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ABSTRACT

This paper compared the Math ISTEP scores of third graders before the implementation of the Saxon Math program to the math ISTEP scores of the same group of students in sixth grade after implementation. Ex post factor research was used to compare data from the comparison year to the treatment year. Data collected was in the form of ISTEP math scores in third and sixth grades. It was concluded that the implementation of the Saxon Math program had a significant effect on the mean scores in math on the ISTEP test. (Author)

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Saxon Math
Southeast Fountain Elementary School
Effective or Ineffective?

Susie Bolser and David A. Gilman

Abstract

This study compared the Math ISTEP scores of third graders before the implementation of the Saxon Math program to the math ISTEP scores of the same group of students in sixth grade after implementation. Ex post factor research was used to compare data from the comparison year to the treatment year. Data collected was in the form of ISTEP math scores in third and sixth grades. It was concluded that the implementation of the Saxon Math program had a significant effect on the mean scores in math on the ISTEP test.

Introduction

Southeast Fountain Elementary School always taught mathematics using traditional, thematic chapter books. As the pressure began to build for schools to perform well on standardized tests, questions concerning the math curriculum began to arise; "Is our current method of teaching mathematics working?" In the 1998-1999 school year, a new math curriculum was adopted. This new math series was somewhat untraditional and many eyebrows were raised when it was adopted. This new math curriculum promised that students would gain a better understanding of math, and more importantly, raise test scores.

Background of the Problem

Mathematics has always been a fundamental element in education, with much emphasis placed upon the math curriculum. Extensive research consistently supports the need for strong math curriculums in the education. Yet, even though the importance of math education is not a disputed issue, the process by which it is taught is.

Historically, the United States has not faired well in math and science. Standardized tests have placed American high schools 19th out of 21 nations on the most recent Third International Mathematics and Science Study test. The National Assessment of Educational Progress shows that almost one third of high school seniors are still computing below the basic level, and a National Research Council panel earlier this year recommended that the United States overhaul its "rather shallow" math curriculum and replace it with a mix of problems, concepts, and applications that are designed to build proficiency (Lord, 2002). Making math and science education a national priority has also been the goal of the American Society of Civil Engineers. They have been long been concerned with the state of science and math education from kindergarten through the 12th grade. The position of the ASCE is that "it is necessary to advance student learning in these areas so that the United States workforce can compete globally (Civil, 2001).

In a hearing on improving math and science education to the House Science Subcommittee on Research, the Honorable Nick Smith, Chairman of the Subcommittee, reported results from the Trends in Mathematics and Science Study. These results showed that although there have been some improvements in science and math education, overall, we have been ineffective in raising United States performance from the middle of the pack (U.S. News, 2001).

In response to America's poor report card in math, many schools have found themselves evaluating their math curriculums. In the past, most textbooks followed the same basic pattern of introducing a skill, doing a large amount of practice on that skill, and then moving forward to the next skill. This process continues to repeat itself throughout the textbook. Questioning whether or not this method was the cause of poor test scores, many schools have turned to more unconventional math curriculums.

One such program is the Saxon Math program. It is a program that has gained what could be referred to as a 'cult' following in some areas. You would be hard-pressed to find someone who is neutral on the effectiveness of this program since the approach is that understanding mathematics is a skill that can be learned through practice. The curriculum is viewed as out of step with some current reform plans that stress group work and unconventional approaches to problem solving (Christian, 2000).

John Saxon, a brash, outspoken, retired Air Force pilot founded Saxon Publishers in 1981. The Saxon pedagogy was incremental development: Teach in small pieces, continual review of those increments, and frequent cumulative testing. Saxon argued that students should not be expected to learn math in big thematic chapters. He felt that math education needed lots of practice and reviewing (Christian, 2000).

In the program outline on the Saxon Publishers web page (2002), the approach was explained as a highly structured one. At the earliest grades the program is scripted so teachers know exactly what to say and how to say it. The goal of the series was for students to learn and remember the foundational skills of mathematics. The Saxon program believes that mathematics is a cognitive structure that builds upon prior learning. John Saxon states in the Preface of his Math 65 textbook that "The ultimate height and stability of the mathematical structure within each individual are determined by the strength of the foundation" (1995).

There are many critics of the Saxon Math program. Many believe that it does not deliver students capable of performing well in higher math and does not adequately emphasize problem solving and critical and creative thinking. In response John Saxon adds "We feel that creativity comes from a well-prepared mind. What we want to give every child in America is the ability to work to develop a well-prepared mind."

