Teacher Quality and Sorting across Traditional Public and Charter Schools in the Detroit Metropolitan Region

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Introduction

In the quest to raise student achievement in low-performing urban schools, researchers often point to the central importance of recruitment and retention of a high quality teacher workforce (Lankford, Loeb and Wyckoff 2002; Rivkin, Hanushek and Kain 2005; Jacob 2007).[1] At the same time, advocates have proposed charter schools not only as a means to reform traditional public schools, but also as a strategy to close the achievement gap between urban students and their suburban counterparts in no small part because charter schools are often freed from many of the constraints faced by traditional public schools, allowing them greater flexibility to recruit and retain a qualitatively different teacher workforce (Center for Education Reform n.d.).

Using data for the Detroit metropolitan region of Wayne, Oakland, and Macomb counties for the 2005-2006 school year, this study sought to answer four research questions: (1) Did charter school teachers differ in measures of teacher quality from traditional public school teachers; (2) Was there variability in teacher quality within traditional public and charter schools; (3) To what extent were teacher quality indicators associated with teacher effectiveness; and (4) Did teacher sorting take place across charter and traditional public schools? This article is divided into eight sections. It begins with a background section on charter schools in Michigan, followed by a section on research on teacher quality and sorting. The third section presents research methods used in the study while findings are discussed in the next four sections, one for each of the research questions. The article closes with a summary, conclusions, and recommendations for future research.

Charter Schools in Michigan

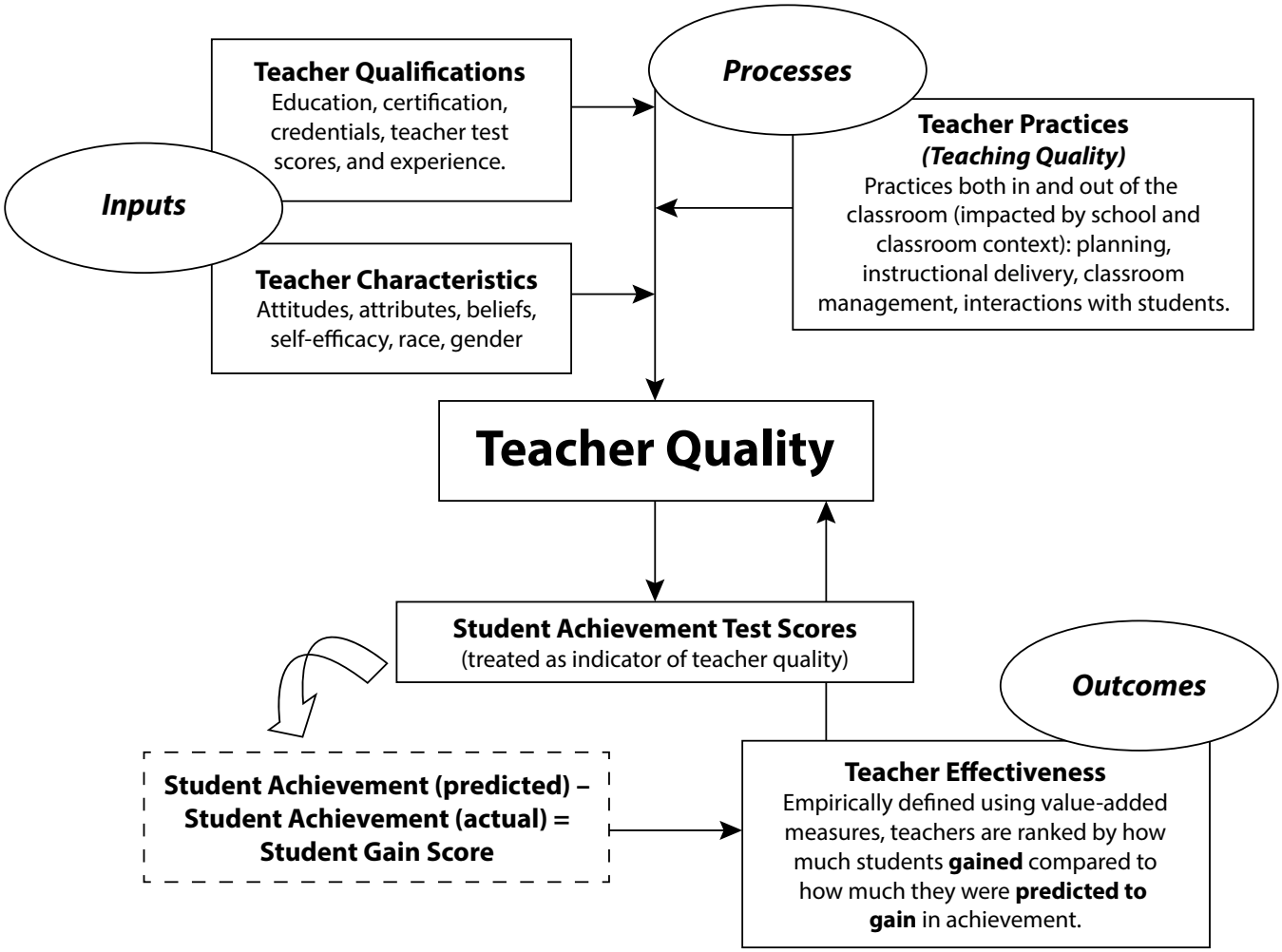
The general concept of charter schools has been discussed in a large and growing research literature (Allen and Gawlik 2009; Archer 2000; Buckley and Schneider 2007; Bulkley 2004; Crawford 2001; Chubb and Moe 1990; Fuller 2000; Gawlik 2007, 2008; Hill, Pierce, and Guthrie 1997; Lyons 1995; McGree

1995; Miron and Nelson 2002; Nathan 1996; Reyes, Wagstaff, and Fusarelli 1999; Wohlstetter, Wenning, and Briggs 1995).[2] A core assumption of charter school advocates is that school autonomy and deregulation can raise teacher quality and student performance, particularly in high poverty urban areas where charter schools tend to be concentrated (Baker and Dickerson 2006). The extent to which charter schools are freed from state regulation and thereby differentiate themselves from traditional public schools, however, differs across states. For example, state charter school laws vary in terms of teacher licensure requirements; eligibility to seek a charter and/or operate a charter school; control of teacher contracts; public financing; and financial disclosure (Green and Mead 2004). State laws also vary with regard to collective bargaining rights of charter school teachers and other school employees. All of these can potentially influence teacher recruitment and retention.

