ASU ARIZONA STATE UNIVERSITY

Colorado
University of Colorado at Boulder

Evaluating the Impact of Charter Schools on Student Achievement:
A Longitudinal Look at the Great Lakes States

Appendix G

June 2007

EPIC | *Education and the Public Interest Center*

EPRU | EDUCATION POLICY RESEARCH UNIT

Education Policy Research Unit
Division of Educational Leadership and
Policy Studies
College of Education, Arizona State
University
P.O. Box 872411, Tempe, AZ 85287-2411
Telephone: (480) 965-1886
Fax: (480) 965-0303
E-mail: epsl@asu.edu
http://edpolicylab.org

Education and the Public Interest Center
School of Education,
University of Colorado
Boulder, CO 80309-0249
Telephone: (303) 492-8370
Fax: (303) 492-7090
Email: epic@colorado.edu
http://education.colorado.edu/epic

● The policy brief is available online at: http://epsl.asu.edu/epru/documents/EPSL-0706-236-EPRU.pdf

Appendix G
Student Achievement in Wisconsin Charter Schools

The Wisconsin Charter Program was established in 1993 with authorization for 10 school districts to establish up to 2 charter schools for a total of 20 statewide. Thirteen charter schools were created under this law during that time. The charter school law underwent many revisions. In 1995, chartering authority was extended to all school boards statewide and the cap on the total number of charter schools was removed. In 1997, the state legislature extended chartering authority in Milwaukee to the chancellor of the University of Wisconsin-Milwaukee, the Milwaukee Area Technical College, and the Common Council of the city of Milwaukee (Wisconsin Charter School Association, 2007).[1]

Although there are a number of studies on charter schools in Wisconsin, there are few empirical studies or evaluations that look at the academic performance of its charter schools. An early report by Stuiber, Swenson, Normandin, and Varana (1998) provided a performance evaluation of Wisconsin's charter schools open during the 1997-98 school year.[2] The report compared charter-school programs and policies to traditional district schools. On average, charter school students scored higher on standardized tests than other district students, but test results were only available for a half dozen schools. A study by Witte, Weimer, Schlomer, and Shober (2004) found that charter schools in operation for more than one year generally were more likely to meet state standards than noncharter students.[3] This study used in innovative approach for comparing charter school and district results, but only two years of data were considered (2000-01 and 2001-02) and no analyses of high school grades was pursued because most of these were deemed to be at-risk schools. Loveless' (2003) analyses of charter school performance in 10 states using the state's own criteria for rating schools found that 11 percent of charter schools were rated as "failing" in Wisconsin compared with 3.5 percent of traditional public schools that were rated as failing.[4]

Data Sources, Outcome Measures, and Methods for Analysis

In Wisconsin, students demonstrate their progress toward achieving academic standards in reading, language arts, mathematics, science, and social studies through their performance on the Wisconsin Student Assessment System (WSAS). The WSAS includes the Wisconsin Knowledge and Concepts Examinations—Criterion-Referenced Test (WKCE-CRT), taken by nearly all students in grades 3-8 and 10. The WKCE-CRT is a large-scale, standardized achievement test administered using carefully defined directions, time limits, materials, and scoring procedures for all test takers to ensure uniform test-taking conditions.

Many of the demographic variables used to create the predicted values were obtained from the Common Core of Data at the National Center for Education Statistics (NCES).[5] From this data source were obtained variables covering school enrollment, ethnicity, free and reduced lunch, and urbanicity or locale. A variable designating charter school status also was used from this data set to distinguish the charter schools in the

state. From the DPI and Office of Educational Accountability Web site, the mean school-level scaled scores for reading and math were obtained for the period 2001 through 2005 for grades 4, 8, and 10, including the number of test takers within each school that reported test results.[6]

A scale score is a score on a numeric scale with intervals of equal size. The scale is applied to all students taking the WKCE-CRT in a particular subject at a particular grade level. The scale score makes possible the comparison of scores from different groups of students or individuals—or schools—from year to year. Each content area is scaled separately. Therefore, the scale scores for one content area cannot be compared with the scale scores from another.

