How Do We Know This Works?

An Overview of Research on Core Knowledge (January 2004)

Teachers, principals and parents often ask, “How do we know Core Knowledge works? Is there any evidence for its effectiveness?” This article is meant to answer those questions by providing a brief overview of some of the most recent and most relevant research.

We have divided this overview into two sections. The first section treats direct evidence; the second looks at indirect evidence. By direct evidence we mean research on Core Knowledge schools — research showing that Core Knowledge can help lift student scores and close the gap between the more and less disadvantaged students. By indirect evidence, we mean other studies that confirm the validity of the central ideas behind Core Knowledge, for example, studies that show that the possession of cultural literacy is strongly correlated with academic and economic success, and studies that show that nations with core curricula tend to outperform nations that lack such core curricula on international tests.

Part I: Direct Evidence

Studies of the effects of implementation of Core Knowledge in American schools have generally been very favorable. A growing body of evidence suggests that Core Knowledge fosters excellence and equity. It fosters excellence by improving student performance, boosting enthusiasm, and laying the groundwork for future learning. It fosters equity by ensuring that all students have the benefit of a rich curriculum and narrowing the gap between high- and low-performing students.

A. The Oklahoma City Study

In the summer of 2000 administrators in Oklahoma City completed a series of carefully controlled, independent studies on the effects of Core Knowledge in public schools in their district. Oklahoma City Public Schools (OCPS) is an urban district with 67 elementary schools. The ethnic make-up of the district is 39% African-American, 36% European-American, 18% Hispanic, 5% Asian American and 2% Native American. At the time when the studies were done, about half of the district’s elementary schools were using the Core Knowledge curriculum.

Researchers began by determining which students in Oklahoma City were being taught the Core Knowledge curriculum and which were not. Next, they used a computer to randomly match students in Core Knowledge classrooms with similar students in non-Core Knowledge schools. The computer matched students with the same characteristics on seven variables: grade level, sex, race/ethnicity, free-lunch eligibility, Title-I eligibility, special-education eligibility, and pre-score on the Iowa Test of Basic Skills (ITBS). This matching procedure yielded 339 matched pairs of Core Knowledge students and non-CK students. The two groups were statistically indistinguishable, except that the members of one group were taught Core Knowledge while the members of the other group were not.

Since the two groups of students were so precisely matched at the beginning of the school year, one would expect them to post virtually identical average scores at the end of the school year. In fact, however, the students who had spent the year in Core Knowledge classrooms outscored the control students in seven of the eight categories on the ITBS. The Core Knowledge students posted significantly higher scores in reading comprehension (58.1 vs. 55.1), vocabulary (59.8 vs. 55.3), science (58.7 vs. 55.8), math concepts (61.4 vs. 59.2), and social studies (58.3 vs. 53.4). The greatest gains — in reading comprehension, vocabulary, and social studies — were computed to be statistically "highly significant."

The initial study looked at ITBS results for the 1998-1999 school year. The researchers had hoped to follow up by looking at ITBS results for the 1999-2000 school year, but the district decided not to use the ITBS at the conclusion of the school year, making it impossible to compare before and after results for 1999-2000. The researchers therefore decided to examine the ITBS results for a previous academic year, 1997-1998. Again students were randomly matched according to the seven variables listed above, and again the Core Knowledge students were found to have outperformed their peers in almost all categories on the ITBS. Core Knowledge students achieved "significant" or "highly significant" advantages in reading comprehension (57.6 vs. 53.1), reading vocabulary (58.8 vs. 54.7), language usage (62.0 vs. 56.3), math concepts (59.3 vs. 56.3), math computation (64.2 vs. 60.7), and social studies (60.4 vs. 56.0).

It is significant that Core Knowledge students posted especially strong scores in reading vocabulary during both of the years examined. Vocabulary is a particularly important area, since it is the single best predictor of academic achievement, and an area in which the gap between ethnic and racial groups has proved to be especially difficult to overcome.

