



**REPORTS ON THE EFFECT OF  
THE UNITEDSTREAMING™ APPLICATION  
ON EDUCATIONAL PERFORMANCE**

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“LOS ANGELES UNIFIED SCHOOL DISTRICT  
MATHEMATICS EVALUATION, 2004”

and

“VIRGINIA SCIENCE AND SOCIAL STUDIES  
EVALUATION, 2002”



## Executive Summary

- These experiments assessed the effectiveness of unitedstreaming™, a proprietary application developed by and available through Discovery Education, that uses Internet-based streaming technology to deliver standards-based video content and support materials to students and teachers.
- Theory and research, including a 2002 evaluation of this application, provide strong reasons to expect the unitedstreaming™ application to enhance educational performance.
- These experiments were conducted in 6<sup>th</sup> and 8<sup>th</sup> grade classrooms in schools in the Los Angeles Unified School District.
- The design of the experiment involved a pretest examination, followed by exposure in the experimental group and no exposure in the control group to the unitedstreaming™ video content, and a subsequent posttest examination. Schools were assigned randomly to conditions.
- The results of the 6<sup>th</sup> grade experiment indicated that experimental group students' examination performance improved by an average of 13.3%, and control group students' performance improved by an average of 8.6%, so that experimental group improvement exceeded that of control group improvement by 4.7%. This effect was ample, statistically significant, and exhibited substantial generality across schools, teachers, and items.
- Among 6<sup>th</sup> grade students the impact of unitedstreaming™ resulted from experimental students being exposed to more unitedstreaming™ mathematics video content than control group students and experimental group students indicating that they liked mathematics more than control group students.
- The results of the 8<sup>th</sup> grade experiment indicated that experimental group students' examination performance improved by an average of 8.4%, and control group performance improved by an average of 6.2%, so that experimental group improvement exceeded that of control group improvement by 2.2%. This effect was important in magnitude, statistically significant, and exhibited substantial generality across schools and teachers, and some generality across items.
- Among 8<sup>th</sup> grade students the impact of unitedstreaming™ resulted from experimental students being exposed to more unitedstreaming™ mathematics video content than control group students.
- Combining these results with the results of the 2002 evaluation indicates that statistically significant effects in the direction of students exposed to unitedstreaming™ video content outperforming students not exposed to unitedstreaming™ content occurred in five of six experiments (two in math, two in science, and two in social studies, and involving elementary and middle school students), the one exception being a result of no difference. Cumulating results across these six experiments produces a mean weighted correlation of .21, corresponding to a mean advantage of approximately .42 standard deviations for those students exposed to the unitedstreaming™ application.
- Limitations of these experiments included the modest reliabilities of the examination scores and the power available to perform certain statistical analyses.
- Recommendations for future research include performing a more extensive analysis of the effects of factors that mediate the relationship between the intervention and examination scores, expanding the number of treatments and factors included in subsequent experiments, and extending these studies to novel locations, additional grade levels, and addition curricula, particularly language arts.

## **Virginia 2002 Study**

### **The Effect of the unitedstreaming™ Application on Educational Performance**

- This evaluation examined the effectiveness of the unitedstreaming™ application, a proprietary application that uses technology to deliver standards-based video content and support materials to students and teachers.
- Because research shows that video content engages students, improves teacher performance, and changes student-teacher interaction in ways that facilitate student achievement, strong reasons exist to expect the unitedstreaming application to enhance educational performance.
- Investigators executed a series of four experiments designed to test this hypothesis: (1) a third grade science experiment, (2) a third grade social studies experiment, (3) an eighth grade science experiment, and (4) an eighth grade social studies experiment.
- These experiments included students from three districts in the state of Virginia, involved the participation of numerous schools and teachers, and examined two grade levels (third and eighth) and two areas of content (science and social studies).
- The design of the experiments involved a pretest examination, followed by a month of exposure to at least 30 content-relevant video clips delivered via the unitedstreaming™ application (or not), and a

subsequent posttest administered approximately one month after the pretest. It included random assignment of classes to either an Experimental Group, those receiving instruction incorporating the unitedstreaming™ application, or a Control Group, those receiving instruction without exposure to the unitedstreaming™ application.

