Core Knowledge Curriculum and School Performance:

A National Study

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Executive Summary

National test score data from 22 Core Knowledge schools across 13 states were analyzed to identify trends in student performance. Aggregated at the school-level, national percentile rankings were available for six years (1998, 1999, 2000, 2001, 2002, 2003) in six content areas (reading, language arts, mathematics, social studies, environmental studies, and science).

Over the six-year review period, the Core Knowledge schools performed well above the national average, with their collective performance increasingly higher than the norm. This performance advantage was evident across the six content areas. The same trend was evident across schools of different sizes, different socio-economic composition, and different ethnic composition. Based on these findings, there appears to be a strong relationship between student performance and the Core Knowledge curriculum.

Enhanced data collection mechanisms will greatly improve the opportunity to monitor the performance of individual schools and make strategic adjustments in the Core Knowledge curriculum and its implementation.

Introduction

At the request of the Core Knowledge Foundation, national test score data from 22 Core Knowledge schools across 13 states were analyzed by academic research specialists at the University of Missouri to identify trends in student performance. This report provides a summary of:

- the data analysis processes used to address the five analysis goals set forth by the Foundation
- the results of the analysis
- conclusions and recommendations

Data Analysis

Using national percentile ranks as the outcome variable, school performance data were analyzed to achieve the following goals identified by the Core Knowledge Foundation:

- Statistically analyze overall outcome trends over time
- Statistically analyze outcome trends for selected content areas over time
- Compare school performance based on the schools' ethnic profiles
- Compare school performance based on the schools' economic profile (as indicated by level of participation in free lunch program)
- Compare school performance based on school size (as indicated by number of teachers in a school)

Data from the Core Knowledge School Renewal Form were first entered into a Microsoft Excel 4.0 worksheet. The data were then cleaned up for inaccuracies and coded. The result was a file containing 26 variables for analysis (see variable list in Appendix). The Excel file was converted to an SPSS (Statistical Package for the Social Sciences) file for data analysis.

Given the variations in the data reported by the schools, the following four-step process was used for each goal prior to the analysis. This process produced goal-specific data sets that were consistent and complete in terms of data type, making legitimate comparisons possible.

1. We eliminated all schools who reported performance using state or local tests. This left us with all schools that used national tests to report performance.

2. We eliminated schools/classes whose outcomes were not reported as percentile rankings. For example Sculptor Charter School reported their scores as "the percent of students at or above satisfactory."

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Data Analysis (cont.)

3. Next, we eliminated any school not reporting information related to the variable in question. For example one school did not report their percentage of students who were on the free lunch program. Therefore, this school was eliminated from the data for analysis when it came to looking at the issue of free lunch.

4. The data left from the original pool of 22 schools and 590 classes was used to look at performance.

Data analysis included repeated measures ANOVA with appropriate post hoc analyses and t-tests to compare outcomes related to the effects of independent variables. Additionally, data were transferred to a graphing program (Cricket Graph) in order to create a graphic representation of data analysis outcomes.

Data from 22 Core Knowledge schools were found to be sufficient in terms of completeness to include in the analysis. These schools were from 13 different states (see Table 1 below)

Table 1. States with Core Knowledge School Using Nationally-Normed Exams

Arkansas	Pennsylvania
California	South Carolina
Colorado	Texas
Georgia	Utah
Minnesota	Virginia
Nebraska	Wisconsin
North Carolina	

The school performance data covered a six-year period, 1998 through 2003. While some schools did not provide performance data for all six years, the sample size was adequate to allow for analysis over this time period. In terms of content areas, data were available for reading, language arts, mathematics, social studies, environmental studies, and science. Again, while some school did not provide performance data for all six content areas, the sample size was adequate to allow for analysis across all areas. The schools varied in size from 44 students to 960 students. The Appendix contains the entire data set used in the analysis.

