ignite! Learning ™

Transforming Classroom Curriculum

Effects of Ignite! Curriculum at Title I Campuses
RESEARCH STUDY REPORT 2007-2008

**Large Urban Southwest
Independent School District**

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INTRODUCTION

Program Description

Ignite! Learning creates comprehensive, motivational, and easy-to-use curriculum that reawakens passion for education, liberating teachers to teach and learners to learn. Informed by educational research on how humans learn, the company was founded on three core beliefs:

1. All students have a gift for learning; they just learn differently.
2. Humans learn best by doing things, applying concepts, and making connections between experiences.
3. Technology can play a vital role engaging students in the ways they learn best.

In designing curriculum that reflects these beliefs, Ignite! Learning seeks to incorporate the strongest ideas from an extensive body of educational research, weaving together a method of instructional design that addresses a broad range of learning styles, captures students' interest, and provides the types of lessons and activities that foster student mastery of knowledge and skills.

Ignite! Learning's curriculum helps students learn the material and skills specified by state and national academic standards in a comprehensive, multimedia-rich manner that appeals to a wide variety of learning styles and interests. By integrating a constructivist approach to the instructional design, Ignite! Learning provides the tools and information students need to create their own deep understanding of the material that goes beyond rote memorization. The course taxonomy is designed to help students make connections among skills and concepts, improving understanding, retention, and the students' ability to apply what they learn. The curriculum's problem-based learning activities challenge students to build their skills and knowledge by applying information, drawing out themes, making connections and solving problems—in other words, not just memorizing facts. Ignite! Learning presents information in contexts that are familiar and engaging for middle school students in order to reinforce the relevance of what they are learning to their daily lives. The curriculum offers a variety of assessments so that students may demonstrate their learning in different styles and formats, thereby providing students, teachers, and parents with better insight into the student's educational progress. In short, Ignite! Learning provides the tools needed to make learning meaningful, enjoyable, and successful for all students (http://www.ignitelearning.com/2008).

METHODOLOGY

Population

Large Urban ISD had a population of 198,769 students for the 2007-2008 school year. Student ethnicity was composed of the following groups: White – 8.2%, Hispanic – 60.3%, African American – 28.5%, Asian – 3.2%, and Native American - 0.1%. In addition, the student population was composed of 29.7% limited English proficient students, and 92.2% qualified for Title I services. The sample of program participants for science included: (1) five elementary schools (3rd-5th) or 460 students, (2) twenty-four middle schools (6th - 8th) or 17,177 students, and (3) five high schools (9th - 11th) or 5,010 students.   Program participants for social studies included: (1) three elementary schools (3rd -5th) or 294 students, (4) twenty-one middle schools (6th - 8th) or 13,364 students and (5) five high schools (9th - 11th) or 5,010 students. These subgroups reflected the demographic characteristics of the population.

Assessment Instrument: Stanford Achievement Test 10th Edition (SAT-10)

The SAT-10 results are presented based on 2002 norms. As a norm-referenced measure, the SAT-10 provides a means of determining the relative standing of students' academic performance when compared to the performance of students from a nationally representative sample. The results included in this report supply a means of making a direct comparison of 2008 students' results to 2007 results. The SAT-10 was designed to assess student achievement in reading, mathematics, language, environment/science, social science, spelling, study skills, thinking skills, and listening.

Specifically, the SAT-10 was constructed to: (1) update content to align with current educational and curriculum trends; (2) update the normative information to make score interpretations and performance generalizations more valid; (3) increase and improve the kinds of information available from assessment; and (4) revise the appearance of the test items to make them more relevant to students.

Data Collection

District and School Profile Reports were obtained from the participating school district. The report included the following information: student performance and outcomes, demographics, and school programs for each school covering the last five years.

Data Analysis

SAT-10 scores for science and social studies were analyzed by campus. Pre and post normal curve equivalent (NCE) test scores were compared to determine if there was a gain or loss from spring 2007 to spring 2008. NCE scores were graphically presented for all campuses and then the total NCE scores for all campuses were compared to determine the differences. In addition, NCE scores were compared between 2007 and 2008 by grade level to determine if there were differences at specific grades at the elementary, middle, and high school level. Paired

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t-tests were conducted at grade levels that demonstrated increases in performance over time to determine if the differences were statistically significant. Significant differences were measured at $p < .05$.