Table 1. Test Data Used in Analyses, by Year, Grade, and Subject

	2000-01	2001-02	2002-03	2003-04	2004-05
Grade 4	Reading & Math	Reading & Math	Reading & Math	Reading & Math	Reading & Math
Grade 8	Reading & Math	Reading & Math	Reading & Math	Reading & Math	Reading & Math
Grade 10	Reading & Math	Reading & Math	Reading & Math	Reading & Math	Reading & Math

The data set created for Wisconsin was complete in terms of test data and the demographic variables required for the regression analysis. No imputation of missing values was conducted, although there were a number of instances where schools were dropped from specific analyses because they had too few test takers (test results in Wisconsin are not reported if there are fewer than 5 test takers in a specific group).

Variables Used to Create the Predicted Values for Each School

Table 2 displays the variables used in developing the residual gain score analysis for Wisconsin's charter schools. The predicted values and residual scores were created using an ordinary least squares multiple regression procedure, in the form of the linear equation given in Equation 1

$$Y_i = a + b_1 MINORITY_i + b_2 LOWINCOME_i + b_3 SPED_i + b_4 URBANICITY_i + \varepsilon_i$$

Where $\hat{Y}$ is the predicted value for a school's mean scaled score i, expressed in terms of the constant a of the intercept term, and where $MINORITY_i$ is the percentage of minority students (minus Asians) for given school i, where $LOWINCOME_i$ is the percentage of students receiving free or reduced lunch for given school i, and where $URBANICITY_i$ is the value (i.e., from 1-8) indicating population density for school i. In this equation, the regression coefficients (bs), also referred to as the *partial regression coefficients*, represent the independent contributions of each independent variable to the prediction of the dependent variable $\hat{Y}$. Essentially, the predicted values indicate how the

school is expected to score based on how other schools in the state with similar demographics have performed on the same test.

Table 2. Variables Included in Residual Gain Score Analysis for Wisconsin

Variable	Description
Mean Scale Score (dependent variable)	School-level mean scale score on the WKCE-CRT
Percent Minority	Percentage of nonwhite and non-Asian-American students enrolled
Percent Low Income	Percentage of students receiving free or reduced lunch
Special Education	Percentage of students with disabilities
Urbanicity (locale)	Rating from 1-8, indicating population density

The residual is the difference between the actual score and the predicted score. If the residual score is negative, then the school is doing worse than expected. If the residual score is positive, the school is performing better than expected.

In the data tables, there are rows that contain the average annual change scores, which indicated the relative direction the school is moving. For example, the school may have all negative residual scores; but if they are becoming less negative over time, the average annual change score will be a positive number. The average annual change score is computed for patterns of actual, predicted, and residual scores across time by subtracting the first score from the most recent and dividing by the number of observations (e.g., years) minus 1 (i.e., N-1).

It is important to note that the results presented in Tables 3 and 4 are aggregate findings across all charter schools with available data. When calculating the aggregate results, the data were weighted by the relative number of test takers per school. For example, if a large school has extremely positive results, they will carry more weight than a small school with less positive results.

Some schools were excluded because they either had too few test takers or else they did not report demographic data. The data for Wisconsin was surprisingly complete. In 2001, the trends captured 84 percent of the schools, and for the last 2 years of the trends we typically were able to include 100 percent of the schools that had students taking specific tests.

Actual Performance and Residual Gains for All Charter Schools

The data presented in Table 3 and Figure 1 illustrate the overall results aggregated for all Wisconsin charter schools from 2001 through 2005 for grades 4, 8, and 10 on WKCE-CRT math and reading assessments for which data were available. The dashed line in Figure 1 illustrates the actual or observed scale scores for charter schools. Based

