high schools in some cells, we combined some categories in this table.

As with elementary/middle schools (Table 8), school poverty helps to explain why low-minority schools with lowest quartile TQIs perform almost as well as majority-minority schools with TQIs in the highest quartile (46.5% vs 49.2%). The average percentage poverty of the former is 25%, compared to 43% for the latter group of schools.

High Poverty/High Minority Schools and TQI

We showed earlier that most of the schools we categorize as high poverty are also high minority schools (Table 4). In this section, we examine whether the increases in school performance that we attribute to higher TQIs for high-minority schools are not in fact simply due to differences in school poverty levels within minority categories (and vice versa). So, here we look at TQI and the performance of high minority/high poverty (HH) schools and low poverty/low minority (LL) schools directly. The results are shown in Table 10 on the next page. HH and LL schools continue to exhibit stronger school performance when they have higher school TQIs. The strongest relationship continues to be demonstrated in the most disadvantaged schools—those that are both high poverty and high minority. The average percentage of students meeting or exceeding ISAT standards went up seven percentage points (a 23% increase) when TQIs moved from the lowest quartile to the second lowest quartile. (There were not enough high-poverty/highest-minority schools in the top two TQI quartiles for analysis.) For PSAE, the increase was 14 percentage points to the middle-high quartile—more than doubling the success rates for HH schools in the lowest 10% TQI. (There were not enough high-poverty/high-minority high schools in the top TQI quartile for analysis.) In short, TQI matters, and matters most for the most disadvantaged schools.

TQI matters, and matters most for the highest poverty/highest minority schools.

Table 10.
School Performance by TQI for Low Minority/Low Poverty and High Minority/High Poverty Schools

TQI Quartile	Percent Meeting/Exceeding ISAT Standard (Elementary/Middle Schools)		Percent Meeting/Exceeding PSAE Standard (High Schools)	
	Lowest Poverty/ Low Minority LL	Highest Poverty/ Highest Minority HH	Lowest Poverty/ Low Minority LL	≥50 % Poverty/ High/Highest Minority HH
Highest	84%	– (N=2)	66%	– (N=1)
Middle High	80%	– (N=2)	60%	25%
Middle Low	79%	37%	58%	18%
Lowest 11-25%	78%	30%	– (N=1)	10%
Lowest 10%	– (N=4)	30%	– (N=0)	11%
Point change (lowest to highest)	6	7	8	14
Percent improvement	8%	23%	14%	127%

Because of the small number of high schools in many cells, we combined some categories in this table.

Multiple Regression Results

We have shown in this report that school percent minority and percent poverty are strongly related to TQI, and that each has an independent relationship to school performance. We did this by drilling down through the data to examine just those schools that are the highest poverty/highest minority and comparing those results to schools that are the lowest poverty/low minority.

One of the complications of an analysis such as this is that a number of important variables are themselves related to one another—percent minority to percent poverty, and TQI to percent minority and percent poverty. Multiple regression is a statistical method for looking at these school characteristics simultaneously, and provides the possibility for examining the independent effect of a variable on an outcome (in this case school performance as measured by the percent of students meeting or exceeding state standards on ISAT or PSAE). So we conducted regression analysis on our data and provide key findings here. The detailed regression results are in the Technical Appendix.

An increase of 1.0 in TQI is related to an increase of 5.9 percentage points in the percent of students meeting or exceeding the PSAE benchmark, on the average.

The R-square statistics obtained from the regression models for each school level shows that the variables we include explain a high percentage of the variance in outcomes across schools (68-76%). Table A3 confirms that TQI has an independent relationship to school performance, even after taking into account the minority and poverty level of the school. Its influence is most important at the high school level, where an increase of 1.0 in TQI (in this case that is one standard deviation) is related to an increase of 5.9 percentage points in the percent of students meeting or exceeding the PSAE benchmark, on the average. For middle schools this improvement is about 2.9 percentage points, and for elementary schools 1.3 percentage points.

School Geographic Characteristics and TQI

Regions of the State and TQI

Figure 6 shows the TQI distribution across the seven geographic regions we analyzed: the Chicago Public Schools (we analyzed this district separately because of its unique size), the Northeast region excluding Chicago Public Schools, the East Central, Northwest, Southeast, Southwest, and West Central regions of Illinois.

