

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

Appendix C

June 2007



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This research was made possible by funding from the Great Lakes Center for Education Research and Practice

## **Appendix C**

### **Student Achievement in Indiana Charter Schools**

Indiana charter school law was approved in 2001 and later revised in 2003. Eleven charter schools opened in Indiana in 2002. Since then, the number of charter schools has continued to increase with 38 charter schools currently operating in the state with a total enrollment of more than 7,900 students. Charter school authorizers in Indiana include The Indianapolis mayor's office, Ball State University, and 3 school corporations: Carmel Clay School Corporation, Evansville-Vanderburgh School Corporation, and MSD Steuben County. While there is no cap on the number of charter schools in Indiana, the law stipulated that only 5 charters could be authorized in 2001-02 and that the number of charters that could be authorized would be increased by 5 in each subsequent year.

Indiana is generally considered to have a charter school law that is not restrictive. The Center for Educational Reform ranked Indiana sixth in the nation, grading it an "A."<sup>1</sup> This strong rating was due to the extensive autonomy granted the charter schools and the fact that multiple groups can authorize charter schools. Similarly, Chi and Welner (in press)<sup>2</sup> gave Indiana high marks for the public nature of the reform and relatively strong demands for accountability.

Ball State University<sup>3</sup> and the Indianapolis mayor's office<sup>4</sup> issued performance reports of the charter schools they sponsor. These studies show mixed results of student progress. Finch et al. (2007) conducted a study that yielded relatively positive results for Indiana charter school students. "The data revealed that students who attended charter schools for three years are more likely to meet normal growth benchmarks than those who are newer to charter schools."<sup>5</sup> In addition, they found that minority students who attended charter schools for three years achieved at a higher level than those who are new to the school.

#### ***Data Sources, Outcome Measures, and Methods for Analysis***

We obtained demographic variables from the Common Core of Data at the National Center for Education Statistics (NCES).<sup>6</sup> These include school enrollment, ethnicity, free and reduced lunch, and urbanicity or locale. A variable designating whether or not a school was a charter school or traditional public school was used from this data set to distinguish the charter schools in the state. Student achievement test results, special education enrollment, and limited English proficiency enrollment data were obtained from the Indiana Department of Education Web site.<sup>7</sup> Since special education was only reported at the district level, we assigned the district value to all schools within the district. Since charter schools are their own districts, the special education data reported for them was actually building level data.

The outcome measure used for this analysis was the mean scale score from the Indiana state assessment (i.e., Indiana Statewide Testing for Educational Progress-Plus, also known as the ISTEP+)<sup>8</sup>. The scale score provided a more sensitive measure of change in the schools than a cut score; however, scale scores were missing for grade 10

## Appendix C: Student Achievement in Indiana Charter Schools

in 2004-05. Although the state now tests students at grades 3-10, grades 3, 6, 8, and 10 were selected this analysis to permit comparison over multiple years. Overall, there were more limited years of data for Indiana's charter schools since this is the newest reform in the region, so the decision was made to include more than three grades in the analysis. Longitudinal data were available for math and language arts in grades 3, 6, 8, and 10. The five most recent years of data available for these grades were the 2002-03 through 2006-07 academic years.<sup>9</sup> Table 1 illustrates the range of grades, years, and subjects included in our analyses.

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

	2002-03	2003-04	2004-05	2005-06	2006-07
Grade 3	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math
Grade 6	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math
Grade 8	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math
Grade 10	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math	Language Arts Math

### Variables Used to Create the Predicted Values for Each School

The data sets we created for Indiana were rather complete in terms of student achievement data, but not as complete in terms of demographic variables. Because there are relatively few charter schools in Indiana, it was critical that we sought to retain as many schools in our analyses as possible. For this reason, when schools were missing a demographic indicator for one or more years, we used mean substitution to impute the missing value so that the school would not be dropped from the analyses.<sup>10</sup>