Table 3. Wisconsin Aggregate Results by Grade, Subject, and Year

School Name	Year	Math					Reading				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
Grade 4	2001	25	923	631.31	627.03	4.28	25	911	650.37	645.50	4.87
	2002	27	1,067	626.62	631.49	-4.86	27	1,066	641.98	647.66	-5.68
	2003	31	1,039	624.86	628.16	-3.30	31	1,029	638.22	642.41	-4.19
	2004	34	1,089	623.57	627.07	-3.51	34	1,089	637.37	642.23	-4.86
	2005	36	1,121	623.32	629.49	-6.16	36	1,121	635.41	642.90	-7.49
Average annual change				-2.00	0.61	-2.61			-3.74	-0.65	-3.09
Grade 8	2001	23	1,634	682.36	679.10	3.26	23	1,637	672.88	670.24	2.64
	2002	28	1,791	682.08	675.91	6.17	28	1,799	671.27	668.82	2.45
	2003	28	1,812	687.56	683.81	3.75	28	1,808	671.42	671.22	0.20
	2004	34	1,916	679.95	675.88	4.07	34	1,918	665.26	665.61	-0.36
	2005	37	2,025	687.27	684.74	2.53	37	2,022	675.30	673.42	1.88
Average annual change				1.23	1.41	-0.18			0.61	0.80	-0.19
Grade 10	2001	15	333	696.03	718.65	-22.61	15	329	685.82	702.84	-17.01
	2002	21	511	695.43	711.51	-16.09	21	515	682.28	690.35	-8.07
	2003	17	382	715.48	714.30	1.18	17	383	702.36	701.06	1.30
	2004	16	404	713.77	716.83	-3.06	16	404	691.67	695.89	-4.22
	2005	19	490	703.75	711.31	-7.55	19	493	695.17	698.03	-2.87
Average annual change				1.93	-1.83	3.77			2.34	-1.20	3.54
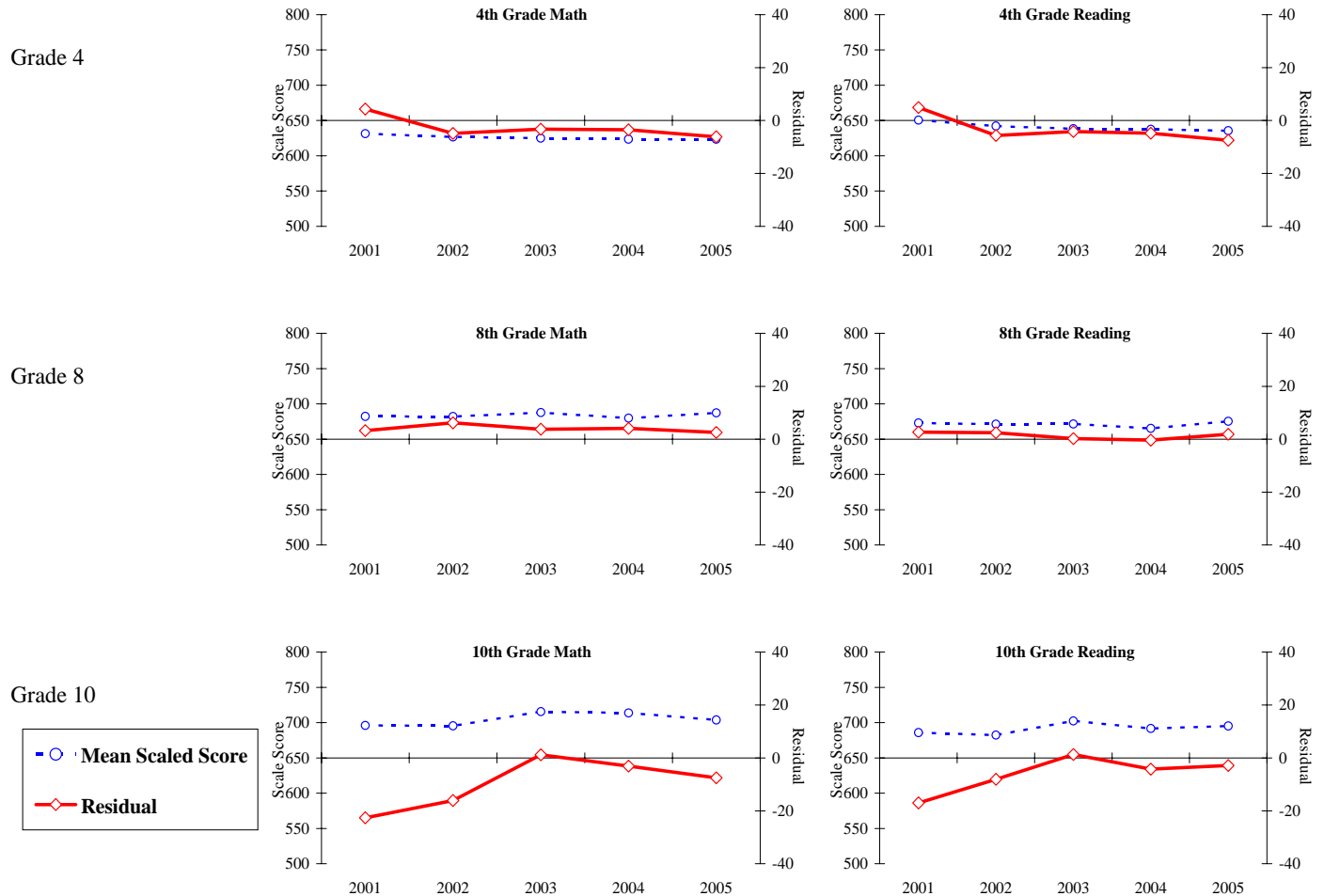
Figure 1. Wisconsin Aggregate Results: Residual Scores and Mean Scale Scores