Chicago schools' TQI scores are quite different from the general distribution in other regions. In the East Central, Northeast, Northwest, and West Central regions, 10–16% of the schools fall into the lowest TQI quartile in the state and 29%–39% of the schools are in the highest TQI quartile in the state. The two southern regions of the state have fewer schools with TQI scores in the top quartile overall and more in the lowest quartile. But these differences pale in comparison to Chicago Public Schools where there is a much larger proportion of schools falling into the state's lowest quarter of school TQI scores—77% of Chicago public schools are in this lowest quartile—and 49% of CPS schools fall into the lowest 10% of TQI scores in the state.

Figure 6.
TQI by Region
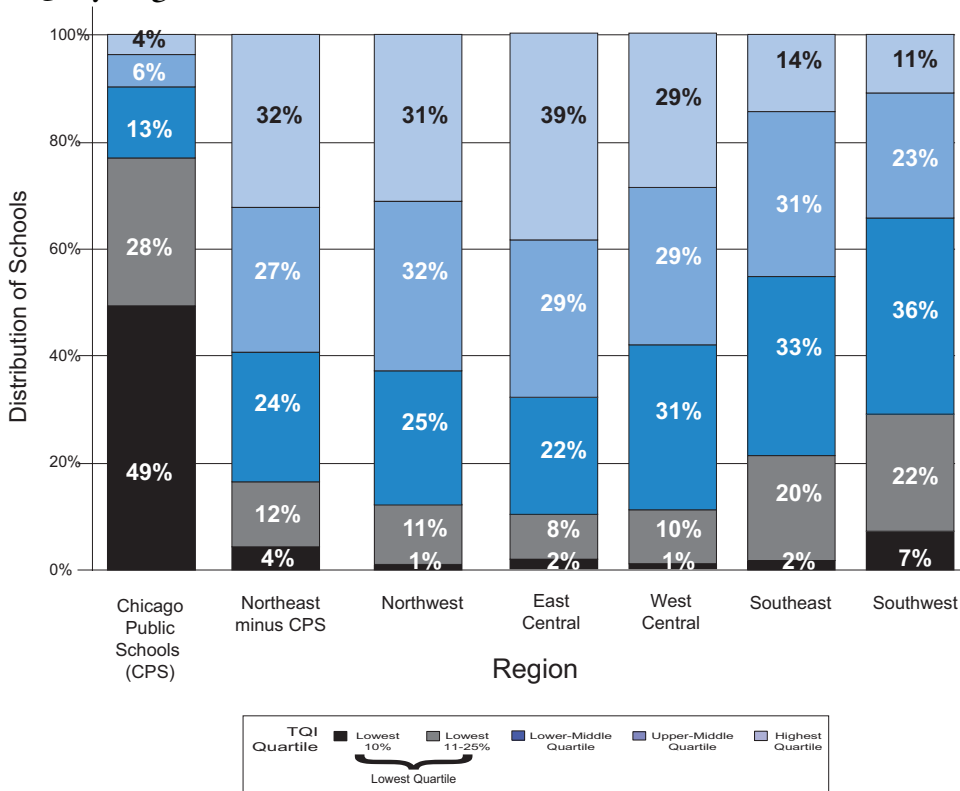
What might help to explain these differences? We know that the seven analytic regions have quite different compositions of urban, suburban, town and rural areas. We also have just shown that schools of high poverty and minority composition have much lower TQIs than less poor and lower minority schools. So, in this section, we examine schools based on their geographic locale and demographic characteristics. We then explore the relationship between school poverty, locale, and school TQI and present a parallel analysis using school percent minority in the following section.

