ISTEP+ Performance for Indiana Charter School Students

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Executive Summary
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The Office of Charter School Research (OCSR) located in Teachers College at Ball State University was created to study the effectiveness of Indiana's charter schools. In particular, the OCSR focuses on the academic performance of pupils attending these schools. In Report 2006-1, "ISTEP+ Performance for Indiana Charter School Students," the OCSR reports on the Indiana Statewide Testing of Educational Progress–Plus (ISTEP+) scores of students' academic performance in Language Arts and Mathematics who were in third grade during the 2003-2004 academic year and fourth grade during 2004-2005. This particular analysis was conducted because it allowed the researchers to look at the performance of the same students over time, thus providing some evidence as to the potential effectiveness of this particular group of seven charter schools.

A total of 179 students' scores were analyzed in Language Arts, whereas 183 students' scores in Mathematics were considered. After running a series of statistical tests three findings are noteworthy:

- A significant improvement in performance was observed over time, particularly on the Mathematics test. Both the passing rates and the means of the difference between individual scores and the cut point (pass/fail cut off) demonstrated higher achievement for these charter school students over time. Greater gains were made in the Mathematics scores than in the Language Arts scores.
- Overall performance on the Language Arts test was generally better than for the Mathematics test. This is particularly evident in the higher rate of students passing the Language Arts test versus those passing the Mathematics test.
- The patterns described above appear to hold for all seven of the schools being examined. All schools saw increases in mean scores from 2003-2004 to 2004-2005 on both tests, and more importantly in the extent to which the average scores approached the threshold considered as passing.

From these analyses, it is fair to conclude that the seven Indiana Charter Schools considered show promise in their ability to increase the academic performance of their students in third and fourth grade in Language Arts, and especially in Mathematics.

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Introduction

The Indiana Statewide Testing of Educational Progress–Plus (ISTEP+) is an examination that is given to all students enrolled in Indiana public schools from Grades 3 through 10. It can serve as a valuable tool for assessing the performance of pupils in the charter system because it is based upon standards that apply to all schools in the state. Test scores for each student are classified as either passing or not passing in both Language Arts (LA) and Mathematics (MA). In addition, the actual scores for each student are available and may provide further data regarding the achievement of individual students.

The purpose of the current study was to examine the performance on the ISTEP+ of charter school students who were in the third grade in 2003-04 and fourth grade in 2004-05. These grade levels were the only ones included in this study because prior to the 2004-05 school year only selected grade levels (including Grade 3) were given the test. Given that the focus of this study was on change in test performance over time, the grade levels available for comparison were limited, and the largest number of students available was in Grade 3.

There was a significant increase in the percent of students passing the MA exam.

Results

A total of 179 students had LA scores for both 2003-04 and 2004-05 in third and fourth grades, respectively, whereas 183 had MA scores in both years. A total of 95 (53.1%) earned a passing score in LA for 2003-04, whereas 97 (54.2%) had a passing score in 2004-05. In contrast, the percent passing the MA test increased from 29% (53 students) in 2003-04, to 48.6% (89 students) in 2004-05. Based on the results of a statistical test, McNemar's Test of Change, it is possible to conclude that there was a significant increase in the percent of students passing the MA exam from 2003-04 to 2004-05. However, there was not a significant change in the LA passing rate over this same period.

In addition to examining performance in terms of passing or failing the ISTEP+, it is also possible to investigate the distribution of LA and MA scores versus the individual cut points. In this instance, interest is in determining the proximity of the actual score received by each student relative to the cut scores for the grade and subject area. Changes in this proximity provide information regarding progress that students made toward achieving the passing score, whether they have met the standard or not. In this study, the passing score for the grade and subject test are subtracted from each student's ISTEP+ scores from 2003-04 and 2004-05. For example, students taking the LA exam in third grade had to achieve a score of 404 in order to be classified as passing the test. Thus, for this research 404 was subtracted from each student's actual score in order to determine how far below or above the standard they were. The same procedure was used with the fourth grade LA exam, where the cut score was 429. The cut values for MA were 393 (third grade) and 415 (fourth grade). The mean LA and MA scores by year appear in Table 1.

An examination of Table 1 shows that the average scores increased in both subject areas, with a greater increase in MA. Because of the presence of outliers in the data, and their influence on the mean, as well as the general wide spread of difference values, the mean

Table 1
Mean and Standard Deviation for Third Grade (2003-04) and Fourth Grade (2004-05) ISTEP+ Scores

	LA 2003-04	LA 2004-05	MA 2003-04	MA 2004-05
Mean	403.05	433.63	364.09	409.99
Standard Deviation	61.21	60.65	56.82	61.62

difference score by year may not provide great insights into average or typical performance. For this reason, the median, the trimmed mean, and four other robust estimates of the average were also considered. Robust estimators are calculated to minimize the impact of outlying values. They are generally thought of as more appropriate than the standard mean when a non-trivial number of outliers are present in the data. These values, along with the standard deviations of the differences, appear in Table 2.