REVIEW OF THE LITERATURE

Ignite! Learning

Ignite! Science and Ignite! Social Studies were designed specifically for students in the middle grades. Learners in their early teens (including upper elementary, middle school, and early high school) will find the learning activities a highly appealing and interactive learning challenge. Research on brain-based learning supports many of the design features of the Ignite! curriculum.

Research Finding: Howard Gardner suggests that an education built on multiple intelligences can make the standard curriculum accessible to a wider range of students. He points out that for students who are struggling with a particular concept, presenting that concept through a range of intelligences offers students a "secondary route" to understanding, perhaps through the medium of an intelligence that is relatively strong for that individual.

Ignite! Application: Ignite! Learning's media is informed by Howard Gardner's writing on multiple intelligences, and offers a clear benefit of appealing to students who are not fully engaged by textbooks or lectures. Appealing to the multiple learning styles and strengths of a community of learners, key academic concepts are presented through media which is highly visual, musically appealing, and linguistically adroit, using wordplay and rhyme. Furthermore, the Ignite! Learning interface uses thumbnail images that give students and teachers a sense of what to expect. Some thumbnails are associated with music videos, while others are associated with narrative media, compare-and-contrast charts, or interactive timelines and number lines. Learners become familiar at a glance with which of their multiple intelligences will be engaged by the lesson.

Research Finding: Research shows that today's young teen learners have unique, Millennial Generation values. In comparison to their "Generation X" older siblings, today's learners are more positive, optimistic, team-oriented, and accepting of authority and rules, with a greater belief in progress and globalism. They have a fundamentally different attitude towards learning, which has been conditioned by growing up with the Internet's instant access to information and communication. (Howe and Strauss 2000; Howe, Strauss, et al. 2003).

Ignite! Application: Ignite! Learning curriculum is relevant to 21st century learners in beneficial ways. The curriculum interface, interactivity, and media templates have the engaging look and feel that media-age students are comfortable with. Additionally, the curriculum highlights connections between students' lived experience and standards-based concepts.

Research Finding: Current cognitive brain-based learning theory emphasizes the importance of teaching and learning knowledge structures (Anderson 1995), rather than teaching individual concepts in isolation. A generation of experimental evidence has demonstrated that knowledge is stored in memory and retrieved by way of its relationships to other knowledge.

Ignite! Application: Ignite! Learning offers students multiple contexts with which to understand content and this creates intellectual scaffolding that allows the students to quickly access the information.

- Course Taxonomy: By following a path from course to unit to topic to media piece, students are able to pinpoint data in its associated context.

- Index: The index function shows how context is fluid. One item of data can have multiple contexts, whether that is ratios in math, convection in science, or Eli Whitney in social studies. Students can view the same idea from multiple contexts.

- Enrichment Activities: Problem-based activities demand higher-order thinking to successfully fulfill the tasks. Students are asked to apply the content they have learned in a new setting and analyze that application in the offline material.

- Print Material: Constructivist writing activities allow students to document their comprehension of the content and thought processes in tackling the subject matter. Throughout the course, there are repeated and varied opportunities for students to record their understanding of the material in the ways they best express themselves.

Each varied interaction with that data further cements it to memory and makes recall easier, creating knowledge structures for the student, by which the student can ascend Bloom's intellectual taxonomy, from knowledge to evaluation. By viewing the same information from multiple contexts, students are treading new neural pathways of access to that data, making the recollection of that data more immediate. By giving data deep familiarity and repeated context, the learner has a greater intimacy and confidence with that information. These repeated interactions, rich contexts, and knowledge structures allow students greater opportunities for success.

Research Finding: Current research on motivation reveals three components: interest, confidence, and concentration. (Keller 1987; Mayer 1998; Clark, Nguyen, et al. 2006).

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Ignite! Application: Ignite! media pieces are particularly well suited to build all three types of motivation in a manner that is designed to be effective with young teen students. From big-picture questions to intrinsic humor to mnemonic devices, Ignite! media interests students in a way that helps them engage with and understand core curriculum concepts. Motivating and engaging middle school students leads to increased confidence and academic success at a critical point in their education. The lightly humorous style of the media and the use of appealing music are carefully constructed to build interest, confidence, and concentration in ways that will effectively compete for the students' attention and cognitive resources — whether in large-group, small-group or individual use.