The area that does stand up to critics is standardized testing. Gail Russell Chaddock sites three examples of significant improvements in test scores in relationship to the Saxon Math program:

> (1) In 1992, Saxon offered to donate his program free to seven Oklahoma City elementary schools. Saxon students were found to have outscored a control group of non-Saxon students in every math category on the Iowa Test of Basic Skills.
>
> (2)Test scores at Falconer Elementary School in Chicago went up so dramatically that cheating was suspected. Students retook the test and scored at the same level. 76.9% of the third, fourth, and fifth-graders scored at or above national norms on the Iowa Test of Basic Skills. Prior to Saxon, only about a third scored at that level.
>
> (3) Saxon students at Riviera Elementary School in Kelseyville, California, one of the state's poorest districts, now outscore students in affluent Laguna Beach school (Christian, 2002).

Since standardized test scores are the means by which schools are evaluated, Southeast Fountain Elementary chose Saxon Math as their new math curriculum in 1998. If it is found that students at Southeast Fountain Elementary do not have higher mean scores on the math portion of the ISTEP test after the implementation of Saxon Math, then the school's current math curriculum should be reevaluated.

Statement of the Problem

Does teaching with Saxon Math as opposed to teaching with thematic chapter math books increase the mean scores on the math portion of the ISTEP test? As educators we are always challenging ourselves to find the best educational tools. Unfortunately, educational "trends" can change as quickly as those in the fashion industry. Especially in the area of Language Arts, methods that are considered to be "the best" one day might change entirely the next. Due to the increased emphasis on standardized test scores, math education seems to have fallen prey to the same scrutiny. School systems are faced with job of deciding whether or not to stick with traditional curriculums and make other modifications to improve achievement or try more non-conventional curriculums. One way to determine whether Saxon Math is producing the outcomes that were expected is to compare the mean scores in math on the ISTEP test before and after the implementation of the program.

For the purpose of this study, a directional hypothesis was tested: The implementation of Saxon Math into the curriculum will cause the mean math scores on the ISTEP to increase.

Methodology

Southeast Fountain Elementary School is located in Fountain County in west central Indiana. It is a rural community with agriculture and industry being the primary source of income. Of the student population, 99% are Caucasian and less than 1% are Hispanic. The ethnic make-up of students is representative of the community. The majority of the population within the school district is low to middle class. 25%-30% of students, depending on enrollment, receive free or reduced lunch.

Enrollment at SEFE is approximately 800 students, making it one of the largest elementary schools in the state of Indiana. Because of the instability of the industries in the area, there is significant fluctuation in enrollment.

The building design at SEFE is somewhat unique. Rather than traditional classrooms, each grade is a large "pod." Within these pods, there are 5-6 classrooms separated only by book carts and small mobile bulletin boards. Kindergarten is the only grade that consists of enclosed classrooms. Noise from all of the teachers and students can be heard at all times within the pods. Keeping students quiet and focused is often a difficult task.

The sample for this study consisted of third grade students from Southeast Fountain Elementary School during the 1998-1999 school year and the same group of students in the 2001-2002 school year, when they were sixth graders. Third grade students in the 1998-1999 school year are the comparison group. The ISTEP was administered to all of these students in October of 1998. Prior to this school year, these students had been taught mathematics using thematic chapter textbooks. The Saxon Math program was implemented in the 1998-1999 school year; thus, these students had only been exposed to the program for less than two months prior to testing. These students continued in the Saxon program until sixth grade. The sixth graders in the 2001-2002 school year are the experimental group. Only the students who took the ISTEP in third grade and also in sixth grade were compared.

This study used a pre-treatment, post-treatment approach using ex post facto research to collect and test data.

To analyze the data, a one tailed pared t-test was conducted. The data was graphed and compared to determine if significant comparisons could be made.

RESULTS

Table 1 shows the mean and standard deviations from 1998-1999 and 2001-2002 derived from the use of a one-tailed paired t-test.

Table 1 Means and Standard Deviations Treatment Groups		
Groups	Means	Standard Deviations
1998-1999	515	55.2
2001-2002	534	46.3

Table 2 shows that the t value was –4.57 with 73 degrees of freedom. At the .001 level of significance, the value is more than the needed in order to show significance.

Table 2 Statistical Test of the Hypothesis		
T	df	Significance
-4.57	73	>.001

Chart 1 shows the number of students who scored above the ISTEP math standards in 1998-1999 and 2001-2002.