Michigan became an early adopter of charter schools via Public Act 362 of 1993. Michigan law allows for three categories of charter schools: public school academies, chartered under Part 6A of the revised school code; urban high school academies, chartered under part 6C of the revised school code to operate within Detroit; and strict discipline academies, chartered under Public Act 23 of 1999 to serve suspended, expelled, or incarcerated youth (Michigan Department of Education 2010). Nearly all Michigan charter schools fall under the first category.

According to the Center for Education Reform, a charter school advocacy organization which annually ranks the "strength" of state charter school laws, Michigan was ranked fourth out of the 42 states which allowed charter schools in 2015 (Zgainer and Kerwin n.d.). The Center's criteria for a "strong" state charter law were: (1) no limits on the number of charter schools statewide; (2) no limits on the number of students who can attend charter schools; (3) no restrictions on the types of charter schools allowed (new starts, conversions, online schools); (4) eligibility of many different types of groups to apply to open charter schools; (5) exemptions/waivers from most school district laws and regulations; (6) funding equivalent to that of traditional public schools; and (7) fiscal autonomy (Zgainer and Kerwin n.d.).

Figure | **A Framework for Teacher Quality and Teacher Effectiveness**



Source: L. Goe, *The Link Between Teacher Quality and Student Outcomes: A Research Synthesis* (Washington, DC: National Comprehensive Center for Teacher Quality, 2007), 9.

Background and Research on Teacher Quality and Teacher Sorting

The study presented in this article draws upon Goe's (2007) research-based conceptual framework to define teacher quality and teacher effectiveness. (See Figure.) In this framework, teacher quality is comprised of inputs and processes. Inputs are divided into teacher qualifications and teacher characteristics while processes are defined as teacher practices or teaching quality. Teacher quality thus defined is related to outcomes, where outcomes are defined as student achievement scores. In order to assess teacher effectiveness, scores are analyzed as to whether or not they meet certain criteria, such as, but not limited to, those associated with value-added approaches. Because some researchers as well as policymakers consider student achievement scores themselves an indicator of teacher quality, this phenomenon is also noted in the figure.

Little research exists on teacher characteristics as an input to teacher quality. Processes related to teacher quality, as described in the framework, are under-researched as well. Hence, this study focused on teacher qualifications for which there is a decidedly larger body of research although not necessarily one in unanimous agreement. As described in the framework, more common qualifications include academic background,[3] certification,[4] credentials, teacher test scores,[5] and experience.[6] Data for these are often more readily available to researchers and were so in the case of this study. For outcomes, Michigan, like most others states, administers annual, mandated achievement tests that assess student proficiency in key subject areas.

This framework embodies the hypothesis that increases in teacher quality are linked to increases in student outcomes and hence teacher effectiveness. However, an alternative hypothesis is found in the concept of teaching sorting; that is, more highly qualified teachers are attracted to schools and districts with higher achieving students. Overwhelmingly, such schools and districts are found in more affluent communities. The availability of these data in Michigan allowed for exploration of this hypothesis as well.

Methods

The population of traditional public and charter school teachers from the tricounty Detroit metropolitan region was used for the study. It consisted of 26,135 teachers,[7] distributed across 794 elementary and middle schools, including 23,171 teachers in 708 traditional public schools and 2,964 teachers in 86 charter schools. All data were for the 2005-2006 school year, the most recent year for which a complete data set could be assembled. High schools were omitted due to data and school coding limitations. Also, in 2005-2006, Michigan and the Detroit region had few charter high schools. The tricounty region is made up of Macomb, Oakland, and Wayne counties. The Detroit Public Schools, the largest in the metropolitan region is located in Wayne county. Table 1 provides a breakdown of traditional public and charter school teachers by county.

Table 1 | **Number of Traditional Public and Charter School Teachers by County for the Metropolitan Detroit Region**

County	Number of Teachers		
	Traditional Public School	Charter School	All
Macomb	4,784	234	5,018
Oakland	7,225	609	7,834
Wayne	11,162	2,121	13,283
Metro Region	23,171	2,964	26,135

Data Sources and Definitions of Variables

Six proxies for teacher quality, which are referred to in the analysis as teacher quality indicators, were selected for use in the study: (1) percent of certified teachers; (2) percent of teachers who graduated from a competitive college; (3) percent of teachers with a major or minor in their subject teaching assignment; (4) percent of inexperienced teachers; (5) percent of teachers holding substitute permits; and (6) teacher turnover. The state of Michigan's register of education personnel and personnel licensing system were the sources of data. The definitions below derived from these data sources.

Percent of certified teachers. "Teacher Certification (%)" is the percent of classroom teachers who hold a teaching certificate rather than a teaching permit. Specifically, it is the sum of the percent of classroom teachers with a provisional,[8] professional, or permanent certificate.[9]

Percent of substitute teachers. The second credential-based proxy for teacher quality is the percentage of teachers in each school working with a "substitute" permit, referred to in the data analysis as "Substitute Teacher Permit (%)." The substitute permit allows a school or district to employ a person who does not hold a valid Michigan teaching certificate on a day-to-day basis when the regular teacher is temporarily absent. This permit is not valid for long-term teaching assignments. The substitute teacher must have completed 90 credit hours of study at an accredited college or university.