In addition to the ITBS, The Oklahoma researchers also looked at students' performance on the Oklahoma Criterion-Referenced Tests (CRTs). Researchers chose to focus on reading and social studies, two areas where students had shown highly significant gains on the ITBS. Students were matched according to the seven variables, as before.

The Core Knowledge students scored higher on all four of the reading objectives and all six of the history and geography objectives. In reading, Core Knowledge students averaged 26.65 correct answers out of a possible 36, or 76%, while non-Core Knowledge students averaged only 22.88 correct answers, or 63%. In history and geography, Core Knowledge students averaged 46.66 correct answers (70%), versus 40.64 (61%) for the control group.

These last findings are interesting because they show that Core Knowledge can improve student performance, not only on norm-based tests like the ITBS but also on criterion-based tests like the Oklahoma CRTs — even when those tests are not based on the Core Knowledge curriculum. This finding might seem hard to accept at first. One might think that the best way to prepare students to meet state standards would be to discard all other standards, thus leaving no distractions. But the Oklahoma results indicate that schools can actually improve students' performance on state tests by combining the Core Knowledge curriculum with their state standards. A simple example can show why this can be an effective tactic.

One of the Oklahoma CRT standards asked students to recognize central personalities and important events of the Civil War. The Core Knowledge Sequence also covers the Civil War, but it provides more specific guidance: it identifies some of the central personalities (Ulysses S. Grant, Robert E. Lee, Abraham Lincoln, Jefferson Davis) and some of the most important events (shelling of Fort Sumter, Battles of Bull Run, Gettysburg, and Antietam, the Emancipation Proclamation, Gettysburg Address, surrender at Appomattox). The Foundation also offers books and lesson plans on these topics. In other words, the Core Knowledge Sequence and its supporting materials can help flesh out the state standards and boost academic achievement.

Standardized tests are important, but they are not the only measures of academic success. The Oklahoma City study also looked at teacher satisfaction with Core Knowledge. Teachers were asked if they were satisfied with Core Knowledge's impact on students' learning. 135 said they were satisfied, 51 said they were somewhat satisfied, 32 had no opinion, and one checked "somewhat dissatisfied." None of the more than 200 teachers polled reported "strong dissatisfaction." What's more, the extent of teacher's satisfaction was found to increase with time: the longer a teacher taught Core Knowledge, the more likely that teacher was to report strong satisfaction.

Teachers also reported that the Core Knowledge curriculum increased students' enthusiasm for learning. 150 teachers were satisfied on this point, 46 somewhat satisfied, and 24 had no opinion. None of the 220 teachers questioned indicated even mild dissatisfaction on this point.

B. The Virginia Longitudinal Study

In 2003 researcher Fred Smith published the results of a longitudinal study of two schools in Virginia. Smith compared students in a Core Knowledge school with students in another school in the same district with a similar demographic make-up. He tracked the effect of Core Knowledge on student achievement using a quasi-experimental, longitudinal, matched-comparison design. The most distinctive aspect of Smith's research was that it tracked students across several years of schooling, from kindergarten to sixth grade. Only children who remained in the Core Knowledge school or the control school for the whole period of the study were evaluated.

Smith found that Core Knowledge had the following positive effects:

- Students who remained in the Core Knowledge school from kindergarten through grade 6 outperformed peers at the control school as measured by mean scaled scores on the Stanford 9TA tests. Core Knowledge students outperformed control students in all subjects tested and for both of the two cohorts of students examined. The Core Knowledge advantage was statistically significant for Reading ($p \leq .029$, $p \leq .002$) and Math ($p \leq .002$, $p \leq .014$).

- Core Knowledge promoted fairness in schooling by providing equal educational opportunity to disadvantaged as well as advantaged students. Both advantaged and disadvantaged (free lunch) students in the Core Knowledge school outperformed students in the control school on the Stanford 9TA tests. Again this was true for all three subjects and for both cohorts examined. The disadvantaged students in the Core Knowledge school showed statistically significant advantages in reading ($p \leq .017$ for one cohort and $p \leq .030$ for the other).