By the end of the fourth grade, students were performing better in LA than in MA.

Table 2
Measures of Central Tendency and Standard Deviation of Difference Between Individual and Cut Scores for Third Grade (2003-04) and Fourth Grade (2004-05) ISTEP+ Scores

	LA 2003-04	LA 2004-05	MA 2003-04	MA 2004-05
Mean	-.08	4.76	-27.73	-3.35
Median	.30	6.00	-26.00	-1.00
5% Trimmed Mean	1.24	4.55	-26.43	-2.14
Huber's *M*	2.17	4.56	-26.46	-2.90
Tukey's Biweight	3.49	4.28	-25.02	-2.03
Hampel's *M*	2.50	4.56	-25.68	-1.93
Andrews Wave	3.59	4.28	–24.98	–2.02
Standard Deviation	60.53	60.80	56.36	61.02

The statistics reported in Table 2 differ in terms of how they deal with outlying values. The mean and the median take no special action, though the median is generally considered more robust (less influenced by outliers) than is the mean. The 5% trimmed mean climinates the 5% highest difference scores and 5% lowest difference scores, whereas the other four methods use weights to control outliers, with values further from the middle of the data receiving less weight than those close to the middle.

The results reported in Table 2 indicate that for MA, there is a notable decrease in the average difference between individual scores and the cut scores from 2003-04 to 2004-05. Regardless of the measure of central tendency used, this average difference declined from being below the cut score by roughly 25 points in 2003-04 to being approximately 2.5 points below the cut value in 2004-05. In contrast, the results for LA show a much smaller improvement in student performance relative to the cut value. Based strictly on the mean, students were less than a point below the cut value, on average, in 2003-04 and actually had a mean above the cut point in 2004-05. When the presence of outliers is taken into consideration, the change over time was even smaller. One important point to note in interpreting performance on the LA exam is that regardless of the statistic used, students' scores were much closer to the cut value to begin with than were their MA scores. In other words, they had a much smaller amount of ground to make up in order to be considered passing in LA than they did in MA. Indeed, by the end of fourth grade, students were performing better relative to the cut score in LA (the average student scored higher than the cut value) than they were in MA (the average student was still between 2 and 3 points below the cut point). Nonetheless, it is clear that students experienced a marked improvement in performance on the MA exam, relative to the cut score.

In order to ascertain whether students were closer to the cut score, on average, in 2004-05 than in 2003-04, repeated measures analysis of variance (ANOVA) was used. This analysis compares the mean differences in the two years, separately for LA and MA.

In addition, it is possible to determine whether the general patterns that emerge overall also hold true for each of the schools included in the analysis. The results of the repeated measures ANOVA indicate that for both LA and MA scores, there was a significant increase in the difference scores (i.e., student performance relative to the passing score improved). For MA, this means that students' scores were closer to the cut score in fourth grade than they were the previous year, though they are still a bit below the cut score on average. In the case of LA, the difference went from being roughly near 0, to favoring the average student by approximately 4.5 points in 2004-05. Using an index known as the effect size, we can also discern that the change in MA was greater than the change in LA (partial eta squared values of .493 and .273, respectively), and that performance on both tests improved over time.

All schools saw increases in mean scores on both exams.

Results of the repeated measures ANOVA also manifest that there were not differences in the change over time among the schools. In other words, the results described in some detail above for the sample as a whole also apply to the individual schools included in the study. The mean ISTEP+ LA and MA scores by school appear in Table 3.

Table 3
Mean Scores on ISTEP+ LA and MA Exams by School: Grades 3 (2003-04) and 4 (2004-05)

	LA		MA	
School	2003-04	2004-05	2003-04	2004-05
Andrew J Brown	393.98	430.46	357.88	410.73
Christel House	427.39	447.26	379.97	428.44
Charter School of the Dunes	393.43	420.60	352.36	397.39
Irvington	429.08	474.46	413.31	435.54
New Community	444.00	467.50	357.91	431.00
Thea Bowman	390.57	418.95	347.91	390.12
Veritas	416.73	448.46	386.75	434.17

Summary

The results of these analyses suggest several conclusions regarding the performance of these charter school students on the ISTEP+ in 2003-04 and 2004-05. First of all, there was clearly a significant improvement in performance across time particularly on the MA test. Both the passing rates and the means of the difference between individual scores and the cut point demonstrated higher achievement for these charter school students over this time. With respect to the LA exam, performance did not improve as markedly as with MA, particularly in terms of the student passing rates.

A second finding to note is that absolute performance on the LA exam was generally better than that for MA. This outcome was particularly evident in the higher rate of students passing the LA exam versus those passing MA in both years. This fact may be part of the reason that the improvement in the mean difference of scores versus the cut value was much greater for MA than LA, as noted above.

Finally, the patterns described above appear to hold for all of the schools in the sample. All schools saw increases in mean scores from 2003-04 to 2004-05 on both exams, and more importantly, the mean difference of scores versus the cut value.

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