Percent of teachers who graduated from a competitive undergraduate college. This variable is referred to as "Competitive College Grad (%)." For those teachers who graduated from a Michigan institution of higher education, the state register of personnel identifies their alma mater. For graduates of out-of-state institutions, only the state is reported. In this study, each Michigan graduate's college was ranked with regard to competitiveness using "Barron's Profile of American Colleges" (Barron's Educational Series, Inc. n.d.).[10] Institutions with a ranking between 1 and 5 were classified as most competitive, while schools ranked 6 through 9 were classified as least competitive.

Percent of teachers with an academic major or minor in their subject teaching assignment. "Teaching Subject Area (%)" represents the percent of teachers in each school with a major or minor in their subject teaching assignment.

Percent of inexperienced teachers. "Inexperienced Teacher (%)"is the percent of teachers in each school with fewer than three years of teaching experience.[11]

Percent of separated teachers. "Teacher Turnover (%)" is the percent of teachers who left a school during the 2005-2006 school year.[12] This variable is intended to capture school working conditions, climate, and stability.

This study also included measures of student poverty and school resources, as described below.

Student poverty. "Student Poverty (%)" is the percent of students eligible for free or reduced-price meals under the federal National School Lunch Program. The data source was the U.S. Department of Agriculture.

School district wealth. "District Wealth" is defined as per-pupil residential assessed valuation. In Michigan, it is referred to as state equalized valuation of homestead property. Note that this variable applies only to traditional public schools in the study as charter schools in Michigan do not have a property tax base.[13]

Instructional Spending. This variable represents total instructional spending per pupil.

Starting teacher salaries and salaries for teachers with a master's degree and ten or more years of experience were obtained from district collective bargaining agreements and individual charter schools. In the data analysis, these are referred to as "Starting Teacher Salary" and "Advanced Teacher Salary," respectively.

For student achievement, scores from the Michigan Educational Assessment program in Michigan Department of Education data files for the 2005-2006 school year were used. At grades 4 and 7, individual pupil scores were available in English language arts and mathematics. Individual pupil scores were aggregated at both school and district levels to provide the number and percent of pupils scoring at the "proficient" level.[14] In those schools that contained both grades 4 and 7, the percent of pupils who scored "proficient" in English language arts and mathematics at grades 4 and 7 were aggregated separately for each grade level.[15] In the data analysis, these variables are referred to as: ELA4 Proficient (%), ELA7 Proficient (%), Math4 Proficient (%), and Math7 Proficient (%).

Statistical Analysis

Descriptive statistics (minimum, maximum, mean, standard deviation, coefficient of variation), Pearson correlation, and tests of differences of means were used in the statistical analysis. Specifically, descriptive statistics and tests of differences of means were used to compare teacher quality indicators in charter schools and traditional public schools while the coefficient of variation was used to assess within group variation. Pearson correlation was used to determine to what extent teacher quality indicators were associated with teacher effectiveness; and to what extent teacher sorting took place across charter and traditional public schools. It is important to note that correlation coefficients indicate only whether two variables move in the same or opposite directions and the degree of linear association. Hence, causality cannot be determined.

Table 2 | **Comparison of Means of Variables for Traditional Public and Charter Schools**

	Traditional Public		Charter			
Variables	Mean	N	Mean	N	F	Statistical Significance
Instructional Spending (Per Pupil $)	5,427	708	3,731	86	227.566	<0.001
Starting Teacher Salary ($)	38,575	712	35,807	73	71.600	<0.001
Advanced Teacher Salary ($)	74,669	708	69,726	23	14.286	<0.001
ELA4 Proficient (%)	74.86	531	53.53	73	102.352	<0.001
ELA7 Proficient (%)	65.43	208	56.35	56	8.767	0.003
Math4 Proficient (%)	78.73	531	59.22	73	80.323	<0.001
Math7 Proficient (%)	48.47	208	33.99	56	15.099	<0.001
Competitive College Grad (%)	8.92	691	13.75	79	17.717	<0.001
Inexperienced Teacher (%)	14.51	705	42.83	80	67.352	<0.001
Teacher Turnover (%)	4.84	705	12.08	80	256.396	<0.001
Student Poverty (%)	38.66	697	54.76	72	52.592	<0.001
Teaching Subject Area (%)	9.58	707	22.86	80	60.227	<0.001
Certified Teachers (%)	65.67	699	56.69	80	27.132	<0.001
Substitute Teacher Permit (%)	10.40	704	47.22	70	650.844	<0.001

Table 3a | **Percentage of Inexperienced Teachers in Traditional Public and Charter Schools by County**

County	Minimum (%)		Maximum (%)		Average (%)		
	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter	All
Macomb	0	16	61	95	22.66	59.44	24.08
Oakland	0	11	100	92	16.47	48.62	18.51
Wayne	0	0	100	100	9.93	39.82	14.27

Table 3b | **Percentage of Inexperienced Teachers in Traditional Public and Charter Schools by County and Detroit Metropolitan Region: Standard Deviation**

	Traditional Public	Charter	All
Macomb	10.63	30.70	13.78
Oakland	13.52	24.31	16.38
Wayne	13.11	22.61	18.19
Metro Region	13.71	23.93	17.30

Table 4a | **Percentage of Teachers Graduated from a Competitive College in Traditional Public and Charter Schools by County**

County	Minimum (%)		Maximum (%)		Average (%)		
	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter	All
Macomb	0	0	20	14	4.18	6.71	4.29
Oakland	0	2	52	54	11.42	16.23	11.73
Wayne	0	0	42	45	9.44	13.87	10.08