- The results indicated that for all experiments Experimental Group and Control Group students performed nearly equivalently on the pretest, so that randomization had the initial effect of producing nearly equivalent groups.
- Furthermore, generally both Experimental Group students and Control Group students improved substantially from the pretest to the posttest.
- Nevertheless, in three of the four experiments, Experimental Group students, i.e., those exposed to the unitedstreaming™ application, improved at a substantially greater rate than did the Control Group students, i.e., those not exposed to the unitedstreaming™ application.

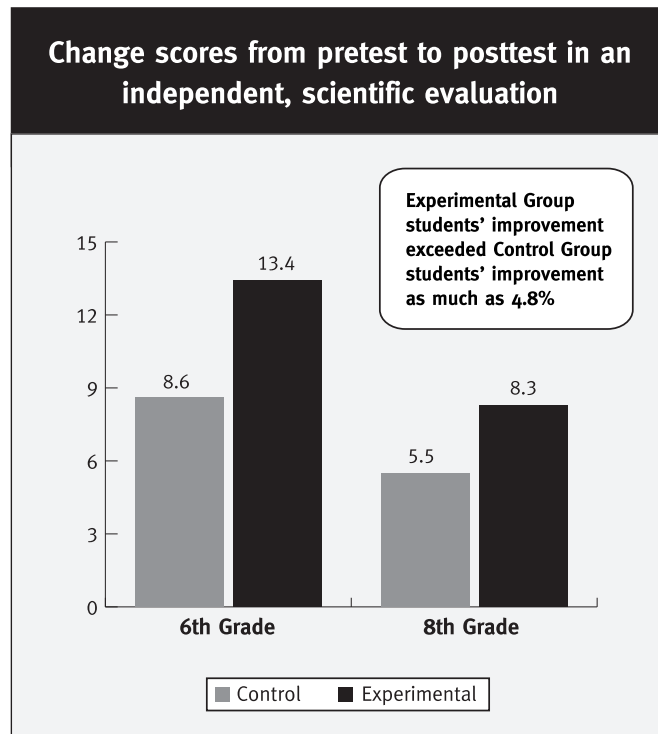
In sum, the unitedstreaming™ application enhanced performance substantially in three of the four cases considered.

- Results for the one exception, the eighth grade science experiment, may have resulted from the substantial time lag between teachers receiving training in the unitedstreaming™ application and their implementing it in the classroom, a delay produced by logistical difficulties in finding common content covered in the schools participating in this experiment.

- These results generalized substantially across units of analysis (district/school, teacher/student) and examination items.
- The data allowed investigators to eliminate possible artifactual explanations, such as missing data, differential attrition, and participation in other experiments as explanations of these findings.
- Important limitations to the results remain. Specifically, the experiments examined two areas of content and two grade levels. One cannot draw a warranted conclusion about the effects of this application to other grade levels, particularly those higher than eighth or lower than third, and to other content areas.
- Furthermore, one cannot generalize the results beyond the specifics of the technology and training employed. Put differently, one could well expect other streaming sites, other training regimens, or both to produce different outcomes than those reported here.
- In summary, a cumulation of the results shows that the Experimental Group students' improvement exceeded Control Group students' improvement by an average of 12.6%. These experiments provide evidence consistent with the hypothesis of the unitedstreaming™ application's effectiveness in increasing students' achievement within these grade levels and content areas.

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# 2004 *unitedstreaming*<sup>TM</sup> Evaluation: 6<sup>th</sup> and 8<sup>th</sup> Grade Mathematics in the Los Angeles Unified School District



**A Draft Report**  
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Video streaming, or video-on-demand, refers to the process of viewing video over the Internet. A user does not have to download a file and then play it back; instead, a file is downloaded and viewed. A video player buffer stores the information while the user views the program. Streaming video usually means availability of the video on demand, but it can mean a video broadcast in real time as an event unfolds. With some applications users can download video clips, save them, and include them in multimedia presentations.