Locale, School Poverty, and TQI

We start by looking at the locale of schools that fall into the five poverty categories. The common assumption is that high-poverty schools are in urban or rural areas, but we see in Table 11 this does not hold completely in Illinois. While 80% of schools in the top 10% based on poverty are in Chicago, and another 8% are in other urban areas, about 10% are in what the Census classifies as suburban areas. Schools in the 50–89% poverty category are quite broadly distributed among Chicago, other urban areas and suburban areas. Looking at the least-poor schools, those with less than 10% poverty, we see that almost none are located in Chicago (0.2%) or other urban areas (2.7%), while 71.7% are in suburban areas, and 24% are in rural areas.[5]

Table 11.
Distribution of Schools by Percent Poverty and Locale

Locale	Poverty Category					Total
	0 - 9% FRL Lowest Poverty	10 - 29% FRL	30 - 49% FRL	50 - 89% FRL	90 - 100% FRL Highest Poverty	
CPS	0.2%	1.6%	3.3%	28.5%	80.4%	14.5%
Urban (minus CPS)	2.7%	5.1%	16.1%	24.5%	8.2%	10.2%
Suburban	71.7%	38.9%	24.1%	27.0%	9.9%	38.9%
Town	1.3%	14.8%	23.8%	11.4%	1.2%	11.2%
Rural	24.0%	39.7%	32.8%	8.6%	0.2%	25.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chicago schools' TQIs, on the average, are lower than schools with similar percent poverty in other locales.

Next, we show the average school TQI of these different groups of schools (Table 12). Schools with at least 90% poverty have much lower TQIs, on the average, whether they are located in Chicago, other urban areas, or suburban areas. But in addition, Chicago schools' TQIs, on average, are lower than schools with similar percent poverty in other locales (compare, for example, Chicago's average TQI of –1.62 for highest poverty schools to the average of –0.83 for similar schools

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[5] We draw your attention to the fact that this table shows the distribution of schools, not students. Rural schools are likely to be much smaller than urban or suburban schools, so the distribution of students would look somewhat different.

in other urban locales). In contrast, the least-poor schools consistently have the highest school TQIs, on average, independent of locale. This means that school poverty is consistently related to the distribution of school TQIs wherever those schools are located across the state.

Table 12.
Average TQI by School Percent Poverty and Locale

Locale	Poverty Category				
	0 - 9% FRL Lowest Poverty	10 - 29% FRL	30 - 49% FRL	50 - 89% FRL	90 - 100% FRL Highest Poverty
CPS	– (N=2)	0.12	-0.16	-0.96	-1.62
Urban (minus CPS)	0.52	0.73	0.18	-0.26	-0.83
Suburban	0.61	0.29	-0.11	-0.54	-1.22
Town	0.35	0.35	0.24	0.07	– (N=5)
Rural	0.45	0.30	0.07	-0.14	– (N=1)
Total	0.57	0.32	0.08	-0.48	-1.51

— = fewer than 10 schools

Locale, School Percent Minority, and TQI

We turn now to the issue of whether school TQI is related to locale within school minority categories. We walk through the same analytic steps as we followed for school poverty. So we first look at how schools with different proportions of minority students are distributed by locale in Illinois (Table 13). We can see that most of the highest minority schools are in Chicago (80%), but that 14% are in suburban areas. Like poverty, school minority concentration is not strictly an urban phenomenon in Illinois.

Table 13.
Distribution of Schools by Percent Minority and Locale

Locale	Minority Category				
	Low Minority <50%	Majority Minority 50-89%	High Minority 90-98%	Highest Minority 99-100%	Total
CPS	0.9%	25.4%	50.2%	80.4%	14.5%
Urban (minus CPS)	8.0%	25.8%	12.0%	5.2%	10.2%
Suburban	41.3%	45.1%	35.6%	14.4%	38.9%
Town	15.1%	2.1%	1.3%	0.0%	11.2%
Rural	34.6%	1.7%	0.9%	0.0%	25.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

We next look at how school TQI is distributed among these different groups of schools (Table 14). For the high- and highest-minority schools, the pattern is similar to the one we saw for the poorest schools – they have the lowest TQIs, on the average, independent of where they are located, with those in Chicago generally somewhat lower than similar schools in other locales.

Table 14.
Average TQI by School Percent Minority and Locale

| Locale	Minority Category			
	Low Minority <50%	Majority Minority 50-89%	High Minority 90-98%	Highest Minority 99-100%
CPS	-0.49	-0.51	-1.29	-1.66
Urban (minus CPS)	0.65	-0.12	-0.57	-2.07
Suburban	0.47	-0.14	-0.96	-1.07
Town	0.26	0.17	– (N=3)	– (N=0)
Rural	0.26	– (N=8)	– (N=2)	– (N=0)
Total	0.35	-0.23	-1.08	-1.60

High poverty and high minority schools are much more likely to have lower TQIs, no matter where they are located in the state.