Findings I: Teacher Quality in Traditional Public and Charter Schools

A comparison of mean values for teacher quality indicators across traditional public and charter schools is found in Table 2. There were statistically significant differences in means for all of the indicators at the .001 level. On average, charter schools had much higher percentages of inexperienced teachers (42.83%) than did traditional public schools (14.51%), although a larger mean percentage of charter school teachers (22.86%) were teaching in subject areas where they held an undergraduate major or minor than were traditional public school teachers (9.58%). Charter school teachers also were more likely, on average, to have graduated from a competitive college, 13.75%, as opposed to 8.92% of traditional public school teachers. However, for certification, a higher mean percentage of traditional public school teachers was state-certified (65.67%) than charter school teachers (56.69%). In addition, the mean percentage of teachers with substitute teacher permits was dramatically higher in charter schools (47.22%) than in traditional public schools (10.40%); and the mean percentage of teacher turnover in charter schools (12.08%) was higher compared with traditional public schools (8.92%).

Because the regional means may mask important county level differences, mean values for teacher quality indicators were analyzed in a more disaggregated format.[16] On average, charter schools in all three counties relied more heavily on inexperienced teachers than did traditional public schools. (See Tables 3a and 3b.) Charter schools in Macomb county had the highest average at 59.44% followed by Oakland county at 48.62% and Wayne county at 39.82%. Traditional public schools had much lower percentages: 9.93% in Wayne County, 16.47% in Oakland county, and 22.66% in Macomb county.

Charter school teachers in all three counties were somewhat more likely than their traditional public school counterparts to have graduated from a competitive college. (See Tables 4a and 4b.) On average, the percent of charter school teachers who

Table 4b | **Percentage of Teachers Graduated from a Competitive College in Traditional Public and Charter Schools by County and Detroit Metropolitan Region: Standard Deviation**

	Traditional Public	Charter	All
Macomb	4.53	5.43	4.58
Oakland	10.35	15.04	10.73
Wayne	9.45	11.05	9.81
Metro Region	9.31	11.63	9.67

Table 5a | **Percentage of Teachers with a Major or Minor in Subject in Traditional Public and Charter Schools by County**

	Minimum (%)		Maximum (%)		Average (%)		
County	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter	All
Macomb	0	5	17	50	3.03	21.57	3.03
Oakland	0	4	56	62	7.48	25.03	7.48
Wayne	0	0	100	80	13.58	22.48	13.58

Table 5b | **Percentage of Teachers in with a Major or Minor in Subject Area in Traditional Public and Charter Schools by County and Detroit Metropolitan Region: Standard Deviation**

	Traditional Public	Charter	All
Macomb	3.80	18.09	6.10
Oakland	8.92	14.21	10.24
Wayne	18.26	15.23	18.11
Metro Region	14.50	15.11	15.09

Table 6a | **Teacher Turnover: Percentage of Teachers Leaving Traditional Public and Charter Schools by County 2005-2006**

	Minimum (%)		Maximum (%)		Average (%)		
County	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter	All
Macomb	0	0	19	19	4.45	6.58	4.54
Oakland	0	0	50	26	4.02	14.00	4.65
Wayne	0	0	100	80	5.49	12.18	6.46

Table 6b | **Teacher Turnover: Percentage of Teachers Leaving Traditional Public and Charter Schools by County and Detroit Metropolitan Region 2005-2006: Standard Deviation**

	Traditional Public	Charter	All
Macomb	4.40	7.99	4.57
Oakland	5.11	7.52	5.81
Wayne	8.16	13.34	9.38
Metro Region	6.73	12.22	7.77

Table 7a | **Percentage of Teachers Holding a Permanent or Professional License in Traditional Public and Charter Schools by County**

	Minimum (%)		Maximum (%)		Average (%)		
County	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter	All
Macomb	0	40	100	89	69.58	58.95	69.16
Oakland	33	40	100	77	66.19	60.64	65.84
Wayne	0	0	100	93	63.74	55.54	62.55

Table 7b | **Percentage of Teachers Holding a Permanent or Professional License in Traditional Public and Charter Schools by County and Detroit Metropolitan Region: Standard Deviation**

	Traditional Public	Charter	All
Macomb	14.49	19.49	14.79
Oakland	12.41	13.60	12.53
Wayne	14.65	18.32	15.48
Metro Region	14.16	17.59	14.79

graduated from a competitive college ranged from 6.71% to 16.23% by county compared to 4.18% to 11.42% of traditional public school teachers. However, there were substantially larger differences with regard to holding an academic major or minor in one's teaching area. (See Tables 5a and 5b.) On average, the percent for charter school teachers ranged from 21.57% in Macomb county to 25.03% in Oakland county. In contrast, mean percentages for traditional public school teachers ranged from 3.03% in Macomb county to 13.58% in Wayne county.

For teacher turnover, the mean percentage for charter schools was higher overall, ranging from 6.58% in Macomb county to 14% in Oakland county. (See Tables 6a and 6b.) The mean percentage of teacher turnover for traditional public schools was lower and varied little, from 4.02% in Oakland county to 5.49% in Wayne county. In addition, traditional public school teachers had uniformly higher mean rates of certification, from 63.74% in Wayne county to 69.58% in Macomb county. (See Tables 7a and 7b.) For charter school teachers, mean percentages ranged from 55.54% in Wayne county to 60.64% in Oakland county. Third, charter schools relied much more heavily on teachers with substitute permits. (See Tables 8a and 8b.) The mean percentages were four to five times those for teachers in traditional public schools, which ranged from 8.90% to 13.38% .

In sum, charter schools differed significantly from traditional public schools on all six teacher quality measures. Overall, the charter school teacher workforce was more likely to be noncertified, inexperienced, and to hold a substitute permit. Although charter school teachers were more likely to be graduates of a competitive college and to hold a major or minor in their teaching subject matter area, they left teaching at a higher rate than traditional public school teachers.