Norming and Norm-referenced Test Scores

Kubiszyn and Borich (1996) claimed that the purpose of testing is to provide objective data that can be used along with subjective impressions to make better educational decisions. They discussed two main types of tests used to make educational decisions: criterion-referenced tests and norm-referenced tests. Criterion-referenced tests provide information about a student's level of proficiency in or mastery of some skill or set of skills. This is accomplished by comparing a student's performance to a standard of mastery called a criterion. Such information tells us whether a student needs more or less work on some skills or subskills, but it says nothing about the student's performance relative to other students.

Norm-referenced tests, on the other hand, yield information regarding the student's performance in comparison to a norm or average of performance by similar students. Norms are statistics that describe the test performance of a defined group of pupils (Noll, Scannell & Craig, 1979). As Brown (1976) noted, potentially there are a number of possible norm groups for any test. Since a person's relative ranking may vary widely, depending upon the norm group used for comparison, Brown claimed that the composition of the norm group is a crucial factor in the interpretation of norm-referenced scores. Along similar lines, Crocker and Algina (1986, pp. 431-432) pointed out,

> "The normative sample should be described in sufficient detail with respect to demographic characteristics (e.g., gender, race or ethnic background, community or geographic region, socioeconomic status, and educational background) to permit a test user to assess whether it is meaningful to compare an examinee's performance to their norm's group."

The process of constructing norms is called norming. Mc Daniel (1994) argued that the result of norming a test is always a table that allows the user to convert any raw score to a derived score that instantly compares the individual with the normative group. Several types of norm-referenced scores (also called derived scores) have been discussed. Brown (1976) discussed four major types: percentiles, standard scores, developmental scales, and ratios and quotients.

Normal Curve Equivalents

Normal curve equivalent (NCE) scores are being reported by a number of test publishers. NCE scores are derived by converting percentile ranks to normalized z score and making a transformation of the form:

NCE = 50 + 21.06 (z)

Thus, the NCE scale has a mean of 50 and a standard deviation of 21.06. According to McDaniel (1994), this rather strange standard deviation was chosen because it leads to NCE scores in which one corresponds to a percentile rank of 1 and ninety-nine corresponds to a percentile rank of 99. However, this author showed that anchoring the NCE scores to percentile ranks at these two points may not have been worth the effort since the two scores cannot be interpreted in the same way. NCE scores are on an interval scale, and in contrast to percentile ranks, NCE scores are meaningfully subjected to arithmetic operations such as calculating averages, making comparisons, and so forth.

Normal curve equivalents that fall in the range of 0 to 40 are considered to be below average, scores that range from 40 to 60 are average and NCE scores of 60 and above are above average. Most student NCE scores are going to be at the 50th NCE which represents grade level performance. NCE score that fall below the 50th NCE are below grade level and those above the 50th NCE are above grade level. When students scores are aggregated in order to present the results for a grade level, a total school or a program the NCE scores tend to be around the 50th NCE. Average NCE score for a total school or program have a tendency to remain the same or increase slightly. An average NCE gain of 1 or 2 points for a school or program, in one year, is an educationally significant finding.

Limitations of the Study

This study did not collect information on the number of days teachers implemented the curriculum or the amount of time students spent on lessons, so caution should be used when interpreting results.

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SCIENCE AND SOCIAL STUDIES RESULTS

1. What percent of schools utilizing Ignite! Learning materials increased their science and social studies Stanford Achievement NCE scores from 2007 to 2008?