*unitedstreaming* is a video on-demand application, produced by Discovery Education, a division of Discovery Communications Inc., that is designed to enhance lesson plans in a variety of subjects for students in grades K-12. In a recent evaluation of *unitedstreaming* Boster, Meyer, Roberto, and Inge (2002) reported that this application produced gains in 3<sup>rd</sup> grade science, 3<sup>rd</sup> grade social studies, and 8<sup>th</sup> grade social studies examination scores, with no differences found between experimental and control groups in 8<sup>th</sup> grade science. The purpose of this report is to provide additional information, based on an evaluation of 6<sup>th</sup> and 8<sup>th</sup> grade mathematics in 2004 in the Los Angeles Unified School District, concerning the effectiveness of *unitedstreaming*. Specifically, it expands upon the Boster et al. (2002) experiments to assess the extent to which those results generalize to other grade levels and other domains of content.

## *Method*

### **Participants**

The 6<sup>th</sup> grade experiment was comprised of 2,140 students. Of these students 1,949 completed the pretest (91.1%), 1,933 completed the posttest (90.3%), and 1,746 completed both the pretest and the posttest (81.6%). The 8<sup>th</sup> grade experiment was comprised of 885 students. Of these students 793 completed the pretest (89.6%), 772 completed the posttest (87.2%), and 686 completed both the pretest and the posttest (77.5%).

### **Design**

Two experiments designed in the same manner were performed. Four schools agreed to participate in both of the experiments. In both the 6<sup>th</sup> grade and the 8<sup>th</sup> grade experiments all classrooms in two of these schools were assigned randomly to the control condition and two schools were assigned randomly to the experimental condition. Control students received instruction in the usual manner. Experimental students received instruction with *unitedstreaming* employed to supplement teacher lesson plans.

### **Instrumentation**

The primary dependent variable was student knowledge about mathematics. For an item to be included on an examination, its content had to be covered in both the experimental and control conditions. To ensure this condition was met, three judges reviewed each Content Standard, the relevant material in the 6<sup>th</sup> and 8<sup>th</sup> grade mathematics textbooks, and viewed each video clip identified as relevant to the content. Teachers from both experimental and control classrooms also reviewed each examination item for content

and language difficulty. Only items that passed these content validity assessments were included. This process ensured that students in both the control and experimental conditions would have access to the same information, and that the students who viewed the clips would not be exposed to material that was covered only in the clips.

Sixth-grade students in both the experimental and control conditions completed the same 21-item examination at both the pretest and the posttest. The 6<sup>th</sup> grade examination included between two and six items associated with each of the seven Content Standards taught during the time of the investigation. Eighth-grade students in both the experimental and control conditions completed the same 24-item examination at both the pretest and the posttest. The 8<sup>th</sup> grade examination included between one and 11 items associated with each of the six Content Standards taught during the time-frame under investigation.

All examination items included four response options, with one correct response and three incorrect foils. The total number of correct answers served as the measure of mathematics knowledge.

## Procedure

To participate in the experiments schools had to have the minimum technological requirements necessary to run *unitedstreaming*, provide a paid day of release for teachers in the experimental condition to train, and logistical support in contacting teachers and collecting materials from them.

In mid January experimental condition teachers participated in a one day training session. In that session they learned how to use *unitedstreaming*. At the end of the day they received copies of the pretest mathematics examination, and upon their return to the classroom, administered them to their students.

During the next several weeks the sixth grade teachers were required to show 18 video clips and the eighth grade teachers were required to show 25 video clips designed to support their lesson plans. These clips were selected so that they matched the state Content Standards covered during the course of the experiment. The teachers were allowed to show these clips in any order, at any time, and as many times as they liked. The only requirement was that all students had to be exposed to each clip at least once. A tracking system was employed, and it indicated that all experimental teachers downloaded all the required clips. The teachers were provided Zenith 46 Series monitors to standardize hardware capabilities among schools. After exposure to the requisite, Content Standard mathematics material teachers were required to administer the posttests examination, a task performed prior to their Third Quarter Assessment Examinations.

For two of the schools, one experimental and the other control, the material was covered in a seven to nine week period. The other two schools, one experimental and one control, covered the material in 12 weeks.



## Results

Table 1 provides a summary of the results of the 6<sup>th</sup> grade experiment. From this table one may observe that, on average, pretest control group scores exceeded those of the experimental group [ $t(1,744)=-6.76, p<.001, d=-.32$ ]. Nevertheless, at posttest the groups evinced no difference in mean examination scores [ $t(1,744)=-.08, ns, d=.00$ ].