on these trend lines, performance for students in Wisconsin's charter schools is relatively flat indicating that the mean scale score for charter schools is not improving over time.

The residual lines are also rather flat, except at grade 10 where noticeable improvements are evident. The average annual change in residual scores is negative for 4th grade, close to zero for 8th grade and positive at 10th grade where the charter school aggregate results improve dramatically in 2002. This increase in 2002 can largely be explained by the addition/inclusion of 6 more charter schools serving high school students.

The aggregate results across all charter schools is still lower than state averages. Nonetheless, state figures should not be used to evaluate charter schools since the state results include a large portion of schools that are not similar in terms of student demographics to charter schools. Our approach that uses residual gains analysis, however, creates demographically similar comparison groups for each charter school.

Actual Performance and Residual Gains for Same Cohort of Schools

As noted earlier, the changes over time depicted in the results from Figure 1 may be due to the addition of new charter schools. The number of schools and the number of students included in each set of results is also indicated in Table 3. Between the first and last test dates, between 7 and 19 charter schools were added to the aggregate results. Therefore, changes in aggregate results may be due to the inclusion of new schools. To control for this we tracked a subset of the same charter schools that had test data available for all years. The results from these aggregate results for cohorts of the same schools over time are illustrated in Table 4 and Figure 2.

For grades 4 and 8, the results for the cohorts of schools are rather similar to the results for all schools. The data for grade 10 had more gaps in it, so the best cohort we could construct of same schools started in 2002 instead of 2001. At grade 10, we were able to track 8 charter schools over time. Many of the small high schools or presumably many of those schools serving at-risk students did not have test data available for each year of the cohort and thus were not included.

The cohort results for grades 4 and 8 are more robust and include a relatively large proportion of the all schools with valid test data. The residual scores for grades 4 and 8 are all positive, but over time become slightly less positive for grade 4. For grade 10, the residual scores are initially negative and improve slightly over time.