**Table 2. Variables Included in Residual Gain Score Analysis for Indiana**

<i>Variable</i>	<i>Description</i>
Mean Scale Score (dependent variable)	School level mean scale score on the ISTEP+
Percentage Minority	Percentage of nonwhite and non-Asian-American students enrolled at the school <i>i</i>
Percentage Low Income	Percentage of students in school <i>i</i> receiving free or reduced lunch
Percentage Special Education	Percentage of students in school <i>i</i> with disabilities
Percentage Limited English Proficient	Percentage of students in school <i>i</i> classified as limited English proficient
Urbanicity (locale)	Rating from 1-8 indicating population density

Table 3 and Figure 1 illustrates our findings across all schools. Actual scores are simply the observed school-level score (i.e., mean scale score) for each grade and subject level test. The predicted values were created using an ordinary least squares multiple regression procedure, in the form of this linear equation:

$$Y_i = a + b_1 \text{MINORITY}_i + b_2 \text{LOWINCOME}_i + b_3 \text{SPED}_i + b_4 \text{LEP}_i + b_5 \text{URBANICITY}_i + \varepsilon_i$$

The variables included in the regression analysis are described in Table 2. 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.

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.

The rows in the tables contain the average annual change scores, which indicate the relative direction in which the school's performance is moving. For example, a school may have all negative residual scores; but if it is 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.

The five year trends we sought to construct run from 2003 to 2007. At grade 8, there were no test results in math and reading for 2003 and 2004. Also note that there were no scale score for grade 10 in 2005. These gaps in test results were common for both charter schools and traditional public schools.

Because of the limited number of charter schools and the limited number of years of test data for the Indiana charter schools—and because there were no upper elementary grades with longitudinal test data—we opted to include and track an additional grade level. In the other five Great Lakes states we tracked 3 grades, however, in Indiana we tracked 4 grades (i.e., grades, 3, 6, 8, and 10).

### ***Actual Performance and Residual Gains for All Charter Schools***

It is important to note that the results in Table 3 and Figure 1 are aggregate results across all charter schools with available data. When calculating the aggregate results, we weighted the data by the relative number of test takers per school. For example, if a large school has extremely positive results, it will carry more weight than a small school with less positive results.

# Appendix C: Student Achievement in Indiana Charter Schools

## Table 3. Indiana Aggregate Results by Grade, Subject, and Year

School Name	Year	Math					Language Arts				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
<b>Grade 3</b>	2003	7	152	369.16	405.83	-36.66	36	152	400.73	426.01	-25.28
	2004	10	374	367.28	412.34	-45.06	36	374	400.09	428.36	-28.27
	2005	11	401	386.49	416.99	-30.49	36	401	407.47	431.94	-24.48
	2006	17	703	388.73	411.11	-22.38	37	703	414.32	427.70	-13.38
	2007	21	887	378.75	402.03	-23.28	37	887	405.00	417.29	-12.29
Average annual change				2.40	-0.95	3.35			1.07	-2.18	3.25
<b>Grade 6</b>	2003	1	18	426.00	469.77	-43.77	1	18	471.00	487.96	-16.96
	2004	4	113	439.44	471.56	-32.12	4	113	463.79	479.91	-16.12
	2005	10	306	465.41	481.56	-16.15	10	292	473.53	481.93	-8.39
	2006	14	514	468.83	486.12	-17.29	14	514	472.46	485.78	-13.33
	2007	17	645	483.08	493.81	-10.73	17	645	478.31	483.35	-5.03
Average annual change				14.27	6.01	8.26			1.83	-1.15	2.98
<b>Grade 8</b>	2003	0					0				
	2004	0					0				
	2005	1	12	539.00	518.28	20.72	1	12	544.00	521.15	22.85
	2006	7	301	499.88	520.53	-20.65	7	301	515.51	528.32	-12.81
	2007	11	450	504.42	519.83	-15.41	11	450	514.05	519.60	-5.54
Average annual change				-17.29	0.78	-18.07			-14.97	-0.78	-14.20
<b>Grades 10</b>	2003	2	70	519.37	520.74	-1.37	2	70	519.46	509.12	10.34
	2004	3	112	517.30	502.11	15.19	3	112	517.74	493.61	24.13
	2005										
	2006	8	341	565.56	576.65	-11.09	8	341	556.04	557.91	-1.87
	2007	13	453	569.91	584.02	-14.11	13	485	555.69	558.94	-3.25
Average annual change				12.63	15.82	-3.19			9.06	12.46	-3.40