In summary, we have shown that high poverty and high minority schools are much more likely to have lower TQIs, no matter where they are located in the state.

The Role of the District in the Distribution of School TQI

Our analysis so far of the distribution of school TQIs revealed that teacher quality is distributed unevenly based in large part on the percent poverty and percent minority of schools, and that the distribution is consistent, whether those schools are located in an urban locale, a suburban locale, a town or a rural locale. However, districts play an important intermediary role in the recruitment of teachers and the allocation of resources, and most districts do not consist of a homogeneous array of schools. Using a statistical procedure called variance decomposition, DeAngelis was able to break the total variation of the TQI into three levels: (1) between regions (Chicago is treated as part of the Northeast Region), (2) between districts within regions, and (3) between schools within district (IERC 2005-1). She showed that most of the difference in school TQI occurs between schools within a district, while a smaller proportion of this variation occurs between districts within the same region and between regions in the state (Figure 7).

Most of the difference in school TQIs occurs between schools within a district, while a smaller proportion of the variation occurs between districts within the same region and between regions in the state.

Figure 7.
Sources of the Variance in TQI
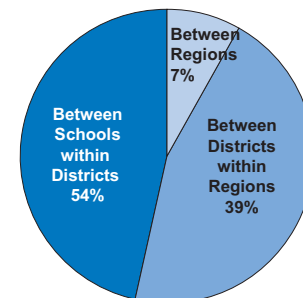
This finding led us to look at within-district TQI distributions. For this analysis, we focus on the state's elementary/middle school districts that enroll at least 10,000 students—there were 22 that met this criterion in 2002-2003. In Figures 8 and 9, vertical columns represent individual districts, and circles in the district's column

Figure 8.
TQI Distribution in Largest Elementary/Middle
School Districts Ranked by Percent Poverty[6]

Districts
(Ranked by % of schools in highest FRL quartile)
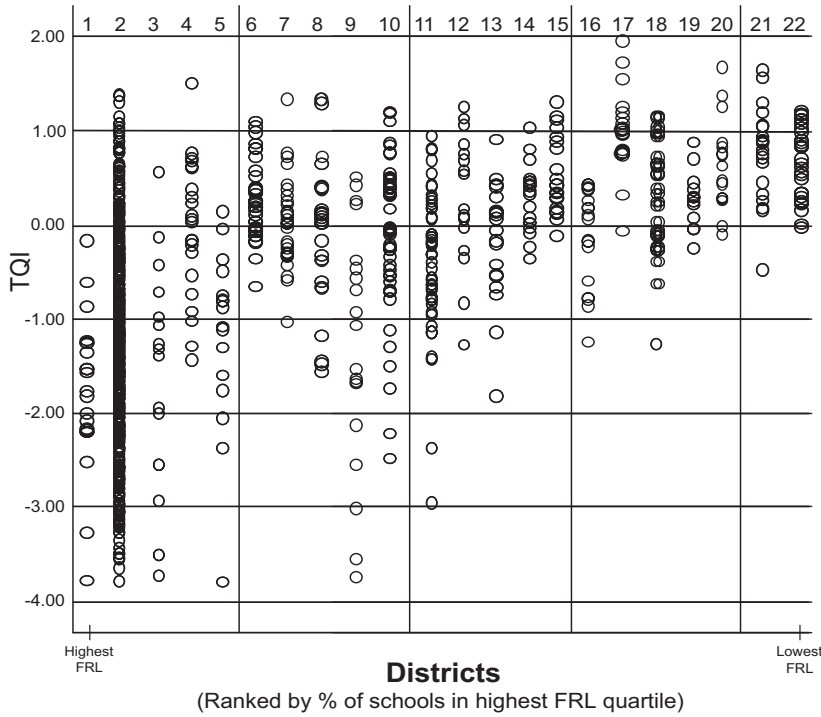
Figure 9.
TQI Distribution in Largest Elementary/Middle School
Districts Ranked by Percent Minority