Table 8a | **Percentage of Teachers with Substitute Permits in Traditional Public and Charter Schools by County**

County	Minimum (%)		Maximum (%)		Average (%)		
	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter	All
Macomb	0	28	83	42	13.38	52.21	10.75
Oakland	0	21	87	71	10.84	45.25	12.68
Wayne	0	0	100	100	8.90	47.34	18.54

Table 8b | **Percentage of Teachers with Substitute Permits in Traditional Public and Charter Schools by County and Detroit Metropolitan Region: Standard Deviation**

	Traditional Public	Charter	All
Macomb	8.79	28.14	10.75
Oakland	9.52	19.34	12.68
Wayne	9.42	26.22	18.54
Metro Region	9.47	25.04	15.76

Findings II: Variability in Teacher Quality within Traditional Public and Charter Schools

To gauge the degree of variability within both groups of schools with respect to teacher quality indicators, the coefficient of variation was calculated for traditional public and charter schools in each county and the region as a whole. (See Table 9.) The findings reveal substantial variability within both groups in each county and the region, but with generally higher values for traditional public schools, as expected, for this much larger group. The exception is percentage of certified teachers, where the coefficient of variation is higher for charter schools than traditional public schools in every county, reflecting the uniformly higher percentages of traditional public school teachers holding certification.

Findings III: Teacher Quality and Teacher Effectiveness

Pearson correlation coefficients were used to estimate the association of teacher quality indicators with teacher effectiveness for traditional public and charter schools. (See Tables 10 and 11.) Teacher effectiveness was defined as the percent of fourth and seventh graders scoring at the proficient level on state exams in English language arts and mathematics.

For traditional public schools, the association between the percent of certified teachers and teacher effectiveness was positive and statistically significant. Coefficients ranged from small (r = .091) to moderate (r = .222). For charter schools, there were stronger positive statistically significant associations, from 0.302 to 0.400.

The association of the percent of teachers in traditional public schools who graduated from a competitive college with teacher effectiveness was positive and statistically significant, with coefficients ranging from small (r = 0.170) to moderate (r = 0.333). For charter schools, there was no statistically significant association.

For traditional public schools, there were moderate negative statistically significant coefficients for the association of the percent of teachers holding a major or minor in their subject area and teacher effectiveness, ranging from -0.266 to -0.435. For charter schools, the coefficients were negative and statistically significant for fourth and seventh grade English language arts proficiency, -0.402 and -0.395 respectively, while coefficients for fourth and seventh grades mathematics proficiency were not statistically significant.

The correlation between teacher turnover and teacher effectiveness was negative and statistically significant for traditional public schools. Coefficients ranged from -0.146 to -0.303, with larger, negative coefficients associated with mathematics proficiency. For charter schools, there was no statistically significant relationship.

The association between the percent of inexperienced teachers and teacher effectiveness was positive and statistically significant, with small to moderate coefficients, from 0.176 to 0.268, for traditional public schools. For charter schools, results were mixed. In contrast to the results for traditional public schools, the association between the percent of inexperienced teachers and teaching effectiveness for charter schools was negative and statistically significant for three of the four measures of teacher effectiveness, ranging from -0.282 to -0.364. The coefficient for seventh grade mathematics proficiency was not statistically significant.

Table 9 | **Coefficients of Variation in Teacher Quality Measures for Traditional Public and Charter Schools by County and Detroit Metropolitan Region**

	Macomb County		Oakland County		Wayne County		Metropolitan Region	
Teacher Quality Measure	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter	Traditional Public	Charter
New Teacher (%)	.469	.517	.821	.500	1.320	.568	.945	.559
Substitute Teacher Permit (%)	.657	.539	.878	.427	1.058	.554	.911	.530
Teacher Turnover (%)	.989	1.214	1.271	.537	1.486	1.095	1.391	1.012
Teacher Certification (%)	.208	.331	.188	.224	.230	.330	.216	.310
Competitive College Grad (%)	1.084	.809	.906	.927	1.001	.797	1.044	.846
Teaching Subject Area (%)	1.254	.839	1.193	.568	1.345	.678	1.514	.661

For traditional public schools, there was a statistically significant negative coefficient for the percent of substitute teachers and teacher effectiveness in seventh grade English Language arts (r = -0.143) and fourth grade mathematics (-0.110). There was no statistically significant relationship with regard to proficiency in fourth grade English language arts and seventh grade mathematics. For charter schools, the percent of substitute teachers was related to only to fourth grade English language arts proficiency, with a negative statistically significant coefficient of -0.367.

Overall, the statistical analysis in this section presents a study in contrasts. In few cases were teacher quality indicators consistently associated with teacher effectiveness, with the exception of the percentage of certified teachers. For both traditional public and charter schools, there were positive statistically significant coefficients on all four measures of student proficiency. Also, for traditional public schools, the percentage of teachers who graduated from competitive colleges was positively associated with teacher effectiveness. For the remaining teacher quality indicators and associated lack of school-level value-added estimates of teacher effectiveness, results were mixed or did not rise to statistical significance. These ambiguous results may be, at least in part, an artifact of the use of a single year of data and associated lack of school-level, value-added estimates of teacher effectiveness.

Findings IV: Teacher Sorting

As noted earlier, the study's hypothesis related to teaching sorting posited that more highly qualified teachers would be attracted to schools and districts with greater resources and higher achieving students. Such schools and districts are generally found in more affluent communities which can afford to spend more per pupil and pay higher teacher salaries. In public school districts, property wealth per pupil is an important indicator of wealth. Since charter schools in Michigan do not have a property tax base, the analysis then moves to instructional expenditures and teacher salaries. This section looks first to descriptive statistics and testing of means, then to correlation coefficients.