- Core Knowledge helped narrow the achievement gap on the Stanford 9TA test between advantaged and disadvantaged students. The achievement gap, as measured by the Stanford 9TA tests, was narrowed for one Core Knowledge cohort and entirely eliminated for the other. The achievement gap between advantaged and disadvantaged students remained large for both cohorts at the control school.

- Core Knowledge helped students achieve much larger gains on the Stanford 9TA over two-year periods, from grade 4 to 6. Both advantaged and disadvantaged students made larger gains than their peers in the control school in all of the 12 cases evaluated. Among disadvantaged students, the edge to Core Knowledge was deemed highly significant in all three subjects ($p \leq .001$, $p \leq .001$ for Reading; $p \leq .001$, $p \leq .001$ for Math; $p \leq .001$, $p \leq .002$ for Language).

Smith's research, described in more detail here, provides compelling longitudinal evidence that Core Knowledge can improve academic performance for both advantaged and disadvantaged students, and can help to narrow the achievement gap between these two groups. His findings also suggest that Core Knowledge may have certain latent effect—effects that may not be visible immediately, and may not show up in a one-year study, but begin to appear after several years of exposure to the curriculum and can grow quite large when exposure persists throughout the elementary years.

C. The Johns Hopkins Studies

During the late 1990s researchers at the Center for the Social Organization of Schools at Johns Hopkins University did a series of studies looking at Core Knowledge's impact on schools. These studies found evidence that Core Knowledge is associated with many positive changes in schools, and that these positive changes are most pronounced when implementation of Core Knowledge is pursued wholeheartedly.

An early Johns Hopkins study looked at the effects of Core Knowledge implementation in five

Maryland schools. Core Knowledge schools were matched with non-Core Knowledge schools with similar numbers of students and similar percentages of students eligible for free or reduced lunch. Researchers also visited each Core Knowledge school and gave teachers questionnaires to assess the degree to which the school was really implementing Core Knowledge.

The researchers then tracked scores on two tests over a five-year period. The two tests used were the Comprehensive Test of Basic Skills, fourth edition (CTBS/4) and the Maryland state test, the MSPAP. Results on MSPAP were mixed and inconclusive, but the researchers found that schools that had achieved at least a moderate level of Core Knowledge implementation had better CTBS/4 scores, especially in reading comprehension. The school with the most consistent and impressive gains in reading comprehension was the school with the greatest level of observed Core Knowledge implementation. The most disappointing final numbers were posted by a school that had abandoned Core Knowledge midway through the study. The full report can be read online, here.

Another Johns Hopkins study widened the focus to look at Core Knowledge schools across the country. Researchers looked at twelve Core Knowledge schools in Colorado, Florida, Ohio, Maryland, Tennessee, Texas, and Washington. Each school was matched with a demographically similar control school in the same district.

Researchers visited each of the Core Knowledge schools five times. During visits they monitored classroom activities and also used an instrument called the Classroom Observation Measure, which has been validated in other studies of elementary classroom instruction. Researchers also surveyed teachers to assess the extent of Core Knowledge implementation.

The Johns Hopkins team found that the degree to which Core Knowledge was implemented was a significant predictor of student achievement gain. Researchers administered two subtests from the Comprehensive Test of Basic Skills, Fourth Edition (CTBS/4). They derived Normal Curve Equivalent Scores (NCEs) from the CTBS/4 Math Concepts and Applications subtest and the Reading Comprehension subtest. When low and high implementing sites were taken together, the effect of Core Knowledge on reading and math achievement was not statistically significant. However, when schools with moderate to high implementation were contrasted with low-implementing sites as controls, the results were more compelling. The Johns Hopkins statisticians reported that the gain difference on standardized tests between low and high implementing schools varied from 8.83 NCEs to 16.28 NCEs. That is an average rise of about 12 NCEs (similar to percentile points) over the controls, more than half a standard deviation—a very significant gain.