Districts
(Ranked by % of schools in highest minority quartile)
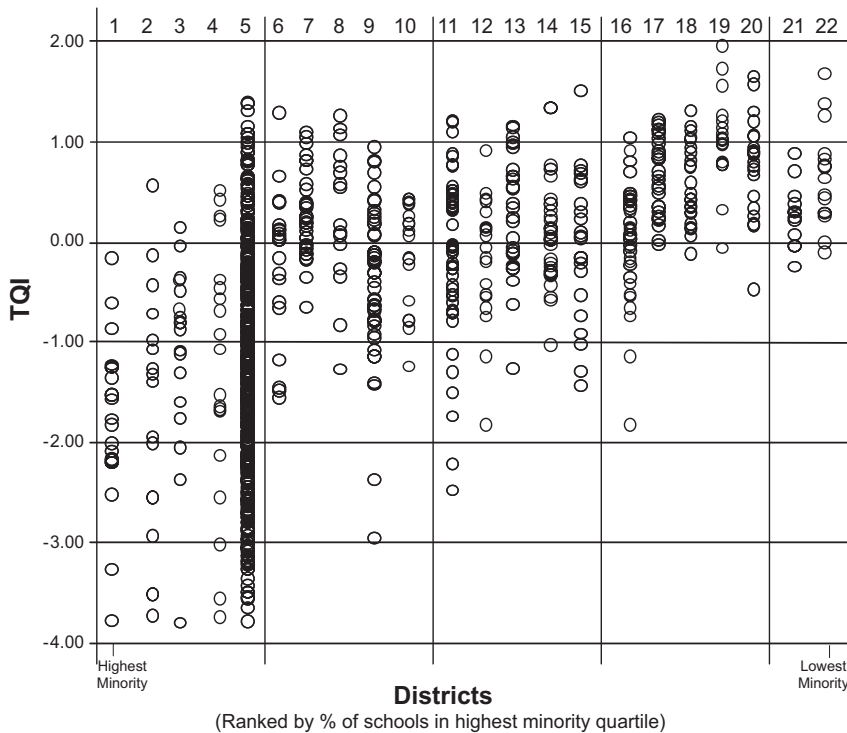
[6] Four outlier schools from districts with TQIs less than -4.0 are not shown on these charts.

represents schools in that district plotted by their TQIs. The district columns appear in order from left to right based on their concentration of poverty (Figure 8) or minority students (Figure 9), with districts with the highest proportion of high-poverty or high-minority schools on the left and the districts with the lowest proportion of high-poverty or high-minority schools on the right.[7]

Districts with larger proportions of poor or minority schools usually have a broader range of school TQIs and include lower TQI scores.

In both of the figures we see that, as the districts become less poor and more non-minority (moving from left to right on each figure), the number of very low school TQI scores (below -2.0) decreases, and the overall spread of TQI scores becomes smaller. For instance, looking at Figure 8, the district with the highest proportion of schools in the highest-poverty quartile (on the far left) has multiple schools with TQI scores below –2.0 and a range of TQI scores from about 0.0 to below -4.0—a very sizable gap between the schools with the highest teacher quality indexes and those with the lowest indexes. Meanwhile, the district with the lowest proportion of schools in the highest-poverty quartile (on the far right), has schools with TQI scores ranging from about 0.0 to just over 1.0—a much smaller range of scores and a much higher average score. Essentially, in districts with large proportions of very-high poverty and very-high minority schools, there are larger percentages of schools with very low TQIs, resulting not only in lower average teacher quality in the district, but also in a larger span between the schools with the most-qualified and least-qualified teachers, as measured by the TQI.

Several districts, though, appear to buck these trends. For example, districts labelled 6 and 7 in Figure 8 have no schools with TQIs below -1.0 even though these districts rank quite high on the school-poverty scale. These exceptions may provide insight about how to organize the teacher-sorting process so that it leads to more equitable distribution. We hope to continue the analysis of within-district distribution differences as the next phase of our research.