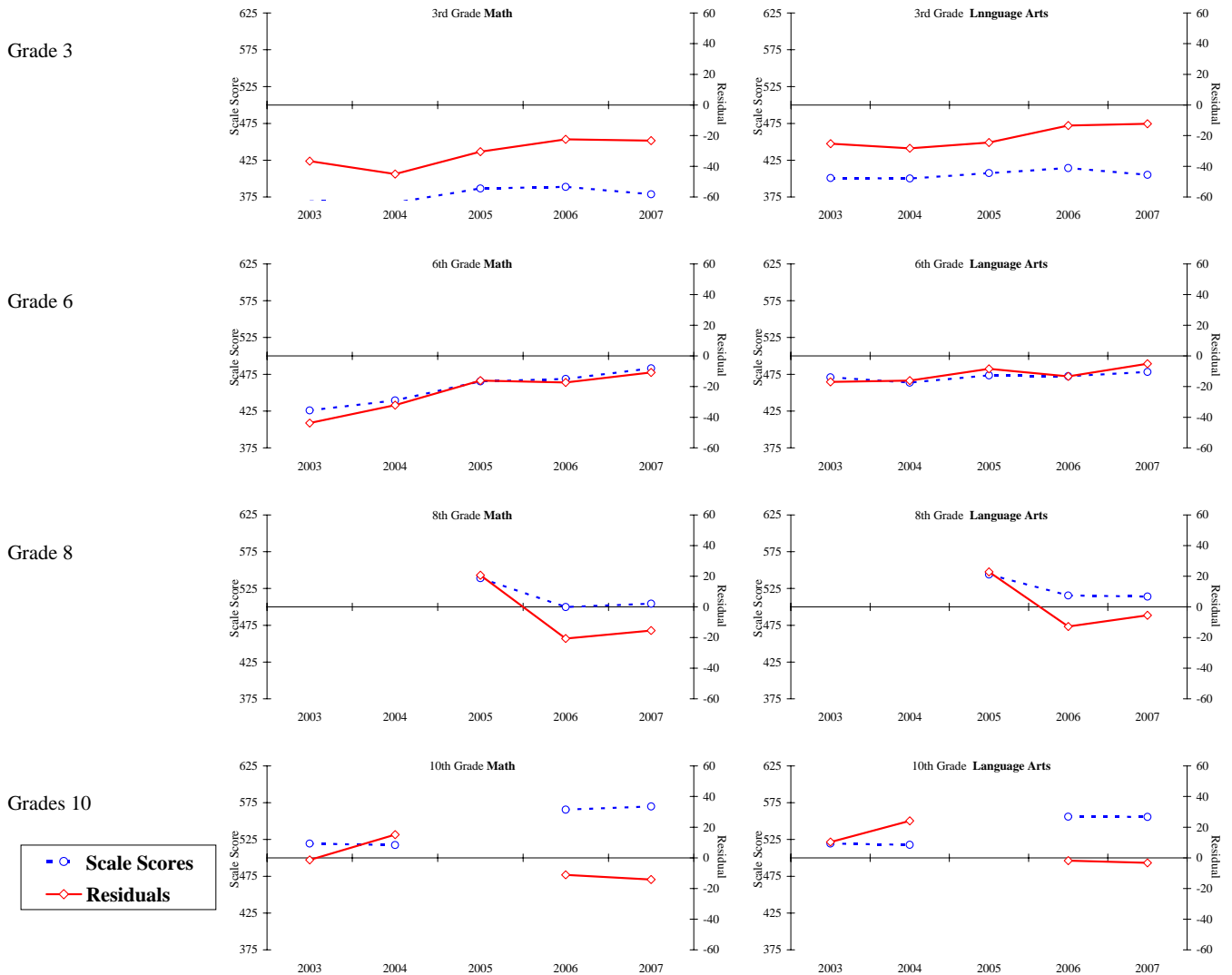


Figure 1. Indiana Aggregate Results: Residual Scores and Mean Scale Scores

The data and charts in Table 3 and Figure 1 illustrate the overall results aggregated for Indiana charter schools. The dashed line in the charts in Figure 1 indicates the actual (i.e., observed) scale scores for the charter schools. These scores are lower than state means and are generally lower than demographically similar schools represented by the predicted values.

### ***Actual Performance and Residual Gains for Same Cohort of Schools***

The changes over time depicted in Figure 1 are likely to be influenced by the addition of new charter schools and the growing enrollment in many of the initial schools. The number of schools and the number of students included in each set of results are indicated in Table 3. Note that the number of schools in the analyses fluctuates considerably from year to year. At grade 6, for example, the number of schools with valid test data increases from 1 in 2003 to 17 in 2007. Changes or lack of change in the test results are more likely to be due to the inclusion of new schools, rather than changes in performance among existing schools.

To control for the possibility that differences over time were due to changes in the schools included in the analyses, we tracked a subset of the same charter schools that had test data available over two or more years. At grade 3, we could create a cohort of seven schools that had test data reported for five consecutive years. At grade 6, the cohort was cut to three years during which ten schools had test data. For grades 8 and 10, we could only build two-year cohorts that contained seven and eight schools, respectively. The results from these aggregate results for cohorts of the same schools over time are illustrated in Table 4 and Figure 2.