The researchers also created Core Knowledge Achievement Tests in science, language arts, and history and geography. Not surprisingly, students in Core Knowledge schools did better on these tests than students in the "comparison" schools where Core Knowledge was not being taught. This might be seen as too obvious to deserve comment, but in fact these results are important for several reasons. For one thing, they show that students retained much of the Core Knowledge content they were taught, and were able to learn this information without losing ground on other academic indicators, like the CTBS/4 tests. Moreover, since the content taught in Core Knowledge schools is carefully chosen and designed to be cumulative, what students learned is

predicted (by E. D. Hirsch, Jr.) to enhance students' vocabulary, reading skill, and learning ability in later grades.

The Core Knowledge Achievement tests were given to all third and fifth graders in the study. Each test had 20 multiple-choice questions; the history and geography test also had one item requiring a written answer. Statistically significant, "educationally meaningful," achievement gain was found in every subject for both cohorts tested—and once again the largest gains were posted by the most dedicated implementers.

In short, when scores were analyzed according to the degree of implementation attained at each school, the data showed academic improvement was accelerated at sites that were implementing strongly. The researchers commented, "The correlation between level of implementation and effect size indicates that when schools implemented the Core Knowledge Sequence with greater reliability and consistency, students achieved improved scores on all tests. Considering only those schools in which the research staff observed Core Knowledge curriculum and instruction in more than 50 percent of classrooms, one sees marked increases in the effect size favoring Core Knowledge."

The study also analyzed the impact Core Knowledge has on student engagement. Researchers made three preliminary observations:

First, 10 of 12 Core Knowledge schools were obtaining measures of student engagement in the "highly effective" range.

Second, the two schools with the highest mean student engagement ratings were also schools that had been deemed "highly implementing" and the two schools with the lowest engagement rating were the two schools rated as the lowest implementers.

Third, the data suggested that "students find Core content stimulating." Researchers noted that this finding "would contradict any assertion that students are 'turned off' in schools that strongly implement Core Knowledge."

Researchers confirmed that the following predicted benefits "were in fact associated with Core Knowledge implementation":

For students, Core Knowledge does:

- Provide a broad base of knowledge and a rich vocabulary
- Motivate students to learn and create a strong desire to learn more
- Promote the knowledge necessary for higher learning

For the school, Core Knowledge does:

- Provide an academic focus and encourage consistency in instruction

- Provide a plan for coherent, sequenced learning from grade to grade
- Promote a community of learners— adults and children
- Become an effective tool for lesson planning and communication among teachers and with parents
- Guide thoughtful purchases of school resources

Beyond these, the study identified some unexpected benefits:

- Core Knowledge created coordination in the curriculum.
- Implementing Core Knowledge improved the professional lives of teachers. "Core Knowledge was viewed very favorably by teachers and seen as an enhancement to their lives. Overwhelmingly, teachers enthusiastically encouraged their teacher friends to implement Core Knowledge. This is a very important finding."
- Implementing Core Knowledge led to increased teacher collaboration. Such "genuine collaborative work among teachers that has a focus on the curriculum and instruction is all too rare in education," the researchers note.
- Core Knowledge enriched students' classroom experience. "Teachers reported that it was not just certain students who were excited by Core, but all students…. The benefits are great for teaching those children who would normally not be exposed to such subjects at home."
- Core Knowledge challenged conventional assumptions about student ability. "Many teachers reported being initially skeptical that Core Knowledge content was not developmentally appropriate for elementary students. However almost all teachers interviewed found that no matter what students' starting points were — low achieving, average or high achieving — they were able to grasp and gain from learning the Core material." One teacher commented: "They may be six-year-olds, but they can grasp a lot more knowledge than we thought before we started this."
- Students built on what they learned previously in Core Knowledge. "Teachers find that in fact students make connections to Core topics they learned in previous grades…. Students make lasting academic connections because of the integration of the curriculum and [its] spiraling structure."
- Core Knowledge increased students' interest in reading. Teachers report that "students are learning to read bigger words sooner. There's an interest to read and to learn." At a number of schools, "educators cited the fact that students are more interested in reading non-fiction as one of the main benefits of Core Knowledge."
- Core Knowledge increased parent satisfaction. "Parents are thrilled, thrilled, thrilled," according to one teacher, another of whom said, "Our parents are elated with the results of Core."