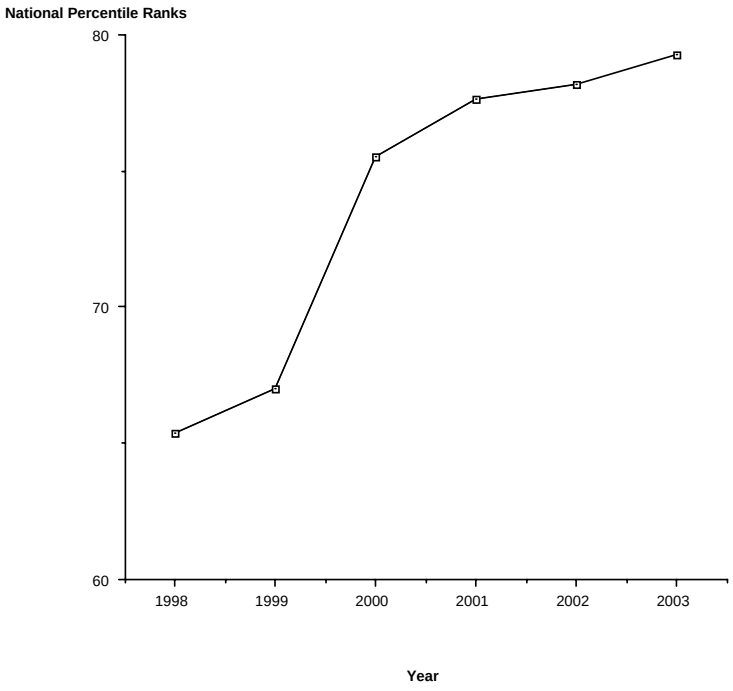
Results

The results for each analysis goal are summarized below. The actual data set used in the analysis is provided in electronic format.

Overall Outcome Trends Over Time

School performance data across content areas were aggregated and analyzed over the years 1998 through 2003. Figure 1 provides a graphic display of the performance means in terms of percentiles. The number of classes (i.e., grade-levels) within the schools ranged from a low of 55 in 1998 to a high of 190 in 2002. Table 2 displays the mean performance scores across all schools for 1998 through 2003, along with standard deviations, minimum and maximum school performance scores, and number of classes for each year.

Figure 1: Total Values by Year



Results (continued)

Overall Outcome Trends Over Time (cont.)

Table 2. School Performance Mean Percentiles, Standard Deviations, Min/Max, and Number of Classes for 1998 - 2003

Year	Performance Mean Percentile	Standard Deviation	Minimum Percentile	Maximum Percentile	Number of Classes (grades)
1998	65.04	13.15	33	96	55
1999	67.02	16.49	30	96	106
2000	75.51	17.65	35	99	136
2001	77.66	16.50	40	99	146
2002	78.18	14.76	39	99	190
2003	79.29	13.52	51	99	174

While it is important to note that collectively the Core Knowledge schools were well above the 50th percentile in 1998, a strong upward trend spanning the six-year period is very evident, with the most recent test year (2003) showing an overall national ranking near the 80th percentile. The gradual flattening of the upward trend is to be expected as a "ceiling effect" comes into play.

An equally important trend can be seen when the Minimum Percentile scores are examined over the 1998 – 2003 timeframe. The Minimum Percentile scores show an improvement over time, with the greatest improvement reflected in the 2003 scores. When coupled with the recent decrease in the Standard Deviation, it appears the Core Knowledge schools may be achieving the dual goals of increasing student performance and decreasing the variability in student performance outcomes. An analysis based on individual student performance data would verify this hypothesis.

Results (continued)

Outcome Trends for Selected Content Areas Over Time

The data were sorted and analyzed based on content area. Figure 2 (below) displays mean percentile ranks for all schools by content area over the years 1998 through 2003 (combining data from all six years). Table 3 (below) provides a summary across context areas for each year. In general, the overall upward trend is reflected in each of the six content areas.