The results for the cohorts of schools are rather similar to the results for all schools, although many of the trends are shorter in duration. The solid red line in Figure 2 indicates the residuals, which are consistently negative at grade 3 and 6. At grades 8 and 10, the residuals are also negative, but the schools are scoring closer to their predicted values.

# Appendix C: Student Achievement in Indiana Charter Schools

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

School Name	Year	Math					Language Arts				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
<b>Grade 3</b>	2003	7	152	369.16	405.83	-36.66	7	152	400.73	426.01	-25.28
	2004	7	188	382.34	413.25	-30.92	7	188	406.66	427.93	-21.26
	2005	7	189	402.76	414.13	-11.38	7	189	424.32	428.39	-4.07
	2006	7	253	401.78	420.82	-19.04	7	253	424.06	438.17	-14.11
	2007	7	250	393.83	411.97	-18.14	7	250	415.70	426.66	-10.96
Average annual change				6.17	1.54	4.63			3.74	0.16	3.58
<b>Grade 6</b>	2003										
	2004										
	2005	10	292	464.62	480.98	-16.36	10	292	473.53	481.93	-8.39
	2006	10	330	479.90	488.68	-8.78	10	330	480.38	487.71	-7.33
	2007	10	363	488.10	498.70	-10.60	10	363	483.16	488.08	-4.93
Average annual change				11.74	8.86	2.88			4.81	3.08	1.73
<b>Grade 8</b>	2003										
	2004										
	2005										
	2006	7	301	499.88	520.53	-20.65	7	301	515.51	528.32	-12.81
	2007	7	314	507.39	517.22	-9.83	7	314	516.99	518.28	-1.29
Average annual change				7.51	-3.31	10.82			1.48	-10.04	11.52
<b>Grades 10</b>	2003										
	2004										
	2005										
	2006	8	341	565.56	576.65	-11.09	8	341	556.04	557.91	-1.87
	2007	8	349	571.09	585.45	-14.37	8	349	560.12	560.75	-0.63
Average annual change				5.52	8.80	-3.28			4.08	2.84	1.23