Researchers found "no obvious negative outcomes for students." However, they did note that implementing the program makes heavy demands on teachers, especially during the first year of implementation. In addition, almost every teacher interviewed reported difficulty in finding age-appropriate materials for various units.

Furthermore, the study observed that implementation of Core Knowledge can be impeded if teachers do not have time for group planning and cooperation, if the school lacks money for resources, or if state standards are perceived as more important than Core Knowledge topics.

The full report is available online, here.

D. Core Knowledge Schools in Colorado

One of the states in which the Core Knowledge idea has caught on is Colorado. There are currently more than 50 schools using Core Knowledge in the state. The following chart shows that Core Knowledge schools are doing quite well on the state's CSAP exam. The results of the 2002 exam are summarized below. They show that large percentages of Core Knowledge schools are posting scores ten, twenty, and even thirty points above the state average. This is additional evidence that implementation of Core Knowledge can go hand-in-hand with success on state exams.

	% of schools above state average	% of schools at least 10 % points above state average	% of schools at least 20 % points above state average	% of schools at least 30 % points above state average
3rd Grade Reading (41 schools total)	80%	63%	32%	0%
3rd Grade Writing (41 schools total)	80%	66%	54%	24%
4th Grade Reading (41 schools total)	78%	71%	46%	17%
4th Grade Writing (41 schools total)	80%	59%	44%	24%
5th Grade Math (42 schools total)	76%	64%	55%	26%
5th Grade Reading (42 schools total)	88%	64%	43%	21%
5th Grade Writing (42 schools total)	79%	55%	50%	33%
6th Grade Math (37 schools total)	84%	68%	46%	24%
6th Grade Reading (36 schools total)	81%	64%	39%	11%
6th Grade Writing (36 schools total)	81%	67%	42%	25%
7th Grade Math (31 schools total)	81%	61%	36%	29%

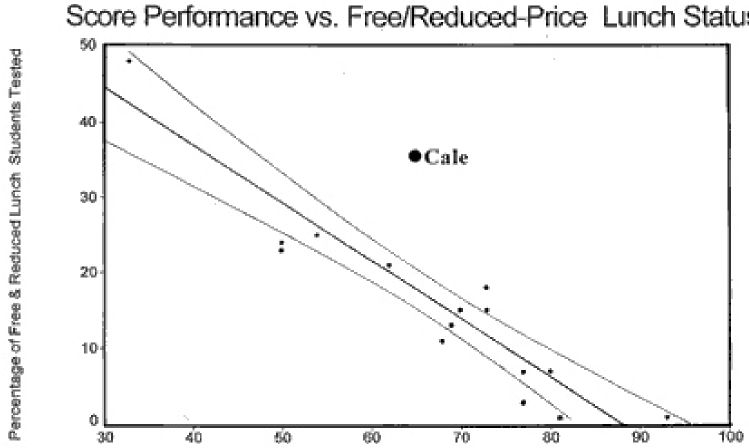
	% of schools above state average	% of schools at least 10 % points above state average	% of schools at least 20 % points above state average	% of schools at least 30 % points above state average
7th Grade Reading (31 schools total)	84%	65%	39%	16%
7th Grade Writing (32 schools total)	78%	66%	38%	22%
8th Grade Math (29 schools total)	69%	55%	48%	24%
8th Grade Reading (29 schools total)	79%	66%	38%	10%
8th Grade Science (29 schools total)	79%	62%	45%	14%
8th Grade Writing (29 schools total)	69%	52%	41%	21%

For more details on Core Knowledge schools in Colorado, visit the website maintained by National Core Knowledge Coordinator for Colorado, Holly Hensey, www.ckcolorado.org.