Table 4. Wisconsin Results from Cohorts of Same Schools Tracked Over Time

	Year	Math					Reading				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
Grade 4	2001	21	884	631.98	626.89	5.09	21	873	650.66	645.36	5.30
	2002	21	839	635.49	632.66	2.83	21	836	651.15	648.26	2.89
	2003	21	765	633.18	628.94	4.24	21	756	646.11	643.18	2.93
	2004	21	728	634.91	629.20	5.71	21	728	647.54	643.41	4.13
	2005	21	658	634.72	631.35	3.36	21	658	645.21	644.42	0.79
Average annual change				0.68	1.12	-0.43			-1.36	-0.24	-1.13
Grade 8	2001	16	1,577	682.80	678.15	4.66	16	1,583	673.16	669.46	3.70
	2002	16	1,601	682.67	674.88	7.79	16	1,609	671.60	668.06	3.54
	2003	16	1,536	687.29	680.71	6.58	16	1,534	670.52	668.85	1.67
	2004	16	1,566	681.89	674.43	7.46	16	1,567	665.56	664.51	1.05
	2005	16	1,541	687.62	682.05	5.57	16	1,539	675.84	671.51	4.33
Average annual change				1.20	0.97	0.23			0.67	0.51	0.16
Grade 10	2001										
	2002	8	320	693.78	697.80	-4.02	8	324	681.70	682.75	-1.05
	2003	8	265	708.98	706.42	2.56	8	265	700.43	697.66	2.78
	2004	8	320	710.38	711.85	-1.47	8	320	690.11	692.50	-2.39
	2005	8	303	704.01	709.46	-5.45	8	300	696.95	696.84	0.11
Average annual change				3.41	3.88	-0.48			5.08	4.70	0.39
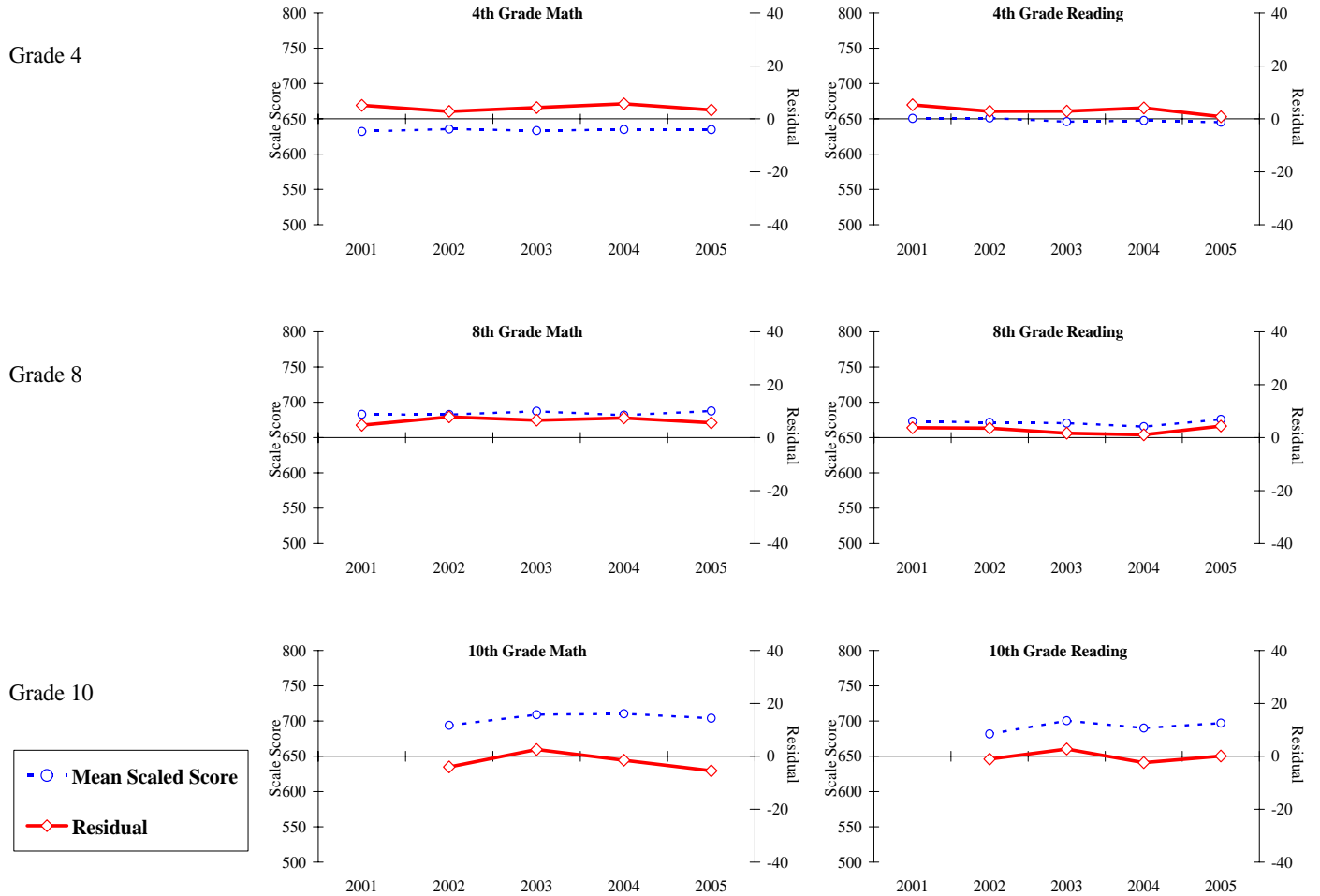
Figure 2. Wisconsin School Cohort Results: Residual Scores and Mean Scale Scores