There were statistically significant differences in means for traditional public and charter schools for instructional expenditure per pupil, teacher salaries, and student poverty. (See Table 2.) The mean instructional expenditure for traditional public schools was $5,427 per pupil compared to $3,731 for charter schools, a difference of 45.5%. Mean teacher salaries were also higher in traditional public schools. For a starting teacher in a traditional public school, the mean salary was $38,575 in contrast to $35,807 in a charter school, a difference of 7.7%. At the advanced level, the gap was similar at 7.1%. Here, teachers with ten years of experience and an advanced degree earned, on average, $74,669 in traditional public schools compared to $69,762 in charter schools. Finally, the mean level of student poverty was substantially higher in charter schools at 54.76% in comparison to traditional public schools where it was 38.66%. Hence, there were stark differences between traditional public and charter schools with regard to mean instructional expenditures, teacher salaries, and student poverty.

There were statistically significant differences in mean student achievement scores across traditional public and charter schools as well. On all four measures of student achievement, the mean percent of students scoring at the proficient level was higher in regular public schools. Some gaps were substantial. For example, there was s 21.33% difference in mean proficiency levels between regular public and charter school students for fourth grade English language arts.

In sum, the descriptive statistics described in the previous two paragraphs would seem to indicate that highly qualified teachers sort themselves giving preference to traditional public schools in the Detroit metropolitan region. Results from the correlation matrices for traditional public and charter schools further test this hypothesis. Operationally, statistically significant correlation coefficients with the appropriate sign would indicate that sorting may be taking place.

School district property wealth per pupil applies only to traditional public schools because Michigan charter schools do not have a property base. The coefficients relating district

Table 10 | **Pearson Correlation Matrix for Traditional Public Schools in the Detroit Metropolitan Region**

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Instructional Spending														
2	Property Wealth	**0.107**													
3	Beginning Teacher Salary	**0.229**	0.027												
4	Advanced Teacher Salary	**0.234**	**0.282**	**0.621**											
5	ELA4 Proficient (%)	-0.011	**0.599**	-0.007	**0.228**										
6	ELA7 Proficient (%)	-0.076	**0.705**	0.009	**0.329**	**0.705**									
7	Math4 Proficient (%)	-0.066	**0.655**	-0.068	**0.253**	**0.84**	**0.676**								
8	Math7 Proficient (%)	-0.062	**0.809**	-0.034	**0.376**	**0.581**	**0.915**	**0.686**							
9	Teaching Subject Area (%)	**0.144**	**-0.299**	**0.083**	**-0.135**	**-0.328**	**-0.266**	**-0.435**	**-0.369**						
10	Competitive College Grad (%)	-0.027	**0.207**	**-0.201**	-0.092*	**0.170**	**0.280**	**0.230**	**0.333**	-0.020					
11	Inexperienced Teacher (%)	**-0.157**	**0.212**	-0.012	0.082*	**0.176**	**0.212**	**0.239**	**0.268**	0.093	**0.160**				
12	Teacher Turnover (%)	**0.118**	**-0.194**	0.079*	-0.023	**-0.146**	**-0.247**	**-0.189**	**-0.303**	**0.386**	-0.024	**-0.127**			
13	Student Poverty (%)	0.089*	**-0.796**	-0.005	**-0.319**	**-0.690**	**-0.822**	**-0.755**	**-0.907**	**0.398**	**-0.190**	**-0.279**	**0.252**		
14	Teacher Certification (%)	-0.022	**0.148**	-0.05	0.005	0.091*	**0.214**	**0.136**	**0.222**	0.068	0.089*	**0.177**	0.012	**-0.124**	
15	Substitute Teacher Permit (%)	-0.031	0.018	0.004	0.043	0.042	-0.143*	0.110*	-0.132	-0.084*	0.072	**0.458**	-0.059	-0.063	**-0.229**

Note: Coefficients in boldface are statistically significant at the .01 level. Coefficients with an asterisk (*) are statistically significant at the .05 level.

Table 11 | **Pearson Correlation Matrix for Charter Schools in the Detroit Metropolitan Region**

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Instructional Spending													
2	Beginning Teacher Salary	0.019												
3	Advanced Teacher Salary	0.019	**1.000**											
4	ELA4 Proficient (%)	-0.029	0.178	0.178										
5	ELA7 Proficient (%)	0.127	-0.386	-0.386	**0.572**									
6	Math4 Proficient (%)	0.024	0.007	0.007	**0.833**	**0.670**								
7	Math7 Proficient (%)	0.051	-0.025	-0.025	**0.619**	**0.771**	**0.774**							
8	Teaching Subject Area (%)	-0.142	-0.108	-0.108	**-0.402**	-0.274	**-0.395**	-0.233						
9	Competitive College Grad (%)	-0.050	-0.331	-0.331	-0.052	-0.074	-0.022	0.014	**0.471**					
10	Inexperienced Teacher (%)	-0.244*	0.195	0.195	-0.302*	-0.282*	**-0.364**	-0.160	**0.703**	**0.425**				
11	Teacher Turnover (%)	-0.013	-0.424	-0.424	0.015	0.006	-0.008	-0.035	**-0.329**	**-0.309**	**-0.364**			
12	Student Poverty (%)	0.042	-0.421	-0.421	**-0.524**	**-0.397**	**-0.553**	**-0.497**	0.080	-0.015	0.116	-0.024		
13	Teacher Certification (%)	-0.262*	-0.053	-0.053	**0.328**	0.302*	**0.373**	**0.400**	.231*	0.156	0.206	0.069	**-0.491**	
14	Substitute Teacher Permit (%)	0.085	0.145	0.145	**-0.367**	-0.157	-0.193	0.061	.290*	**0.377**	**0.396**	-0.273*	0.287*	-0.132