Strategies for Change

We have shown that schools that serve large proportions of poor and minority students are likely to demonstrate stronger school academic performance outcomes when their cadre of teachers, on the average, have more of the positive attributes and fewer of the negative attributes that are measured by the TQI. And TQI is related to school performance even after taking account of school demographics. This finding does not lead to a simple solution to closing the achievement gap, because we know that teachers usually take advantage of a competitive labor market to seek out what they perceive to be supportive teaching opportunities—and this often means that less-poor, less-intensely minority schools can attract better teachers. This sorting process takes place even within districts, and leaves the most disadvantaged schools with the fewest opportunities to select the most capable teachers—and yet the data provided in this report show that this is exactly where the effects of a stronger cadre of teachers manifest themselves most strongly. What strategies might contribute to improving teacher quality in high poverty/high minority schools?

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[7] Most of these districts have just one or two high schools, eliminating the possibility of examining differential high school TQIs within districts.

➢ *Every school should be a place where high quality teachers want to teach.*

● **Community and state support.** Communities and the state need to ensure that every school building is safe, clean and fully equipped for 21st century learning. Illinois has the second largest funding gap among the states between its highest-funded districts and its lowest-funded districts. Not only is the funding gap large, but Illinois ranks in the bottom third of states in funding to its high-poverty schools. The state needs to address this funding challenge if it wants to provide the opportunity for all of its children to reach their fullest potential.

● **District and school leadership.** District leaders need to ensure that school leadership is conducive to high expectations for teaching and learning. Teachers who are competitive in the teacher labor market are not going to stay at schools where they are not treated with the professional regard they deserve or where their high expectations are undermined by a less-demanding learning culture.

➢ *Every teacher should be a person that a school wants to hire and retain, and a parent wants in their child's classroom.*

● **Rigorous training.** Teacher education programs need to set high expectations for the academic achievement of all of their students. Content expertise, particularly for middle and high schools grades, needs to be rigorously developed and maintained.

● **In-service support.** Schools and districts need to strengthen in-service content and pedagogical support to teachers in key disciplines.

➢ *Human resources policies should place a priority on getting and keeping high quality teachers in the most needy schools.*

● **Hiring and retention.** Schools and districts should consider teachers' own academic success as one of the essential criteria for recruitment. We acknowledge that the TQI does not capture all (or perhaps much) of what distinguished a good teacher from a mediocre teacher, or an excellent teacher from a good teacher, but research does suggest that teacher academic preparation matters. Schools need a critical mass of teachers with strong content and pedagogical expertise to build the disciplinary teams that all schools need.

● **Placement and transfer practices.** Districts and teacher unions have a responsibility to examine hiring and seniority rules, and budget allocations, that may hinder some schools from building the cadre of talented teachers that they especially need to meet the special needs of high-poverty, high-minority schools within districts. This may include providing financial incentives for high quality teachers to teach in disadvantaged schools.

The solutions are not easy, but our students deserve nothing less than our all-out effort to improve the quality of their schools. This report sheds some new light on the challenges and potential solutions.

Technical Appendix

The TQI Scale

The TQI is scaled by setting the statewide school mean for all schools to 0.0 and the standard deviation to 1.0. This means that if the TQI were distributed precisely normally, about 68% of schools would be within -1 and +1, and 95% of schools would be within -2 and +2. (The TQI is not precisely normally distributed, see Figure 1 on page 6.) Table A1 shows how TQI scores translate to TQI quartiles.

Table A1.
TQI Ranges by Quartile

	TQI Quartile				
	Lowest Quartile		Lower-Middle Quartile	Upper-Middle Quartile	Highest Quartile
	Bottom 10%	11-25%			
All schools combined	-6.7 to -1.4	-1.4 to -0.4	-0.4 to 0.0	0.0 to 0.7	0.7 to 3.0
Elementary schools	-6.7 to -1.5	-1.5 to -0.5	-0.5 to 0.0	0.0 to 0.5	0.5 to 3.0
High Schools	-2.6 to -0.4	-0.4 to 0.1	0.1 to 0.6	0.6 to 1.0	1.0 to 2.6

The next table (A2) shows the average TQI-component values for schools that fall, approximately, at each standard deviation. So for the 18 schools with a TQI of +2 (actually 1.9 to 2.1), the average of their teachers' ACT composite scores is 24.8, while the average percent of the teachers failing the Basic Skills Test on the first attempt is less than 1%. In contrast, for the 40 schools with a TQI of -2 (actually -1.9 to -2.1), the average of their school ACT composite score is 18.1, while the average percent of their teachers failing the Basic Skills Test on the first attempt is 14%.