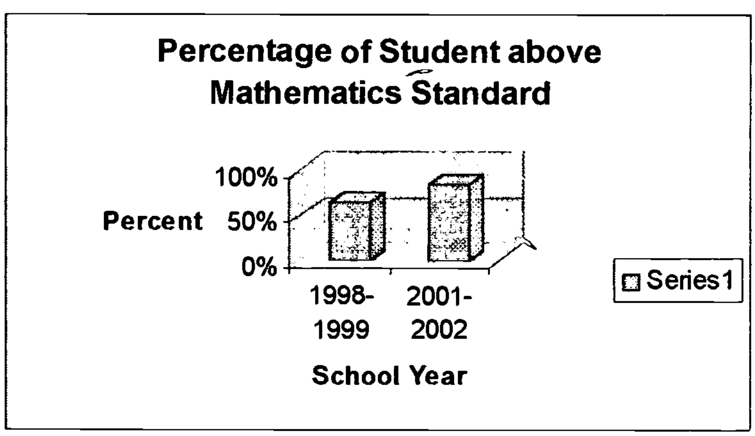

Chart 1

Discussions, Conclusions, and Recommendations

For the purpose of this study, the success of the implementation of the Saxon Math program was measured by comparing the mean math scores on the ISTEP test of third grade students before the implementation of Saxon Math and those same students in sixth grade after implementation. From the results of the t-test, the mean scores in math increased after Saxon Math was implemented. The computed value at the .001 level was more than needed in order to show significance. The directional hypothesis, which stated that there would be an increase in mean math scores as a result of the implementation of the Saxon Math program cannot be rejected.

As Chart 1 illustrates, the percentage of students scoring above the ISTEP standard in math increased after the implementation of Saxon Math.

Although the results of this research shows positive results of the Saxon math program, school corporations should not be quick to judge the program a complete success. Further investigation needs to be done as these students progress through junior and senior high school. Isolated scores in problem solving and critical thinking should also be analyzed and compared, as these are the areas that literature finds to be weak in this program.

In conclusion, the success of students in mathematics is of utmost importance at all levels of education. School system curriculums need to find the best tools to facilitate student's achievement in math as well as other subject areas. It is crucial, though that administrators not gauge student's success or failure on a program alone. All other possible contributors must be taken into consideration when analyzing student achievement.

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4-4 hr – 5:30
phone Cervo.

Paired Student's *t*-Test: Results

The results of a paired t-test performed at 16:16 on 16-APR-2002

t= -4.57
degrees of freedom = 73

The probability of this result, assuming the null hypothesis, is 0.000

Group A: Number of items= 74
403. 417. 444. 450. 450. 450. 451. 451. 453. 456. 457. 460. 461. 471. 473. 473. 474. 475. 478. 478. 479. 481. 483. 486. 487. 487. 488. 490. 495. 495. 496. 496. 497. 498. 499. 499. 500. 501. 505. 505. 516. 517. 518. 519. 520. 521. 523. 524. 524. 526. 530. 531. 535. 537. 542. 543. 545. 549. 560. 570. 575. 580. 580. 583. 588. 595. 597. 598. 599. 613. 616. 619. 642. 687.

Mean = 515.
95% confidence interval for Mean: 502.3 thru 527.8
Standard Deviation = 55.2
Hi = 687. Low = 403.
Median = 500.
Average Absolute Deviation from Median = 42.6

Group B: Number of items= 74
404. 419. 462. 465. 473. 477. 479. 482. 483. 486. 490. 491. 493. 496. 500. 500. 501. 505. 506. 507. 515. 518. 518. 519. 521. 521. 522. 524. 524. 524. 524. 524. 526. 527. 528. 529. 529. 529. 529. 530. 530. 534. 535. 537. 538. 540. 545. 546. 549. 551. 554. 555. 555. 558. 559. 559. 567. 567. 569. 571. 578. 582. 583. 583. 585. 585. 587. 591. 591. 597. 604. 610. 647. 689.

Mean = 534.
95% confidence interval for Mean: 523.5 thru 544.9
Standard Deviation = 46.3
Hi = 689. Low = 404.
Median = 529.
Average Absolute Deviation from Median = 33.9

Group A-B: Number of items= 74
-92.0 -85.0 -82.0 -78.0 -72.0 -72.0 -70.0 -67.0 -60.0 -60.0 -58.0 -53.0 -50.0 -48.0 -46.0 -45.0 -45.0 -44.0 -43.0 -43.0 -42.0 -37.0 -37.0 -33.0 -32.0 -32.0 -32.0 -31.0 -31.0 -31.0 -30.0 -29.0 -29.0 -29.0 -28.0 -27.0 -27.0 -27.0 -24.0 -22.0 -20.0 -16.0 -16.0 -15.0 -15.0 -15.0 -10.0 -8.00 -7.00 -6.00 -5.00 -4.00 -2.00 -2.00 -1.00 1.00 3.00 6.00 7.00 11.0 11.0 12.0 24.0 29.0 30.0 31.0 32.0 41.0 43.0 45.0 52.0 52.0 54.0 64.0

Mean = -19.1
95% confidence interval for Mean: -27.50 thru -10.80
Standard Deviation = 36.0
Hi = 64.0 Low = -92.0
Median = -27.0
Average Absolute Deviation from Median = 28.1

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