Percent of Campuses Demonstrated NCE Change in Standford Achievement Science Test Scores from 2007-2008
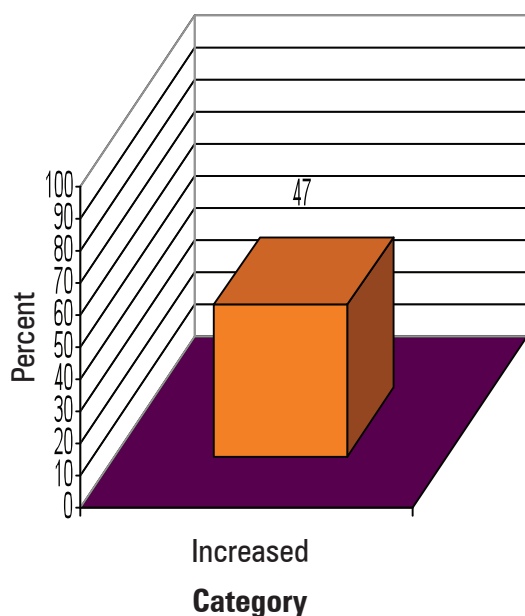
Percent of Campuses Demonstrated NCE Change in Standford Achievement Social Studies Scores from 2007-2008
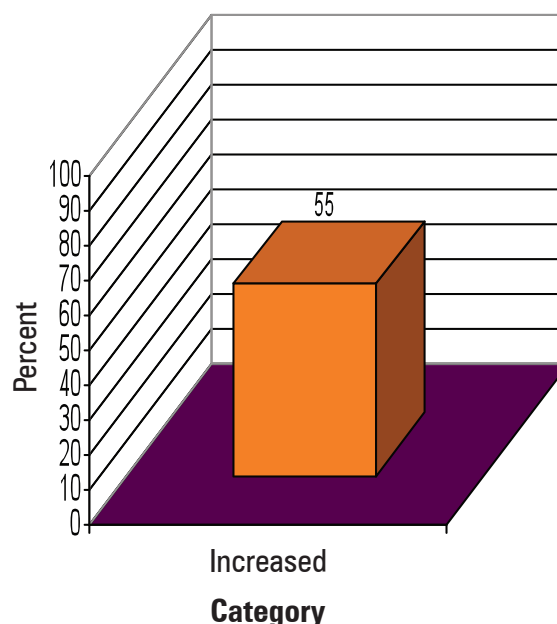
FINDINGS:

Science
Thirty-four schools utilized the Ignite! Learning materials in science.

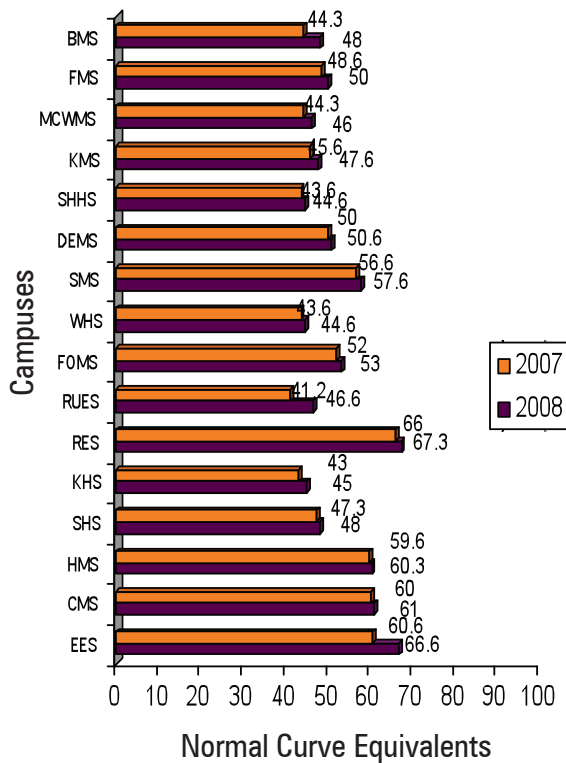- 47% of schools (16 schools) increased their Stanford NCE scores in science.