Note: Coefficients in boldface are statistically significant at the .01 level. Coefficients with an asterisk (*) are statistically significant at the .05 level.

property wealth to teacher quality indicators supported, in part, the hypothesis that highly qualified teachers would sort themselves by choosing higher property wealth over lower property wealth districts. Schools in property wealthy districts were positively associated with higher proportions of certified teachers (r = .148) and teachers who graduated from competitive colleges (r =.207). They also were associated with lower rates of teacher turnover (r = -.194). At the same time, schools in property wealthy districts had higher proportions of new teachers (r = .212) and lower percentages of teachers holding a major or minor in their subject area assignment (r = -.299), possibly reflecting enrollment growth and associated new teacher hires, or hires in hard to fill positions, such as mathematics, sciences, and special education. Finally, the relationship between use of substitute teachers and district property wealth was not statistically significantly.

Instructional expenditure per pupil represents an important school resource because it allows those schools with higher levels to purchase a high quality teacher workforce. However, the correlation matrices indicate that there was potential teacher sorting only for the teaching quality indicator of having an academic major or minor in one's teaching subject that favored traditional public schools over charter schools (r = 0.144). The same was also true for teacher sorting related to beginning teacher salaries (r = 0.083). However, there was no evidence of teacher sorting related to advanced teacher salaries.

Finally, teacher sorting and student achievement were examined. The correlation matrices indicate that there was potential teacher sorting only for the teaching quality indicator of having graduated from a competitive college. These teaching candidates favored traditional public schools over charter schools across all four student achievement measures, with statistically significant positive coefficients ranging from 0.170 to 0.333.

Summary, Conclusions, and Recommendations for Future Research

The purposes of this study were to determine if regular public and charter school teachers in the Detroit metropolitan region differed in indicators of teacher quality, to assess variability in teacher quality indicators, and to explore whether teacher sorting was taking place. Data for the 2005-2006 school year were used. Michigan is an important state in which to study these issues given its early adoption of charter schools dating back to 1993 and their strong presence in the Detroit metropolitan region.

The study drew upon a conceptual framework with research-based definitions of teacher quality and teacher effectiveness where teacher quality is comprised of inputs and processes which in turn are related to outcomes, defined as student achievement. To assess teacher effectiveness, student test scores on fourth and seventh grade English language arts and mathematics were analyzed as to whether they met state-defined proficiency levels. Some researchers as well as policymakers consider student achievement scores themselves indicators of teacher quality.

A comparison of mean values of teacher quality indicators across traditional public and charter schools found statistically significant differences for all. On average, charter schools had much higher percentages of inexperienced teachers although a larger mean percentage of charter school teachers were teaching in subject areas where they held an undergraduate major or minor. Charter school teachers also were more likely, on average, to have graduated from a competitive college. However, for certification, a higher mean percentage of traditional public school teachers were state-certified. In addition, the mean percentage of teachers with substitute teacher permits was dramatically higher in charter schools as was teacher turnover. Even when the analysis disaggregated schools by county, these differences held. At the same time, further analysis indicated that there was substantial within-group variation for traditional public and charter schools in the study, making a definitive portrait impossible.

To estimate the association of teacher quality indicators with teacher effectiveness across traditional public and charter schools, Pearson correlation was used. In few cases were teacher quality indicators consistently associated with teacher effectiveness, with the exception of the percentage of certified teachers. For both traditional public and charter school teachers, there were positive statistically significant coefficients on all four measures of student proficiency. Also, for traditional public schools, the percentage of teachers who graduated from competitive colleges was positively associated with teacher effectiveness. For the remaining teacher quality indicators, the results were mixed or did not rise to statistical significance.

As an alternative hypothesis, the study proposed that highly qualified teachers would be attracted to schools and districts with greater resources and higher achieving students. Although analysis of descriptive statistics seemed to indicate that highly qualified teachers might be sorting themselves giving preference to traditional public schools, results from the correlation matrices were more ambiguous. Results relating school district property wealth to teacher quality indicators supported, in part, the hypothesis that highly qualified teachers would sort themselves by choosing higher property wealth over lower property wealth school districts. Broader measures of resources encompassing both traditional public and charter schools, such as instructional expenditures and teacher salaries, yielded little in the way of teacher sorting. There did seem to be some sorting related to higher beginning teacher salaries that favored traditional public schools. Results for teacher sorting and student achievement were also inconclusive in that there was potential teacher sorting only for the teaching quality indicator of having graduated from a competitive college. These teaching candidates favored traditional public schools over charter schools across all four student proficiency measures.

Although this study was grounded in a research-based conceptual framework and used the population of traditional public and charter school teachers from the tricounty Detroit metropolitan region, the ambiguous results results may be, at least in part, an artifact of the use of a single year of

data. Second, while descriptive statistics, tests of means, and correlation are important starting points for analysis, future research may benefit from multivariate statistical analysis and causal modeling, using longitudinal data. Still, this study provides an important first glimpse into traditional public and charter schools in a major metropolitan area in a state that has enthusiastically embraced charter schools with minimal regulation or oversight. Broad brush stroke statistics paint a picture that should raise concerns with policymakers and spur further research in the areas of teacher quality, teacher effectiveness, student achievement, fiscal resources, and teacher sorting.

Endnotes

[1] In their research, Rivkin, Hanushek, and Kain (2005) found teacher quality to be associated with as much as seven percent of the variance in student achievement gains. Lankford, Loeb, and Wyckoff (2002) and Jacob (2007) asserted that the issue of teacher quality is particularly acute in urban districts, where poverty is high, achievement and graduation rates are low, and schools struggle to recruit and retain classroom teachers.