E. Some Individual Schools

Cale Elementary School (Charlottesville, VA), a public school where 34% of students get free or reduced-price lunches, significantly outperformed local schools with a similar demographic profile after it adopted Core Knowledge. In the graph below, the diagonal lines represent the best prediction of the percentage of low-income students who would score above the 50th national percentile on standardized tests (in this case the Iowa Test of Basic Skills). The dots on the graph show that while most of the district's elementary schools performed within their predicted range, Cale Elementary performed significantly above what would be predicted by the socioeconomic composition of its students.

Albemarle County, Virginia
ITBS - 1996
Score Performance vs. Free/Reduced-Price Lunch Status



Percentage of Students Testing Above the 50th National Percentile
Diagonal bands show predicted performance range.

Cale's principal commented on his schools achievements: "Since we implemented Core Knowledge, our scores for all students have consistently gone up, especially in social studies, science, and math. The scores surprise us because they constantly go up. We are scoring well above the national norms in social studies, above the 75th percentile. That is very good for our diverse population. These are not all middle-class kids. Half of our students taking the Iowa Test of Basic Skills each year come from low-income homes. Our scores defy what you might expect."

Hawthorne Elementary (San Antonio, Texas), has led its mostly Hispanic student body to increased cultural literacy and improved reading skills. Hawthorne is an urban school where 28% of the students have limited English proficiency and 96% receive free or reduced-price lunches. A study published in the Journal of Education for Students Placed at Risk examined how students at Hawthorne compared to students in the other 65 elementary schools in the San Antonio Independent School District on the Reading Performance section of the Texas Assessment of Academic Skills (TAAS). The JESPAR study includes the following graph, which illustrates that, while district reading performance is generally consistent across grade levels, with a student pass rate of about 55%, Hawthorne's results show a steep increase in the reading pass rate at consecutive grade levels. At grade 3, Hawthorne's pass rate of 34% is well below that of the district. By grade 5, however, Hawthorne's 67% pass rate far exceeds the district's 56% pass rate.

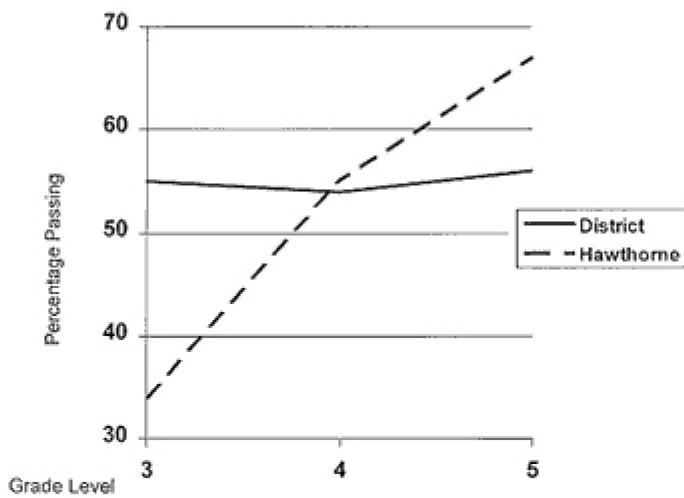


Figure 1: Texas Assessment of Academic Skills Reading Performance.

The authors of the JESPAR study concluded that the carefully sequenced Core Knowledge curriculum does appear to increase achievement at successive grade levels, and also has the potential to help disadvantaged students overcome their disadvantages and achieve academic proficiency.

Three Oaks Elementary (Fort Meyers, FL), a mixed blue-collar/white-collar suburban school with a minority population of 18%, where 40% of students receive free or reduced-price lunch, also made impressive progress after implementing Core Knowledge. In an analysis comparing test scores from Three Oaks and a control school with approximately the same demographic mix, Three Oaks, after using Core Knowledge for three years, reported higher scores than the control school in every category tested. The test used was the California Test of Basic Skills (CTBS). The standard deviation—measuring the spread of scores, from the highest to the lowest—also narrowed by 32 points, indicating that Three Oaks and Core Knowledge had succeeded in lifting low achievers up toward the mean.