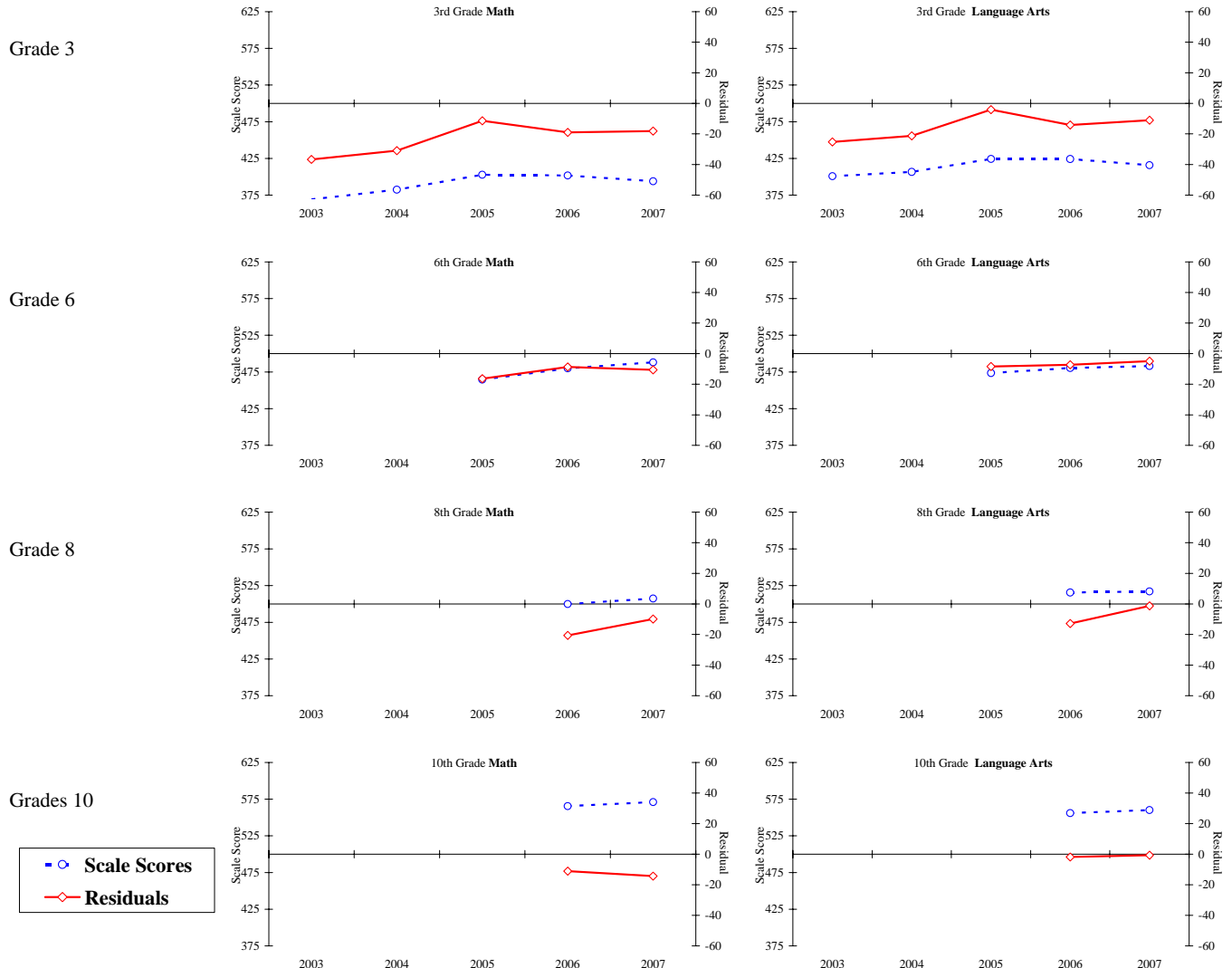


Figure 2. Indiana School Cohort Results: Residual Scores and Mean Scale Scores



*Summary of Findings from Indiana*

Two evaluation questions were asked in this study: (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 eight mean test residuals by grade for Indiana charter schools using the most recent year of available data (i.e., 2006-07). Results revealed 33 instances in which charter school residuals are positive (e.g., student achievement is higher than expected) and 90 instances in which they are negative (e.g., student achievement is lower than expected). In other words, only one-quarter of the comparisons favored charter schools. Therefore, one can conclude the charter schools in Indiana are currently performing at levels 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**