[2] The U.S. Department of Education provides a basic, generally accepted definition of charter schools as "public schools that operate with freedom from many of the local and state regulations that apply to traditional public schools." See, "U.S. Department of Education, "Charter Schools," http://www2.ed.gov/parents/schools/choice/definitions.html#cs.

[3] Ballou and Podgursky (1995) provided a summary of the literature that addresses the relationship between the strength of academic background and teacher effectiveness. Their analysis of teacher quality employed college selectivity, academic major, undergraduate GPA, and SAT scores as indicators of quality.

[4] Traditional state teacher certification has been used as a proxy for teacher quality (Betts, Rueben, and Danenberg 2000; Goldhaber and Brewer 2000; Darling-Hammond 2000; Goldhaber 2006; Boyd, Langford, and Wycoff 2007), but the research evidence is mixed. Some studies have claimed that teachers lacking state certification/licensure are no better or worse in practice than state-certified teachers (Abell Foundation 2001) while others have found that state certification is an important step in ensuring teacher quality (Darling-Hammond 2002). Wayne and Youngs (2003) found that certification in a particular subject area may result in more effective teaching, but their methods and results have been criticized (Freedman 2002; Imai 2002). On the other hand, Goldhaber and Anthony (2007) found that North Carolina teachers who earned certification from the National Board for Professional Teaching Standards were more effective at raising elementary school student achievement than non-board-certified teachers. They also noted that the statistical significance and magnitude of the National Board for Professional Teaching Standards advantage varied by grade level and student type. The advantage was greatest with low-income students in earlier grades.

[5] Some studies have correlated teacher test scores on basic skills and college entrance exams with student scores on standardized tests and found that high-scoring teachers were more likely to show significant gains in student achievement than their lower-scoring peers (Ferguson 1998; Ferguson and Ladd 1996; Strauss and Sawyer 1986). Studies with richer detail on teachers, such as the quality of teachers' undergraduate institution, have found effects on student outcomes (Ehrenberg and Brewer 1994; Ferguson and Ladd 1996).

[6] Teachers' experience levels have also been found to be positively related to student outcomes (Betts, Rueben, and Danenberg 2000; Rivkin, Hanushek, and Kain 2005). Teachers with less teaching experience produced smaller learning gains in their students than those with more experience (Fetler 1999; Murnane and Phillips 1981). The benefits of experience, however, appeared to level off after the first three to five years of teaching.

[7] It should be noted that this region represents approximately 20% of Michigan's classroom teachers.

[8] The provisional certificate is Michigan's initial teaching certificate, issued following the successful completion of an approved elementary or secondary teacher preparation program, including student teaching. It is issued after the candidate has passed all components of the Michigan test for teacher certification, including a basic skills test in reading, writing, and mathematics; subject area examinations for prospective secondary level teachers; and an elementary examination for prospective elementary grade teachers.

[9] The professional certificate is Michigan's advanced teaching certificate. It requires completion of 18 semester hours of study following provisional certification, along with three years of successful teaching experience. This certificate is valid for up to five years and renewable through the completion of continuing education credits. The professional certificate, created by 1988 legislation, replaced the permanent, 30-hour continuing and 18-hour continuing certificate as Michigan's advanced teacher credentials. However, many current teachers in Michigan still hold these credentials, which may be renewed.

[10] Per Hess (2012), "Barron's Profile of American Colleges" uses four criteria to rank competitiveness: high school class rank, high school grades, standardized test scores, and an institution's selectivity rate.

[11] See, for example, Rivkin, Hanushek and Kain (2005); and Betts, Rueben, and Danenberg (2000) who found lack of experience to be associated with ineffective teaching.

[12] The register of education personnel utilizes 19 different codes for reporting personnel separations. In 2005-2006, the most frequently reported codes were for retirements, departures for other education jobs, layoffs, and departures from the education profession.

[13] It was also used as a means to identify charter schools, for which this measure is zero, since Michigan charter schools have no local property tax base.

[14] Pupils who score at levels 1 or 2 on the state assessment are considered "proficient" in the subject tested.

[15] In those schools that contained only a grade 4 or a grade 7, the same two measures were used, but included only those pupils in either grade 4 or grade 7.

[16] Numbers of traditional public and charter schools by county and for the metropolitan region for Tables 3a to 8a are found in the Appendix.

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Appendix

Numbers of Schools for Tables 3a through 8a

Table A-1

Counties and Metropolitan Region	Number of Schools		
	Traditional Public	Charter	All
Macomb	149	6	155
Oakland	206	14	220
Wayne	354	60	414
Metro Region	709	80	789

Note: Corresponds to Table 3a.

Table A-2

Counties and Metropolitan Region	Number of Schools		
	Traditional Public	Charter	All
Macomb	145	6	151
Oakland	204	14	218
Wayne	345	59	404
Metro Region	694	79	773

Note: Corresponds to Table 4a.

Table A-3

Counties and Metropolitan Region	Number of Schools		
	Traditional Public	Charter	All
Macomb	150	6	156
Oakland	207	14	221
Wayne	354	60	414
Metro Region	711	80	791

Note: Corresponds to Table 5a.

Table A-4

Counties and Metropolitan Region	Number of Schools		
	Traditional Public	Charter	All
Macomb	149	6	155
Oakland	206	14	220
Wayne	354	60	414
Metro Region	709	80	789

Note: Corresponds to Table 6a.

Table A-5

Counties and Metropolitan Region	Number of Schools		
	Traditional Public	Charter	All
Macomb	146	6	152
Oakland	204	14	218
Wayne	352	60	412
Metro Region	702	80	782

Note: Corresponds to Table 7a.

Table A-6

Counties and Metropolitan Region	Number of Schools		
	Traditional Public	Charter	All
Macomb	149	3	152
Oakland	205	11	216
Wayne	354	56	410
Metro Region	708	70	778

Note: Corresponds to Table 8a.