Part II: Indirect Evidence

A. Cultural Literacy and Success in Grade School

In addition to test results in Core Knowledge schools, research has shown that students with more cultural literacy tend to do better in school. Georgia Kosmoski and her research team looked at the relationship between cultural literacy and academic achievement. They gave the Cultural Literacy Assessment Test (CLAT), a 75-item test of cultural literacy to 611 fifth graders and compared results on the CLAT with scores on the Comprehensive Test of Basic Skills (CTBS). The researchers found a significant positive correlation between cultural literacy and each area of academic achievement for all ethnic and socioeconomic subgroups studied. Whether the students were white, African-American, or Hispanic, the students who scored high in cultural literacy also tended to score high in academic achievement. The results of the experiments are discussed in an article in The Journal of Experimental Education, listed in the bibliography below.

B. Cultural Literacy and Success in College

Studies conducted by Joseph F. Pentony of the University of St. Thomas indicate that cultural literacy also correlates with success in many college classes. In a 1992 article published in Educational and Psychological Measurement, Pentony reported that he had given the Cultural Literacy Test (CLT), a 115-item test developed by the Core Knowledge Foundation in the late 1980s, to 150 first-year English students at the University of Saint Thomas. Pentony found that the total scale score for the CLT "correlated significantly" with grades in English courses and with Verbal SAT scores but not with certain other measures of academic success. On the basis of these findings, Pentony was cautiously optimistic about E.D. Hirsch's theory of cultural literacy, suggesting that the lack of cultural literacy might indeed be disabling in some settings and the possession of cultural literacy might be enabling in others. But Pentony concluded that more research was needed, particularly at the community college level.

Pentony published a second article on the subject in 1996, in Psychological Reports.

This time Pentony gave the CLT test to 150 students at an urban community college. He found that "scores on the CLT correlated significantly with both over-all GPAs and with grades in Freshman English," as well as with scores on the Texas Academic Skills Program. In his closing paragraphs, Pentony again stressed the need for more testing.

A third article appeared in 1997, in Adult Basic Education. After giving the test to 200 students at a large research university, Pentony found that scores on the CLT correlated significantly with GPA, Verbal SAT scores, Math SAT scores, and grades in a whole list of courses, including freshman English, first-semester history, government, general psychology, and freshman math.

Of the students who scored below 70 on the CLT, only 24% were able to earn a B or better in first-semester freshman English. By contrast, students who scored higher than 70 on the CLT had a 63% chance of earning a B or better. Pentony noted that the results obtained by this study were "generally stronger" than the results from previous studies." He concluded: "There is considerable evidence that the construct of cultural literacy is valid."

In 2001 Pentony and two associates reported the results of a fourth study in The Community College Journal of Research and Practice. This study boasted a larger sample group than all of the previous studies put together — 1,343 students from three different community colleges. The results, however, were quite similar. Scores on the CLT "correlated significantly" with GPA, as well as grades in first-semester freshman English courses, history courses, and government courses.

Both Kosmoski and Pentony noted that the correlations they observed do not prove causation. In other words, the fact that students with more cultural literacy were found to do better in grade school, on college admissions tests, and in many college classes does not prove that they excel because they have more cultural literacy. This is true. However, when multiple correlations come from a variety of different studies, the possibility that there is a causal relationship is greatly strengthened, particularly when, as in this case, the causal relation is well grounded in theory.

C. Knowledge and Power

"Knowledge is power," the English philosopher Francis Bacon declared 400 years ago. But is that still true in modern America? Researchers Thomas G. Sticht, Richard Hofstetter, and Carolyn G. Hofstetter, decided to find out. They conducted telephone interviews with hundreds of adults in the San Diego area. Participants were asked a series of questions about their income, occupation, and level of political activity, then another series of questions designed to assess their content knowledge, or cultural literacy.