Figure 2: National Percentile Ranks
All Schools by Subject

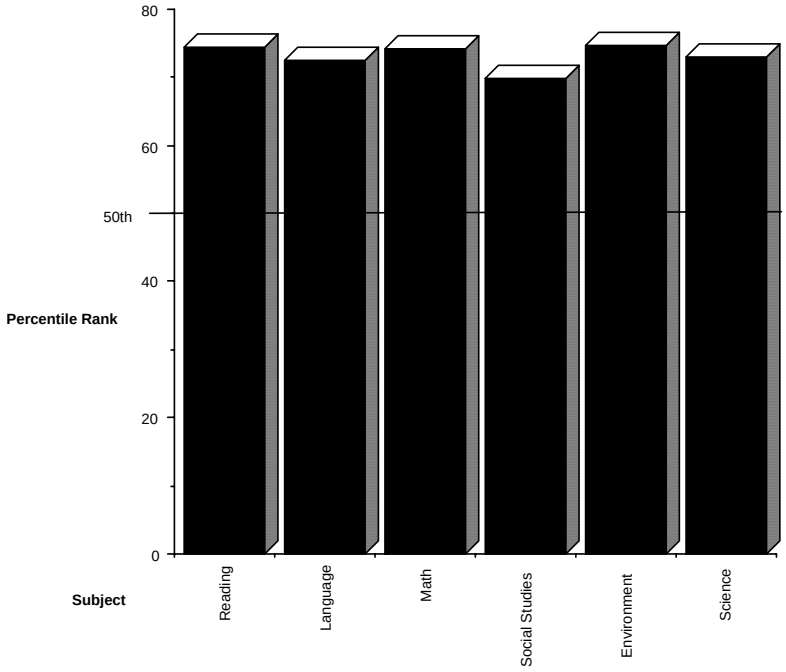


Table 3. Content Area Percentiles: 1998-2003

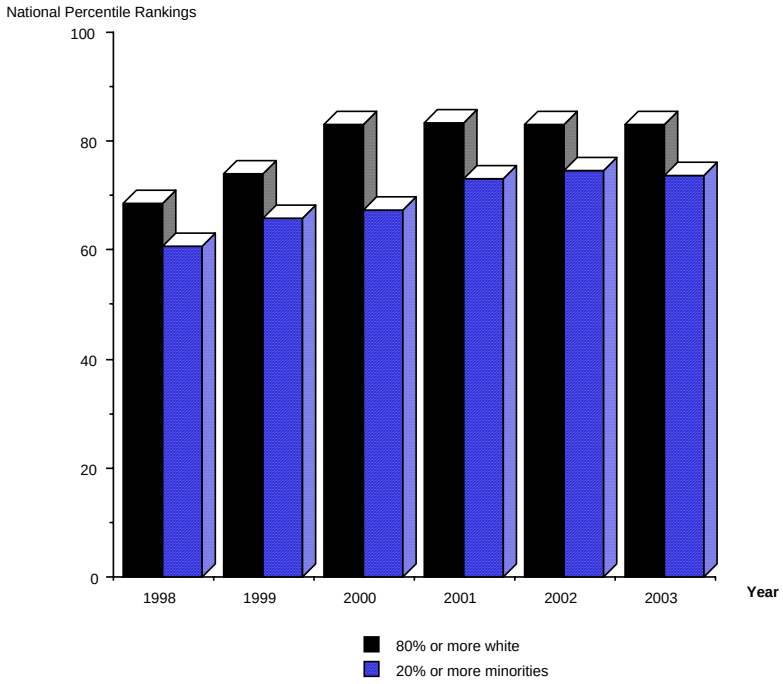
Subject/Year	1998	1999	2000	2001	2002	2003	Overall
Reading	67	71	74	77	77	77	74
Lang Art	64	65	74	75	77	77	72
Math	63	68	76	78	78	80	74
Soc Studies	58	60	72	75	75	77	69
Env Studies	73	70	73	78	81	71	74
Science	66	63	73	77	77	80	73

Results (continued)

School Performance Based On Ethnic Profiles

The schools were divided into two categories: schools in which 80% or more of the students were Caucasian and schools in which less than 80% of the students were Caucasian. As shown in Figure 3 (below), while schools with a higher percentage of Caucasian students outperformed schools with a lower percentage; both categories of schools consistently scored above the 60th percentile nationally.

Figure 3: Comparison of National Percentile Ranking by Year by Ethnic Profile



In one sense, the trends in the Core Knowledge schools based on ethnic profile are consistent with trends found nationally. White students tend to out-perform Black and Hispanic students in 4th and 8th grade reading and mathematics. (see: http://nces.ed.gov/nationsreportcard/mathematics/results2003/raceethnicity.asp and http://nces.ed.gov/nationsreportcard/reading/results2003/raceethnicity.asp for details) However, the fact that schools with higher percentages of non-Caucasian students consistently scored well above the national average (at or above the 60th percentile) sets these schools apart from their non-Core Knowledge counterparts.

Results (continued)

School Performance Based On Economic Profile

The schools were sorted into two categories based on the percentage of students participating in a free lunch program: schools with 25% or more of the students participating in a free lunch program and schools with less than 25% of the students participating in a free lunch program. For the purpose of this analysis, participation in a free lunch program was an indicator of affluence.

The four-step process described in the Data Analysis section of this report was particularly important when looking at the issue of school affluence. This process reduced the original data set to 15 schools and 314 classes (down from 22 schools and 590 classes). Using 25% as the "cut point", there were 3 schools and 32 classes which had 25% or more of their students in a free lunch program (less affluent schools), compared to 12 schools and 282 classes with less than 25% of their students in a free lunch program (more affluent schools).

