SUMMARY OF CEREGO ACADEMICA PRE-PILOT STUDY

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Summary

A pre- pilot study of CEREGO's platform in a K-12 environment demonstrated significant gains in knowledge over a 5-week period. For all topic areas involved in the study, the classes that used CEREGO showed significantly greater learning outcomes than the classes that did not use CEREGO. These findings provide strong initial support for the usefulness of CEREGO in the classroom, which should now be verified in a follow-up study.

Overview

During a five-week period in Spring of 2013, 484 high schools students from the Academica Charter School system in Florida took part in a pre-pilot study testing the CEREGO system. The study involved 14 different high school classes covering 5 different topics (Algebra, Art History, Cell Biology, Civics, and Reading). For each class, teachers assisted with creating 1 to 4 CEREGO courses covering appropriate content areas. Teachers also developed tests of knowledge for each content area that were given to each student before and after using the CEREGO system. An additional 5 classes who covered the same material but who did not use the CEREGO system were also given the test of knowledge at the end of the 5 weeks to allow for a comparison to the CEREGO classes. In total, 326 students who used the CEREGO system and 158 students who had classes as usual participated in this pilot study.

The main purpose of this study was to provide an opportunity to try out measures and procedures that will be used in a future larger study to determine how effective the use of CEREGO is in the high school classroom environment. A secondary goal was to collect initial evidence of the impact of CEREGO on learning outcomes in high school students. To that end, we examined how much students learned over the 5-week period. We also compared learning outcomes for students who used CEREGO to students who had not used CEREGO. The study was directed by researchers from the CUNY Graduate Center and New York University, who were also responsible for analyzing all data and creating a final report.

Method

For this study, data came from the following sources:

- *Teacher and Student Surveys* (given before using CEREGO, and weekly during the use of CEREGO),
- *Tests of knowledge* (given both before and after using CEREGO)
- *Interviews with teachers* after the 5-week use of CEREGO, and
- *CEREGO log files* on student activity.

The surveys were administered online. Knowledge tests for each class were written by the teachers and included 15 to 20 multiple choice and short answer questions covering the

specific content area of that class. The tests of knowledge were administered by the Academica teachers in their classes before and after students used CEREGO. Teacher interviews were done in person by the researchers. Log files were collected by the CEREGO system for the duration of the 5-week period.

Summary of Findings

Time on task and items started. Analysis of the log data provided by the CEREGO system showed that the average amount of time students spent using CEREGO was 2 hours, 34 minutes during this five week period (averaging 31 min per week). On average, students started 80% of the items in their CEREGO courses, and had 28% of the items "at goal" by the end of the study.

Student survey responses. Overall, the weekly student surveys reveal a persistent high positive view of CEREGO. Each week, students reported feeling positive about learning with CEREGO and wanted to continue to learn with the system. The students also reported that learning with CEREGO was "easy" or "very easy", and that they were learning "much" or "very much" with CEREGO.

Teacher survey responses. The teacher survey indicated CEREGO was used to almost the same extent as an in-class assignment and as homework. On most weeks, students spent at least 20 minutes on the CEREGO system. The majority of teachers reported that their students were either "more engaged" or "much more engaged" with CEREGO, and "more on task" or "much more on task". Almost all of the teachers reported that using the CEREGO system had little or no effect on their workload, although they did report an increased workload during the first and last weeks of the pre-pilot study.

Teacher interviews. The teacher interviews confirmed the overwhelmingly positive opinion of CEREGO that was reported in the weekly surveys. Additionally, most teachers reported integrating CEREGO into their ongoing classes. However, some teachers reported an inability to use CEREGO the way they would have liked to because they didn't have enough computers for all of their students.

Learning Outcomes – Knowledge Gains. Comparing scores on the tests of knowledge that were given before and after students used CEREGO indicated that there were significant, large increases in knowledge, with an average gain of 27% (F (1, 252) = 74, $p < .001$. Cohen's $d = .66$), a medium to large effect. There was considerable variation between classes, with all but one class showing significant learning gains that ranged from 10%-50%, see Figure 1. The one exception was a class that had already covered the material presented by CEREGO and was therefore near "ceiling" on pretest scores (leaving no room for knowledge gain). The effect sizes for the remaining classes ranged from a Cohen's d = .55 to $d = 2.40$, which is considered to be medium to very large effect sizes.