Summary of Findings

The evaluation questions in this study were: (1) How does student achievement in charter schools compare to demographically similar public schools? (2) Are charter schools an effective strategy for improving student achievement over time? Results for these two questions are summarized in Tables 5 and 6. Table 5 presents a cross-sectional comparison of six mean test residuals by grade for Wisconsin charter schools using the most recent year of available data (2005). Results revealed 77 instances in which charter school residuals are positive (i.e., student achievement is higher than expected) and 107 instances in which they are negative (i.e., student achievement is lower than predicted). In other words, only 40 percent of the comparisons favored charter schools. Therefore, one can conclude the charter schools in Wisconsin are currently performing at levels that are slightly lower than predicted and lower than demographically similar traditional public schools.

Table 5. Cross-Sectional Comparison Test Residuals by Grade for Charter Schools Using the Most Recent Year of Available Data

	Grade 5 Math	Grade 5 Reading	Grade 8 Math	Grade 8 Reading	Grade 11 Math	Grade 11 Reading	Totals
# Schools with Positive Residuals	16	14	18	20	4	5	77
# Schools with Negative Residuals	20	22	19	17	15	14	107

Table 6 presents a comparison of the average annual change in test residuals by grade for Wisconsin charter and cohort charter schools over five years. Results revealed that the residuals for charter schools overall are relatively unchanged overtime. The average annual change in residuals across all schools was +0.20. On the other hand, when we look at a cohort of same schools over time, the average annual change score in residuals is -0.20. This means that over a five year period, the trend in student achievement is relatively unchanged.

Table 6. Comparison of Average Annual Change (AAC) in Test Residuals by Grade for Charter Schools and Charter School Cohorts Over Five Years (2001 to 2005)

	Grade 5 Math	Grade 5 Reading	Grade 8 Math	Grade 8 Reading	Grade 11 Math	Grade 11 Reading	Mean AAC across all tests
Average Annual Change in Residual Scores for All Schools with Available Data	-2.61	-3.09	-0.18	-0.19	3.77	3.54	0.20
Average Annual Change in Residual Scores for Cohort of Same Schools	-0.43	-1.13	0.23	0.16	-0.48	0.39	-0.21

As the results in this section reveal, Wisconsin's charter schools are not performing better than demographically similar public schools. Rather, the charter schools in Wisconsin are performing at levels that are rather similar to what would be predicted given the performance levels of demographically similar public schools.

When looking at change over time for either the aggregate of schools or cohorts of same schools we found little or no change on average. The findings from Wisconsin are somewhat unique in the Great Lakes states. In the other states, the charter schools tend to be further behind their comparisons groups, but are making more improvements over time.

Notes and References

[1] Wisconsin Charter School Association. (2007). Charter school law basics. Retrieved April 23, 2007, from http://www.wicharterschools.org/charter.law.cfm

[2] Stuiber, P., Swenson, D., Normandin, H., & Varana, D. (1998). *Charter school program: An evaluation.* Madison, WI. Legislative Audit Bureau.

[3] Witte, J., Weimer, D., Schlomer, P., & Shober, A. (2004). *The performance of charter schools in Wisconsin.* Madison: Robert La Follette School of Public Affairs, University of Wisconsin.

[4] Loveless, T. (2003). *Charter schools: Achievement, accountability, and the role of expertise.* Washington, DC: The Brookings Institution.

[5] Retrieved [February 27, 2007] from the Web site for the Common Core of Data: http://nces.ed.gov/ccd/.

[6] Retrieved [February 23, 2007] from http://dpi.state.wi.us/oea/hist/profic.html. The scale scores for years before 2002-03 were retrieved [February 23, 2007] from http://dpi.state.wi.us/oea/hist/summaries.html.