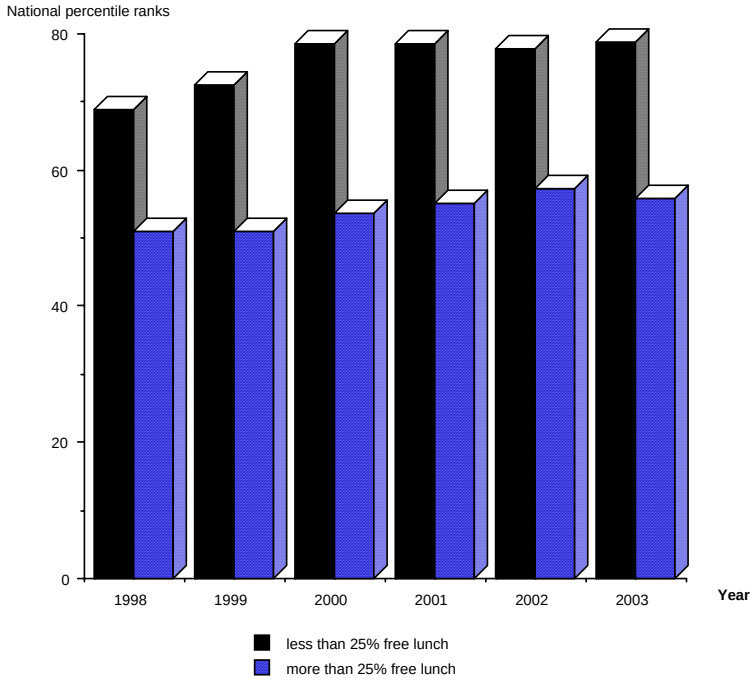
As summarized in Table 4 and Figure 4, there is a performance difference between the less affluent schools and the more affluent schools, with the more affluent schools consistently out-performing the less affluent schools.

Table 4. Performance Means and Standard Deviations for More and Less Affluent Schools

	More Affluent Schools				**Less Affluent Schools**		
Year	Number Classes	Mean	S.D.		Number Classes	Mean	S.D.
1998	83	68.1807	14.4063		32	51.0313	12.5736
1999	113	72.3628	13.7348		32	51.1250	9.8234
2000	175	78.4743	14.9938		32	53.7187	9.6093
2001	166	78.5476	15.0399		32	55.1563	8.2466
2002	235	77.8081	14.2023		23	57.4348	6.7002
2003	219	78.6831	12.8196		9	55.8889	4.7022

Results (continued)

Figure 4: Comparison of schools with less than 25% of students on free lunch program with schools with 25% or more of students on free lunch program.



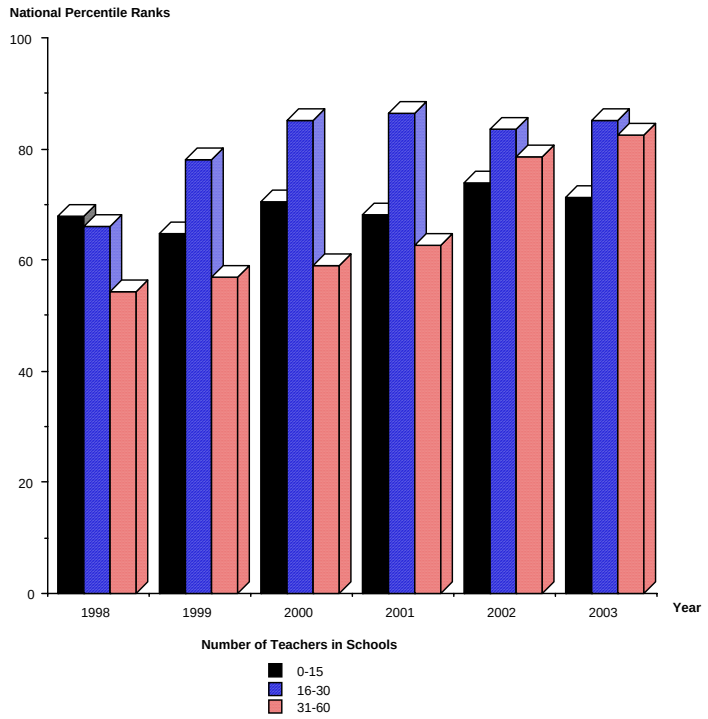
The performance gap between more affluent and less affluent schools is consistent with the national trend. For example, the National Center for Educational Statistics reported performance differences based on affluence in reading and mathematics for 4th and 8th grade students. (see: http://nces.ed.gov/nationsreportcard/mathematics/results2003/lunch.asp and http://nces.ed.gov/nationsreportcard/reading/results2003/lunch.asp for details). However, it should be noted that the three less affluent schools, on the average, scored at or above the national mean over the six year period.