Social Studies
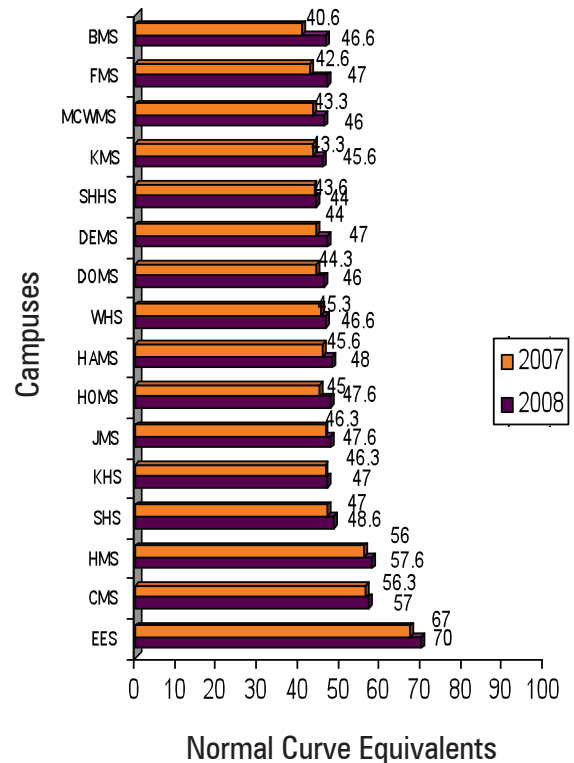Twenty-nine schools utilized the Ignite! Learning materials in social studies.

- 55% of schools (16 schools) increased their Stanford NCE scores in social studies.

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2. How many of the schools utilizing Ignite! Learning materials increased their science and social studies Stanford NCE scores from 2007-2008?

Sixteen Campuses Demonstrated NCE Gain on the Stanford Achievement Test in Science from 2007-2008

Campuses (top to bottom): BMS 44.3/48, FMS 48.6/50, MCWMS 44.3/46, KMS 45.6/47.6, SHHS 43.6/44.6, DEMS 50/50.6, SMS 56.6/57.6, WHS 43.6/44.6, FOMS 52/53, RUES 41.2/46.6, RES 66/67.3, KHS 43/45, SHS 47.3/48, HMS 59.6/60.3, CMS 60/61, EES 60.6/66.6

Legend: 2007 / 2008

X-axis: Normal Curve Equivalents (0 to 100)

Sixteen Campuses Demonstrated NCE Gain on the Stanford Achievement Test in Social Studies from 2007-2008

Campuses (top to bottom): BMS 40.6/46.6, FMS 42.6/47, MCWMS 43.3/46, KMS 43.3/45.6, SHHS 43.6/44, DEMS 44/47, DOMS 44.3/46, WHS 45.3/46.6, HAMS 45.6/48, HOMS 45/47.6, JMS 46.3/47.6, KHS 46.3/47, SHS 47/48.6, HMS 56/57.6, CMS 56.3/57, EES 67/70

Legend: 2007 / 2008

X-axis: Normal Curve Equivalents (0 to 100)
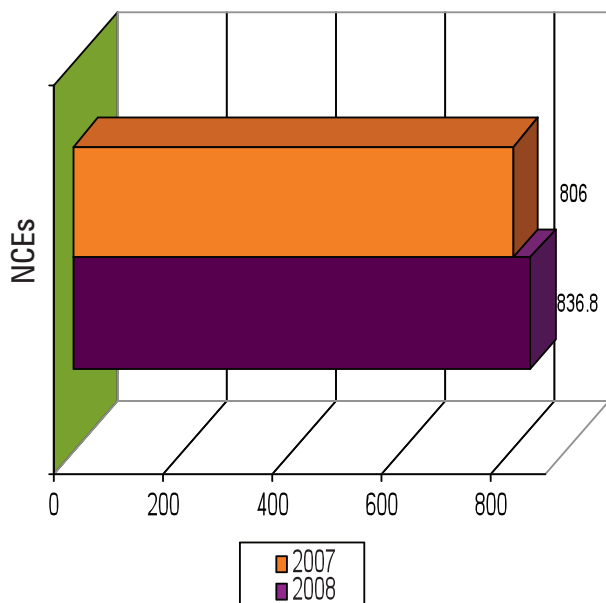
FINDINGS:

Science

- 47% of schools (16 of 34 schools) increased their Stanford NCE scores in science.
- 44% of schools (7 of 16 schools) had NCE scores above grade level (50th NCE) in 2007 and 8 or 50% scored at or above grade level in 2008.
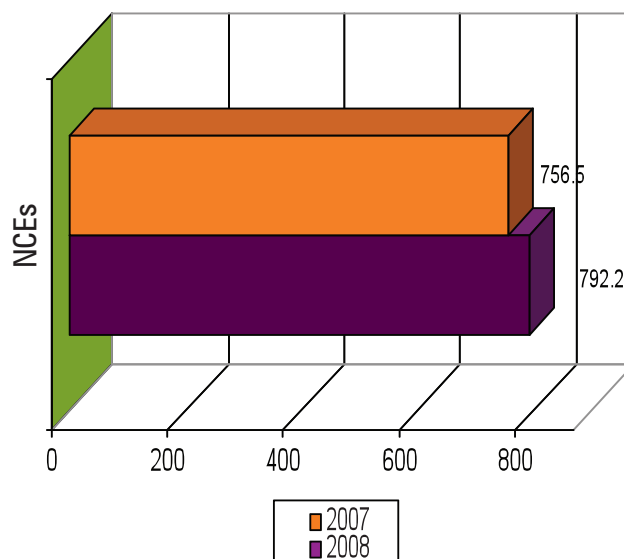
Social Studies

- 55% of schools (16 schools) increased their Stanford NCE scores in social studies.
- 19% of schools (three of 16 schools) had NCE scores at or above grade level both on the pre and post test.

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3. What was the total score in science and social studies NCEs for the sixteen campuses that participated in the Ignite! Learning Project and demonstrated a gain from 2007 to 2008?

Ignite! Learning Science NCE Scores on the Stanford Achievement Test for Campuses Demonstrated Increase from 2007-2008

Ignite! Learning Social Studies NCE Scores on the Stanford Achievement Test for Campuses Demonstrated Increase from 2007-2008

FINDINGS:

Science

- The sixteen campuses that implemented the Ignite! Learning science program increased their NCE scores from 806 to 836.8 or 30.8 points and obtained an average NCE gain of 1.9 points.
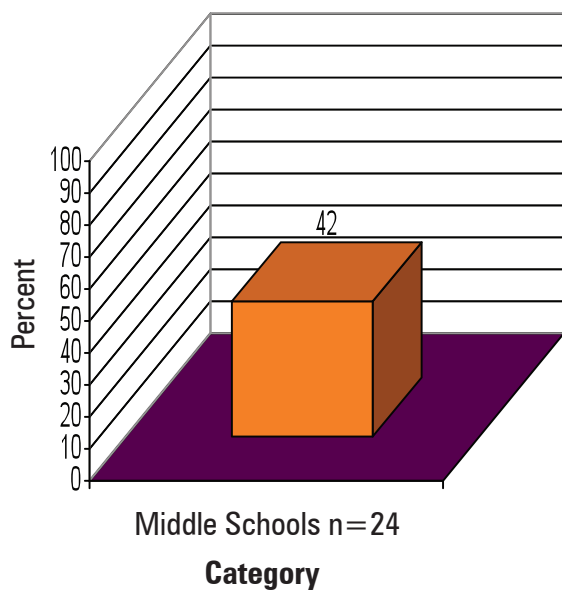
Social Studies

- The sixteen campuses that implemented the Ignite! Learning social studies program increased their normal curve equivalent (NCE) scores from 756.5 to 792.2 or 35.7 points and achieved an average NCE gain of 2.2 points.

Discussion:
Results presented in these graphs demonstrate the total gain in normal curve equivalent scores and the average gain for science and social studies. An average NCE gain of 1 or 2 points for a school or program, in one year, is an educationally significant finding.

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4. What percent of middle schools utilizing Ignite! Learning materials demonstrated change in their science and social studies Stanford NCE scores from 2007 to 2008?

Percent of Campuses Demonstrated Change in Science on the Standford Achievement Test 2007-2008
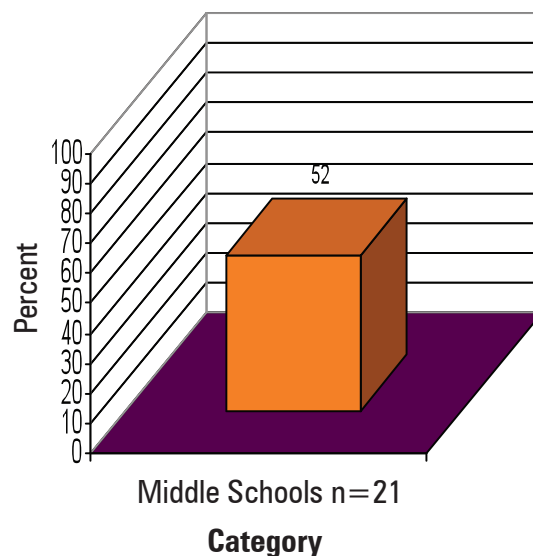

Middle Schools n=24
Category

FINDINGS:

Science

- 42% of schools (ten of 24 schools) increased their Stanford NCE scores in science.