One sample *t*-tests performed on the change score data indicate that both the control group [ $t(1,002)=18.16, p<.001$ ] and the experimental group [ $t(742)=22.48, p<.001$ ] exhibited substantial mean gains from pretest to posttest. Moreover, experimental group gains exceeded control group gains by a substantial margin [ $t(1,744)=6.33, p<.001, d=.30$ ].

In the control group the mean pretest examination percentage was 39.8%, and the mean posttest examination percentage was 48.4%; thus, there was a mean improvement of 8.6%. In the experimental group the mean pretest examination percentage was 35.0%, and the mean posttest examination percentage was 48.4%; therefore, there was a mean improvement of 13.4%. Hence, examining the manner another way, gains in experimental group performance exceeded gains in control group performance by 4.8%.

Table 2 provides a summary of the results of the 8<sup>th</sup> grade experiment. These data provide no reason to conclude that pretest control group scores and experimental group scores differed on average [ $t(684)=.90, ns, d=.07$ ]. At posttest, however, the mean experimental group score exceeded substantially that of the control group [ $t(684)=3.18, p=.002, d=.24$ ].

One sample *t*-tests performed on the change score data indicate that both the control group [ $t(295)=7.13, p<.001$ ] and the experimental group [ $t(390)=10.29, p<.001$ ] exhibited substantial mean gains from pretest to posttest. Moreover, experimental group gains exceeded control group gains by a statistically significant margin [ $t(684)=2.49, p<.013, d=.19$ ].

In the control group the mean pretest examination percentage was 30.0%, and the mean posttest examination percentage was 35.5%; thus, there was a mean improvement of 5.5%. In the experimental group the mean pretest examination percentage was 30.9%, and the mean posttest examination percentage was 39.2%; therefore, there was a mean improvement of 8.3%. Hence, examining the manner another way, gains in experimental group performance exceeded gains in control group performance by 2.8%.

## Discussion

Because in both the 6<sup>th</sup> grade and the 8<sup>th</sup> grade experiments experimental group mean gains exceeded those of control group mean gains, the data are consistent with the hypothesis that the *unitedstreaming* application enhanced mathematics examination performance. These data are consistent with the results of the Boster et al. (2002) evaluation. They replicate the results of that series of experiments, and they extend them by demonstrating an effect of the application in a different content domain and with a different grade level, 6<sup>th</sup> grade. Although the magnitude of the effects is somewhat smaller than reported by Boster et al.

(2002), the obtained differences are statistically significant. Moreover, averaged across the two experiments in the Los Angeles Unified School District, experimental group performance exceeds that of the control group by 3.8%, a figure likely to be of practical import as well.

Nevertheless, this series of experiments is limited in several important ways. Three are particularly noteworthy. First, it is limited by geography and demographic characteristics, taking place in the western United States in a large inner city classroom environment. Second, it is limited by grade level, only two of the thirteen pertinent grades being examined. Third, it is limited by content, specifically mathematics. Combining these results with those of Boster et al. (2002), however, reduces the latter two limitations somewhat, particularly the third limitation.

Finally, it should be noted that these results are preliminary in that they pertain only to a superficial analysis of all of the data collected in the project. The conclusions are stated tentatively, and should be interpreted as such by any reader of this draft report.

## Reference

Boster, F.J., Meyer, G.S., Roberto, A.J., & Inge, C.C. (2002). A report on the effect of the *unitedstreaming* application on educational performance. Technical Report.

**Table 1**

Mean (Standard Deviation) Pretest, Posttest, and Change Scores for the 6<sup>th</sup> Grade Experiment: Control Group  $N = 1003$ , Experimental Group  $N = 743$

	<b>Control Group</b>	<b>Experimental Group</b>
Pretest	9.56 (3.81)	8.41 (3.12)
Posttest	11.62 (4.51)	11.61 (4.44)
Change	2.06 (3.95)	3.20 (3.88)

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**Table 2**

Mean (Standard Deviation) Pretest, Posttest, and Change Scores for the 8<sup>th</sup> Grade Experiment: Control Group  $N = 296$ , Experimental Group  $N = 390$

	<b>Control Group</b>	<b>Experimental Group</b>
Pretest	6.31 (2.47)	6.49 (2.68)
Posttest	7.46 (2.97)	8.24 (3.31)
Change	1.15 (2.76)	1.74 (3.34)

Figure 1