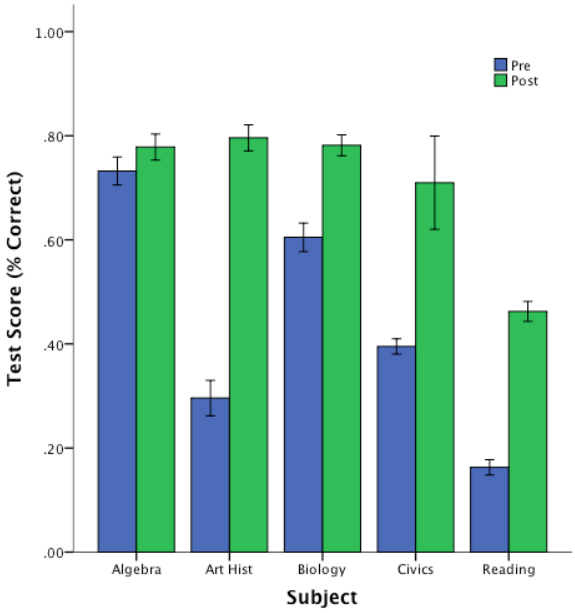

Figure 1. *Pretest to Posttest Gains for Classes Using CEREGO by Subject*

Learning Outcomes - CEREGO system v. Control. To determine how much adding the CEREGO system improved student learning, comparisons of knowledge scores were done between classes that did not use the system and those that did use CEREGO. Overall, there was a significant positive effect of using CEREGO (F (4, 283) = 28.04, p = .003, Cohen's d = .50), a medium effect. On average, the CEREGO classes performed 13% better than the non-CEREGO classes on the knowledge tests given at the end of the 5-week period. There was considerable variation between the classes, with the boost of CEREGO ranging from 11% to 36% in the various classes, see Figure 2.

Effect size is a simple way of quantifying the difference between two groups. For this study, Cohen's d was selected to measure effect size as it provides a common way to understand the size of a difference between two means. Cohen's d describes effects of 0.2 as small effect (1/5 of a standard deviation unit), 0.5 as medium effect (½ of a standard deviation unit), and effects larger than 0.8 (8/10 of a standard deviation unit) as large effects.

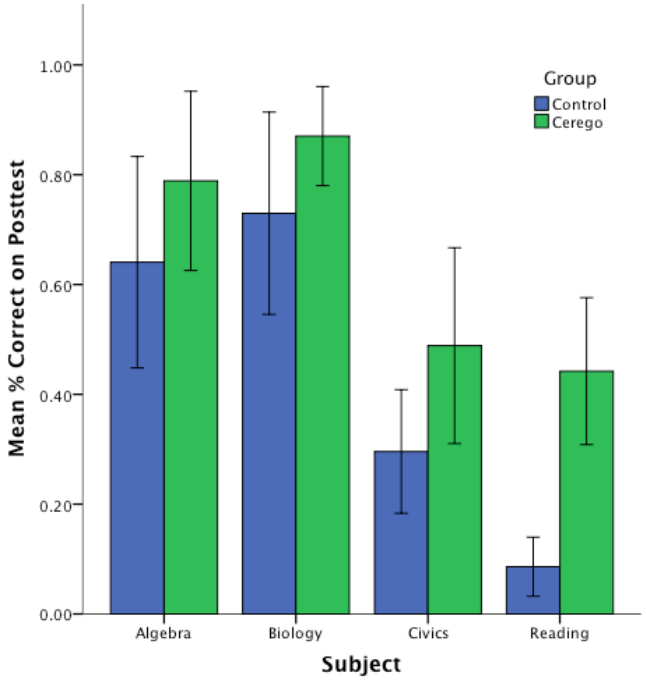

Figure 2. *Knowledge Scores for CEREGO versus Non-CEREGO (control) Classrooms by Subject*

Conclusions

The pilot study was successful in regard to preparing for the next study. The measures used in the pilot study proved to be appropriate for this age group and meaningful in capturing relevant data. The need to slightly modify some of the data collection procedures was identified, but all procedures worked as hoped. This pilot study also revealed some exciting findings about the usefulness of the CEREGO system in the classroom. All the CEREGO classes showed significant gains in their knowledge over the 5-week period (except for the one class that had already learned the material). Furthermore, for all topic areas, the classes that used CEREGO showed significantly greater learning outcomes than the classes that did not use CEREGO. These findings provide strong initial support for the usefulness of CEREGO in the classroom, which should now be verified in a follow-up study.