Percent of Campuses Demonstrated Change in Social Studies NCE Scores on the Standford Achievement Test from 2007-2008


Middle Schools n=21
Category

Social Studies

- 52% of schools (eleven of 21 schools) increased their Stanford NCE scores in social studies.

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5. What middle school grade levels utilizing Ignite! Learning materials demonstrated NCE gains in science and social studies Stanford NCE scores from 2007 to 2008?

Grade Levels Demonstrated NCE Gain on the Stanford Achievement Test in Social Studies from 2007-2008
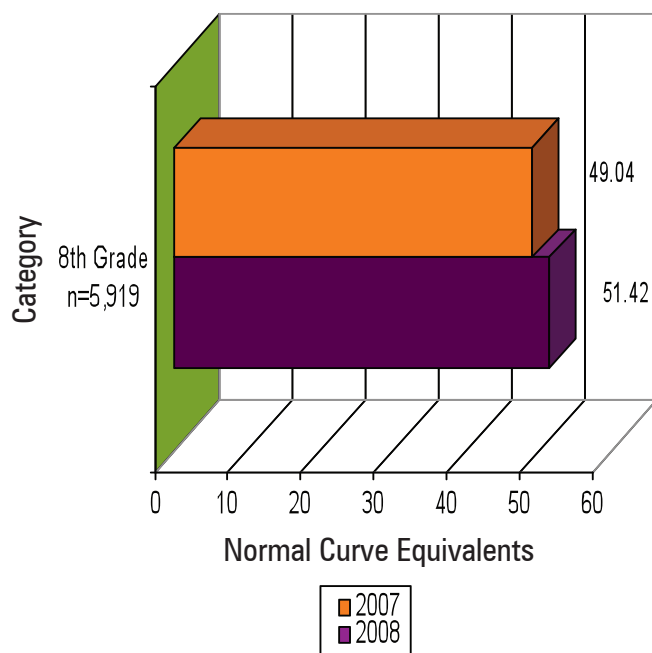
Grade Levels Demonstrated NCE Gain on the Stanford Achievement Test in Science from 2007-2008
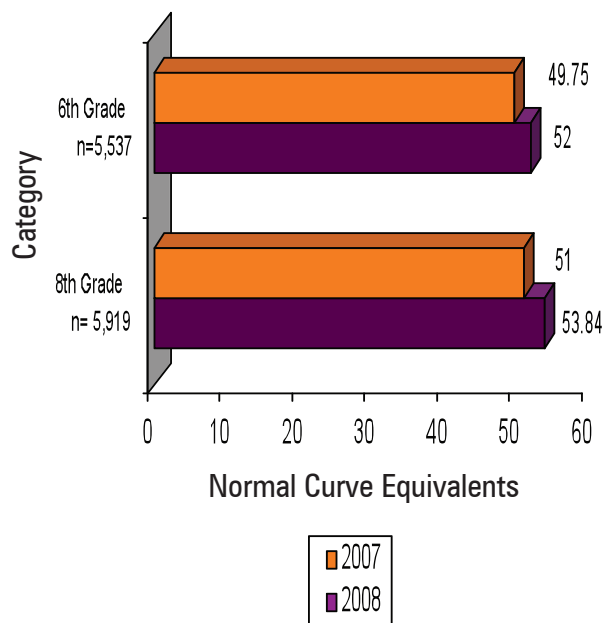
FINDINGS:

Science

- Science mean NCE scores of 6th grade Ignite! Learning students from 2007 (49.75) to 2008 (52) reflect an increase of 2.25 points.

- Ignite! 8th grade science students attained a higher mean scale score in 2008 than in 2007 (53.84 vs. 51, respectively). The difference between the mean scale scores was 2.84.

Social Studies

- Social studies mean NCE scores of 8th grade Ignite! Learning students from 2007 (49.04) to 2008 (51.42) reflect an increase of 2.38 points.