The investigators found that there were correlations between content knowledge and all three indicators of power examined — occupation, income, and level of political activity. This was true even when age, education, and ethnicity were controlled for. In other words, regardless of one's age, race, or level of education, possession of large "banks" of declarative knowledge is associated with achieving a position of power in American society.

Perhaps the most startling finding involved median household incomes for those posting high, middle, and low scores on the cultural literacy tests used. Those who posted high scores had a median income of $65,000, those posting middling scores had a median income of $39,000, and those posting low scores had a median income of $26,000.

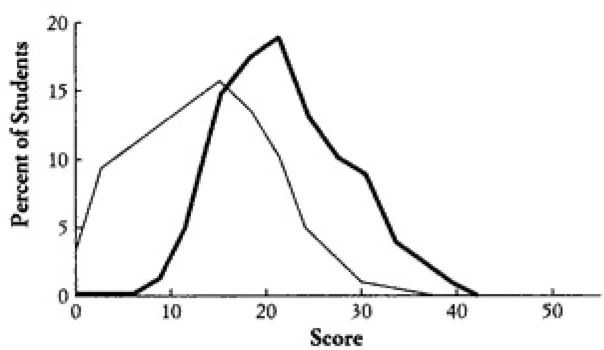
The researchers summarized their findings as follows: "While high levels of declarative knowledge are not absolutely necessary for achieving power, they certainly seem to help. Therefore, educational practices that downplay the importance of content knowledge in favor of processes of thinking or learning should be reconsidered."

D. Evidence from Other Countries

Two distinguishing feature of Core Knowledge are that it attempts to lay out a core curriculum that can provide common ground for all American schools, and that it insists on introducing academic subjects and rich content in the early grades. International evidence suggests that there are good reasons for both of these policies.

Numerous studies have found that nations with rigorous national curricula tend to post better achievement scores and better results on international tests. Results from the International Association for the Evaluation of Educational Achievement studies, done in the 70s and 80s, showed nations with core curricula, like Sweden, Finland, Hungary, and Japan close to the top, while non-core nations like the U.S. generally lagged behind.

Harold Stevenson and his team of researchers compared math performance for eleventh-graders in Japan, a nation with a core curriculum, and the United States, where there is no national core curriculum. Stevenson's team controlled for socioeconomic level and other crucial variables and found that much larger percentages of U.S. students were performing at low levels. The results of the investigation are summarized in the chart below, from The Schools We Need.



Eleventh graders' scores on the mathematics test: Japan, heavy line; United States, light line. Mean ± 1 standard deviation: 21.72 ± 6.59 and 13.39 ± 7.06, respectively. Sample sizes: 1120 and 1197.

Source: H. Stevenson, C. Chuansheng, and L. Shin-Ling, "Mathematics Achievement of Chinese, Japanese, and American Children: Ten Years Later," *Science* 259 (January 1, 1993): 51–58.

Another case in point is TIMSS, the Third International Math and Science Study, which has found that Singapore and other nations with national curricula rank near the top of international math and science scores. In the 1999 installment of TIMSS, Singapore ranked first in the world in math and third in science, in spite of the fact that the country was ranked next to last for the level of home educational resources available. In other words, Singapore's impressive academic results seem to have very little to do with an advantageous home environment and a great deal to do with an effective school system structure organized around a solid, rigorous curriculum.

Click here for more information.

As far as starting early is concerned, a very telling international example is the case of French preschool. The French offer free preschool for all children, and all French preschools follow a rich, well-defined curriculum with clear-cut developmental, psychomotor, academic, and social goals. Some students begin school as early as age 3, and research has shown that the earlier a French child starts preschool, the less likely the child is to be held back in a later grade, and the better his or her behavior and achievement levels are likely to be in first and second grade. Another study indicates that French children who have had the benefit of preschool are, by all indirect measures, better adjusted and happier for having had early exposure to challenging and stimulating early academic experiences. Finally, French preschools succeed in narrowing the gap between students from well-off families and the less advantaged. Click here for more information.

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