

**USE OF DISCOVERY EDUCATION SCIENCE AND  
SCHOOL PERFORMANCE:  
CHARLOTTE/MECKLENBURG**

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## ***Summary***

- Substantial association was found between the use of Discovery Education Science and the change in the percentage of students who reached proficiency after a retest, such that an increase in Discovery Education Science use produced a proportional increase in the change in this percentage.
- As with all correlational analyses the direction of causality may be questioned. Moreover, the possibility that the observed relationship is spurious with respect to some variable(s) unmeasured in this study cannot be dismissed.

## ***Project Description***

This project involves secondary analyses of data from Charlotte/Mecklenburg, North Carolina. These analyses examine the relationship between frequency of use of Discover Education Science and science examination performance.

The measures of frequency of Discovery Education Science (DESci) use include the number of logins from the 2008-2009 academic year, both for video and non-video content. These indicators were summed to create a DESci measure. Then indices were then employed as predictors of examination performance.

Performance was measured by the percentage of students in any given school who achieved proficiency on a standardized state science examination. Because this figure was available both for the 2007-2008 and the 2008-2009 academic years change in performance was able to be calculated. Moreover, a measure of the percentage of students who achieved proficiency with a retest was available. Thus, an additional change score was computed using this figure as a posttest measure. The association between frequency of DESci use and the change in science examination performance could be quantified.

The unit of analysis was the school, not the individual student. It was important to control for extraneous variation that could affect school

performance, such as the demographic and socio-economic characteristics of the schools. Such variables were used as control variables in the analyses. Given the data available in the database, these factors included an indicator of socio-economic status (percentage of students with paid lunch or free and reduced lunch), ethnicity, school size, class size, sex, and school environment (number of computers). If DESci usage is a causal factor that leads to improvement in school performance, then a substantial positive relationship between DESci use and change in school science achievement will be observed when controlling for these extraneous factors.

## ***Results***

### **Characteristics of the Sample**

A total of 108 schools were included in the data base. Of these 108 schools, 79 (73.1%) used Discovery Education services. Additionally, 82 (75.9%) of the schools were elementary schools, the remaining 26 schools (24.1%) being middle schools.

Across these 108 schools the sex composition of students ranged from 36% male to 55% male with a mean of 50.6% male and a standard deviation of 2.9% male. This distribution was skewed negatively and leptokurtic.

The ethnic composition of schools varied substantially for certain racial groups, e.g., Blacks, Hispanics, multiracial, but not for others,

e.g., Asians, Whites, Indians. The mean racial composition across these schools was 42.8% Black, 31.1% multiracial, 17.0% Hispanic, 4.5% Asian, 4.0 White, and 0.5% Indian.

One important feature of the classroom environment is number of students enrolled in the school and the number of students in the classrooms. The enrollment in these 108 schools ranged from 236-1,492 with a mean of 776.68 ( $S=278.37$ ). The number of teachers ranged from 18-104 with a mean of 52.19 ( $S=15.36$ ). Classroom size varied from 9.6-20.9 with a mean of 14.68 ( $S=2.17$ ). The distribution of each of these features of classroom environment did not differ markedly from the normal curve.

Another important environmental feature is school location, and Table 1 summarizes these data. From this table it may be observed that there is a variety of locations among these schools. The middle suburbs, affluent, landed gentry, and micro city dominate, accounting for approximately two-thirds of the schools and more than 70% of those with known location.

Table 1  
The Distribution of School Location

LOCATION	PERCENTAGE
CITY CENTER	7.4
INNER SUBURBS	5.6
MIDDLE SUBURBS	22.2
LANDED GENTRY	13.9
MICRO CITY	13.0
AFFLUENT	17.6
SECOND CITY SOCIETY	0.9
ELITE SUBURBS	9.3
RUSTIC LIVING	0.9
UNKNOWN	9.3

The percentage of students receiving paid lunch ranged from 4% to 98% with a mean of 46.3% and a standard deviation of 29.6%. The distribution of this variable was approximately bimodal with a substantial number of schools with a low percentage of students receiving paid lunch, another substantial number of schools with a high percentage of students receiving paid lunch, and relatively few schools with an intermediate percentage of students receiving paid lunch.

Similarly, the percentage of students receiving free and reduced lunch ranged from 2% to 96% with a mean of 53.7% and a standard deviation of 29.6%. The distribution of this variable mirrored closely that of the distribution of the percentage of students with paid lunch.

Approximately 93.5% of the schools had a special education program, so that only 6.5% did not have such a program. The percentage of students with disabilities ranged from 1% to 21% across these schools

with a mean of 11.3% and a standard deviation of 3.3%. These percentages were distributed approximately normally across schools. The percentage of students with limited English proficiency (LEP) ranged from 2% to 72% with a mean of 18.2% and a standard deviation of 13.4%. These data were skewed positively and leptokurtic.

## **Measurement**

Discovery Education Science use ranged from 0 to 6,090. The distribution of DESci was skewed positively and leptokurtic with a mean of 576.4 and a standard deviation of 839.5. Pretest proficiency ranged from 5.0% to 93.6% with a mean of 39.2% and a standard deviation of 22.6%. Scores were skewed positively, albeit modestly. Posttest proficiency ranged from 5.5% to 95.0% with a mean of 47.8% and a standard deviation of 22.7%. Scores approximated closely a normal distribution. Posttest proficiency with retests ranged from 9.0% to 95.0% with a mean of 57.5% and a standard deviation of 22.0%. Scores approximated closely a normal distribution.

The distribution of change scores formed by subtracting the pretest from the posttest ranged from -13.1% to 32.3% with a mean of 8.6% and a standard deviation of 9.2%. This mean was substantially greater than zero ( $t(107)=9.72, p<.001$ ). The distribution of scores approximated closely the normal curve. The distribution of change scores formed by subtracting the pretest from the posttest with retests ranged from -8.9%

to 40.8%. This distribution approximated closely the normal curve with a mean of 18.3% and a standard deviation of 10.3%. This mean was also substantially larger than zero ( $t(107)=18.54, p<.001$ ).

## **Prediction**

There was no evidence that the relationships among the Discovery Education use measure and either or the change measures were non-linear. Hence, traditional correlation and linear regression analyses were performed. A relationship was found between DESci use and change from pretest to posttest with retests ( $r=.21, p=.03$ ), and it did reach, and exceed, the conventional .05 level of statistical significance. Regressing this latter measure of change onto DESci use produced the following regression equation,  $CHANGE=16.843+[(.003)(DESci)]$ . Thus, a school which exhibited mean use of DESco (576.4) would be expected to produce an 18.57% (mean change) increase in the number of students who achieved proficiency. When controlling for other factors which correlated substantially with examination performance, the effect of DESci on examination performance remained relatively strong, albeit not always statistically significant at the .05 level.

## **Conclusions**

Thus, there is some evidence in these data that increased use of Discovery Education Science yields an important proportional increase in the change percentage of students at a school who achieve proficiency



with a retest. As is always the case with correlational data it is important to notice that the direction of causality may be reversed, although it would be unlikely given that change scores were employed as the criterion variable. It is also possible that the relationship could be spurious with respect to some uncontrolled factor that was not measured in this study. Such possibilities can only be addressed through subsequent research.