Table A2.
Average School-level Teacher Attributes by Approximate TQI Score

TQI Component	TQI < -3.5 (N=17)	TQI ≈ -3 (-3.1 to -2.9) (N=19)	TQI ≈ -2 (-2.1 to -1.9) (N=40)	TQI ≈ -1 (-1.1 to -0.9) (N=102)	TQI ≈ 0 (-0.1 to 0.1) (N=404)	TQI ≈ 1 (0.9 to 1.1) (N=225)	TQI ≈ 2 (1.9 to 2.1) (N=18)
Teachers' average ACT composite score	16.9	18.1	18.1	19.4	20.8	22.9	24.8
Teachers' average ACT English score	16.6	17.8	18.4	19.9	21.4	23.5	25.3
% of teachers who failed the Basic Skills Test on first attempt	43%	14%	14%	9%	2%	1%	0%
% of teachers with emergency or provisional credentials	19%	17%	8%	4%	1%	0%	0%
Teachers' average undergraduate college competitiveness ranking	2.6	2.8	2.8	2.9	3.0	3.3	3.7
% of teachers with three or fewer years of teaching experience	19%	17%	17%	21%	18%	17%	15%

Table A3.
Results from Ordinary Least Squares Regression Analyses: The Relationship Between School Performance and Selected Characteristics

Variable	Estimated change in percent of students in a school meeting or exceeding state ISAT or PSAE standards	Interpretation
Elementary Schools (R-square = 0.68)		
Intercept	83.6	This is the estimated average school percent passing ISAT for zero poverty/zero minority schools with a TQI of 0.0.
TQI	1.3 point increase for each 1.0 increase in TQI	TQI is independently related to school performance after accounting for school percent minority and percent poverty. TQI is measured in units of 1.0 – a standard deviation from the mean of 0.0. TQI ranges from a low of –6.7 to a high of +3.7.
Percent minority	-1.3 point decrease per 10% increase in % minority	School percent minority is independently related to school performance, after accounting for school poverty and TQI.
Percent poverty (free/ reduce lunch)	-3.3 point decrease per 10% increase in % poverty	School percent poverty is independently related to school performance after accounting for school percent minority and TQI. The independent effect of school poverty is stronger than school minority status.
K-8 Schools (R-square = 0.76)		
Intercept	82.5	Similar to elementary schools.
TQI	1.9 point increase for each 1.0 increase in TQI	TQI has a stronger independent effect in K-8 schools than in elementary schools. This is related to the inclusion of middle grades (see next panel).
Percent minority	-1.0 point decrease per 10% increase in % minority	Similar to elementary schools.
Percent poverty (free/ reduced lunch)	-3.8 point decrease per 10% increase in % poverty	A stronger effect than for elementary schools.
Middle Schools (R-square = 0.73)		
Intercept	77.7	Lower than for elementary and K-8 schools.
TQI	2.9 point increase for each 1.0 increase in TQI	A stronger effect than for elementary schools.
Percent minority	-0.5 point decrease per 10% increase in % minority	A weaker effect than for elementary schools.
Percent poverty (free/ reduced lunch)	-4.1 point decrease per 10% increase in % poverty	Similar to K-8 schools.
High Schools (R-square = 0.70)		
Intercept	60.3	This is the estimated average school percent passing PSAE for zero poverty/zero minority schools with a TQI of 0.0. Lower than for elementary and middle schools.
TQI	5.9 point increase for each 1.0 increase in TQI.	The independent effect of TQI is about two times as strong at the high-school level than for middle schools.
Percent minority	-0.6 point decrease per 10% increase in % minority	Similar to K-8 and middle schools.
Percent poverty (free/ reduced lunch)	-3.8 point decrease per 10% increase in % minority	Similar to K-8 and middle schools.

For further information, contact the IERC toll-free at 1-866-799-IERC (4372)
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