Results (continued)

School Performance Based On School Size

To determine if the Core Knowledge curriculum was differentially effective for schools of different sizes, the schools were divided into three categories based on the number of teachers in a school. Small size schools were operationally defined as schools having15 or fewer teachers; medium size schools as having 16 to 30 teachers; and large size schools having more than 30 teachers. As illustrated in Figure 5, medium size schools tend to outperform the small and large schools. However, in more recent years (2002 and 2003), the gap between medium and large schools has narrowed.

Figure 5: Comparison of School Size: Number of Teachers by Performance by Year



Conclusions and Recommendations

Conclusions

Based on the available data and subsequent analysis, there appears to be a strong relationship between student performance and the Core Knowledge curriculum. Schools that implemented the Core Knowledge curriculum consistently exceeded the national averages across six content areas, regardless of the ethnic profile, economic profile, or school size.

Not only is there a performance gap favoring Core Knowledge schools over their national counterparts, the gap widens over time suggesting the performance gains may be long-term and sustainable provided the schools continue to implement the Core Knowledge curriculum.

Recommendations

While there is a performance advantage favoring Core Knowledge schools, the available data are not adequate to conclude this advantage can be attributed solely to the Core Knowledge curriculum. Other factors, such as the process of implementing the curriculum or building-level leadership, may be involved. In the future, the Foundation should consider collecting nationally-normed school performance data prior to the time schools adopt and implement the Core Knowledge program. This baseline data would make it possible to attribute changes in school performance more directly to participation in the Core Knowledge program.

The relative performance of schools with different ethnic and economic profiles has been in the national spotlight for many years. One organization, the Education Trust, tracks student performance data and periodically issues reports examining trends related to ethnic composition, affluence, and other key variables. For example, one report provided a state-by-state comparison of African American, Latino, and White 4th and 8th grade students in terms of performance in mathematics, science, reading, and writing. While the Core Knowledge school performance data used in the current report does not lend itself to analytic comparison with the trends noted by the Education Trust, it may be informative for Core Knowledge decision makers to consult the Education Trust website (http://www2.edtrust.org/edtrust) for national trends in selected areas.

Conclusions and Recommendations (continued)

Recommendations (continued)

In terms of optimizing the Core Knowledge curriculum and its implementation, the Foundation may wish to create a more automated data reporting mechanism for schools to use. Such a mechanism (see Appendix) would make it possible to monitor the performance of individual schools on a real-time basis and make strategic adjustments in the Core Knowledge curriculum and how it is being implemented. Finally, a mechanism for providing yearly feedback to individual schools, comparing their performance to similar schools and national norms, should be considered.

Appendix

Appendix A contains a brief document describing an online database system for managing school performance data.

Appendix B contains the entire data set used in the analysis. A printout has been provided to the Core Knowledge Foundation.

Appendix A

Performance Information Management System
(Narrative below provided by Eyebits Inc.)

Collecting, analyzing and representing student and teacher performance and engagement data is a time consuming and difficult task. But, it is a very important task that is required to make data based decisions to help improve student performance. Eyebits Inc. develops Performance Information Management Systems (PIMS) that help improve the quality of learning environments through tools to monitor activity, progress and outcomes so that adjustments to programs can be made to maximize their impact for students. PIMS also make the task of collecting data a more efficient and less time consuming process through the use of web applications that are easy to use and can be accessed through secure web pages using a standard web browser.

The following are some features of PIMS:

- Collect information on student activities and engagement
- Track learning interventions and the outcomes of those interventions
- Track programs and services provided to students and the utilization of those programs and services
- Track roles and participation of professional educators, part-time help, and parent helpers
- Support dynamic plans of action that correlate activities to performance data associated with those activities to make data based decisions that are used to modify the plans of action
- Provide online surveys and evaluation instruments to collect data that go beyond teacher assessments of student work, grades, and standardized tests. Example measures: student, teacher, and staff climate (is the environment supportive, safe, free of discrimination, etc.), student-orientation toward engagement in further education after high school, and perception of students regarding quality and extent of programs and services offered to them)
- Easy tabulation and statistics of collected data
- Generate preformatted reports based on collected data
- Allows instantaneous summary of data at any point in time (get a snapshot!)

The following are some benefits of PIMS:

- Monitor program services to make data driven decisions to increase accountability
- Improve the performance of learning interventions
- Improve the quality of life for students, teachers and staff
- Make analysis and reporting an easier and less time consuming task

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Appendix B

A printout of the entire data set has been provided to the Core Knowledge Foundation. Please contact the Foundation for more information.