	<i>Grade 4 Math</i>	<i>Grade 4 Reading</i>	<i>Grade 6 Math</i>	<i>Grade 6 Reading</i>	<i>Grade 8 Math</i>	<i>Grade 8 Reading</i>	<i>Grade 10 Math</i>	<i>Grade 10 Reading</i>	<i>Totals</i>
Schools with Positive Residuals	4	4	5	5	3	4	4	4	33
Schools with Negative Residuals	17	17	12	12	10	9	6	7	90

Table 6 contains data that seeks to answer our second evaluation questions: Are charter schools improving over time? The results in this table present a comparison of the average annual change in residual scores. The results are broken out for the aggregate of all Indiana charter schools, and for the cohort of same schools that we tracked over time. Results revealed that the residuals for charter schools overall are decreasing by 1.75 with the greatest decreases occurring in grade eight. This drop in residuals among the aggregate of all charter schools can be explained by the inclusion of new charter schools over time that have low test results. The residuals for the cohort of charter schools show an average increase of 3.27 residual points per year with the greatest increases occurring in grade eight.

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

	<i>Grade 3 Math</i>	<i>Grade 3 Reading</i>	<i>Grade 6 Math &amp; Reading</i>	<i>Grade 8 Math &amp; Reading</i>	<i>Grade 10 Math</i>	<i>Grade 10 Reading</i>	<i>Totals</i>
Average Annual Change in Residuals	3.35	3.25	5.62	-16.13	-3.19	-3.40	-1.75
Average Annual Change in Residual Scores for Cohort	4.63	3.58	2.31	11.17	-3.28	1.23	3.27

In summary, Indiana's charter schools are not performing as well as predicted. On the whole, charter schools lag behind state performance levels, and they are performing at levels that are lower than demographically similar traditional public schools. Although this reform is still relatively new, the trends for the cohort of schools we tracked indicated that Indiana's charter schools are improving over time and decreasing the gap in performance between themselves and demographically similar public schools in the state.

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## Notes and References

<sup>1</sup> Retrieved [March 15, 2007] from [http://www.edreform.com/\\_upload/ranking\\_chart.pdf](http://www.edreform.com/_upload/ranking_chart.pdf).

<sup>2</sup> Chi, W. C., & Welner, K. G. (in press). Charter ranking roulette: An analysis of reports that grade states' charter school laws. *American Journal of Education*.

<sup>3</sup> Finch, W.H., Baker-Boudissa, M., & Cross, T. (2007). *ISTEP+ Performance for Indiana charter school students*. Muncie, IN: Office of Charter School Research, Ball State University.

<sup>4</sup> Indianapolis Mayor's Office (2006). *Indianapolis mayor's office fourth year charter review*. Indianapolis: Indianapolis mayor's office.

<sup>5</sup> Finch, W.H., Baker-Boudissa, M., Cross, T. (2007). *Student progress and achievement in Indiana charter schools: The impact of continued enrollment*. Muncie, IN: Office of Charter School Research, Ball State University.

<sup>6</sup> The Web site for the Common Core of Data is <http://nces.ed.gov/ccd/>.

<sup>7</sup> Retrieved [March 26, 2007] from <http://www.doe.state.in.us/htmls/education.html>

<sup>8</sup> Retrieved [March 23, 2007] from

<http://www.learnmoreindiana.org/k12academics/Assessments/Pages/ISTEP+.aspx>

<sup>9</sup> Retrieved [February 20, 2007] from <http://www.doe.state.in.us/istep/welcome.html>.

<sup>10</sup> For example, if a school reported that it had 70 percent minority students in 2003, no data in 2004 and 90 percent minority students in 2005, we would insert a value of 80 percent for the missing data point. There was insufficient data among charter schools to conduct more sophisticated approaches for imputing missing values.