Discussion:
Increases in mean NCEs were found at 6th and 8th grade levels in science and 8th grade level in social studies.

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6. What grade levels utilizing Ignite! Learning science and social studies curriculum attained significance difference between 2007 and 2008?

Middle School Science

Independent T-test Using Science Stanford Achievement Test Results for IGNITE 6th Grade Pre-Test 2007 compared to Post-Test 2008						
Stanford	N	Mean NCE	Standard Deviation	t	df	Sig.(2-tailed)
Pre-2007	5,537	49.75				
Post-2008	5,537	52.00	2.93776	3.752	23	0.001

Science 6th grade mean NCE difference on the Stanford Achievement Test from 2007 (49.75) to 2008 (52) was 2.25. The difference was statistically significant at the $p<.05$ level.

Independent T-test Using Science Stanford Achievement Test Results for IGNITE 8th Grade Pre-Test 2007 compared to Post-Test 2008						
Stanford	N	Mean NCE	Standard Deviation	t	df	Sig.(2-tailed)
Pre-2007	5,919	51.00				
Post-2008	5,919	53.84	2.73374	5.3194	24	0.0

Science 8th grade mean NCE difference on the Stanford Achievement Test from 2007 to 2008 was 2.84. The difference was statistically significant at the $p<.05$ level.

Middle School Social Studies

Independent T-test Using Social Studies Stanford Achievement Test Results for IGNITE 8th Grade Pre-Test 2007 compared to Post-Test 2008						
Stanford	N	Mean NCE	Standard Deviation	t	df	Sig.(2-tailed)
Pre	5,919	49.04				
Post	5,519	51.42	2.03657	5.357	20	0.0

Social studies 8th grade mean NCE difference on the Stanford Achievement Test from 2007 to 2008 was 2.381. The difference was statistically significant at the $p<.05$ level.

Discussion:
Statistically significant increases in NCEs were found at 6th & 8th grade science and at 8th grade in social studies as demonstrated by the independent t-tests.

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SUMMARY

Science:

Sixteen of the thirty-four schools that used the Ignite! Learning science curriculum (47%) increased their Stanford NCE scores in science. The sixteen campuses increased their NCE scores from 806 to 836.8 or 30.8 points and obtained an average NCE gain of 1.9 points.

Ten of the 24 middle schools or 42% increased their Stanford NCE scores in science. Science mean NCE scores of 6th grade Ignite! Learning students from 2007 (49.75) to 2008 (52) reflect an increase of 2.25 points. Ignite! Leaning 8th grade science students attained a higher mean scale score in 2008 than in 2007 (53.84 vs. 51, respectively). The difference between the mean scale scores was 2.84.

These results indicate a positive result in student achievement for approximately half of the campuses that used the Ignite! science curriculum. Data analysis (paired t-tests) for science revealed that 6th and 8th grade students demonstrated statistically significant NCE gains from pre to post testing.

Social Studies:

Sixteen of the twenty-nine schools that used the Ignite! Learning social studies curriculum or 55% increased their Stanford NCE scores in social studies. The sixteen campuses increased their normal curve equivalent (NCE) scores from 756.5 to 792.2 or 35.7 points and achieved an average NCE gain of 2.2 points.

Eleven of the 21 middle schools or 52% increased their Stanford NCE scores in social studies. Social studies mean NCE scores of 8th grade Ignite! Learning students from 2007 (49.04) to 2008 (51.42) reflect an increase of 2.38 points.

Increases in social studies NCE scores were reflected for more than half of the schools that implemented the Ignite! Leaning social studies curriculum. Data analysis (paired t-tests) for social studies revealed 8th grade students demonstrated statistically significant NCE gains from pre to post test.

EDUCATIONAL IMPLICATION

Approximately half of the campuses that implemented the Ignite! Leaning science and social studies curriculum increased their Stanford NCE scores from pre to post testing. It appears that the amount of time teachers spent implementing the Ignite! Curriculum had an impact on student achievement test scores at these sixteen schools.

Middle school students (6th and 8th grade) in science and (8th grade) in social studies attained statistically significant NCE gains. Based on the results of this study, Ignite! Learning science and social studies curriculum would have the most impact on the achievement test scores of middle school students.

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