

Reach

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Innovative Curriculum Boosts Fourth Graders' Knowledge of Math and Science

Use of Speedometry also leads to improvements in girls' attitudes toward math and science

USC ROSSIER RESEARCHERS KNEW FOURTH GRADERS WOULD HAVE FUN WITH SPEEDOMETRY, a free curriculum designed in partnership with the Mattel Children's Foundation that comes with 40 Hot Wheels cars and 100 feet of track.

But what would the students learn?

The answer is found in an 80-page report that followed a two-year effort, including a pilot phase and a district-wide randomized-control trial involving approximately 1,800 fourth graders in 59 classrooms. A five-member USC Rossier faculty team with expertise in K-12 education and science and math standards collaborated with teachers to design the two-week curriculum to teach basic principles in science, technology, engineering and math (STEM). The curriculum allows students to explore scientific concepts such as potential and kinetic energy while providing teachers with a new instructional tool that emphasizes hands-on investigation and active engagement in scientific practices such as designing experiments, gathering and recording data and reporting results.

Not only did the fourth graders have a lot of fun, but they also showed gains in content knowledge of math and science and a greater interest in lessons in comparison to students who did not use the curriculum (see page 2).

The researchers hope that Speedometry can serve as a model for future development and research around new standards-aligned curriculum, both to extend Speedometry to other grades and settings (such as after school), and also to encourage the creation of other programs to help teachers bring inquiry-based STEM learning to students.

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Julie Marsh
Associate Professor of Education

“Imagine groups of kids gathered around toy racing tracks and colorful mini cars. They’re building ramps, testing out which cars go farther and what makes them go faster. Girls and boys are engaged in the activities and shouting out the names of the cars or ideas for what to do next. Now imagine that in this process they’re learning how to think and act like scientists. They’re making predictions, gathering data, displaying results, examining patterns, developing explanations based on scientific principles and presenting their results.”

USC
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MESSAGE

From the Dean

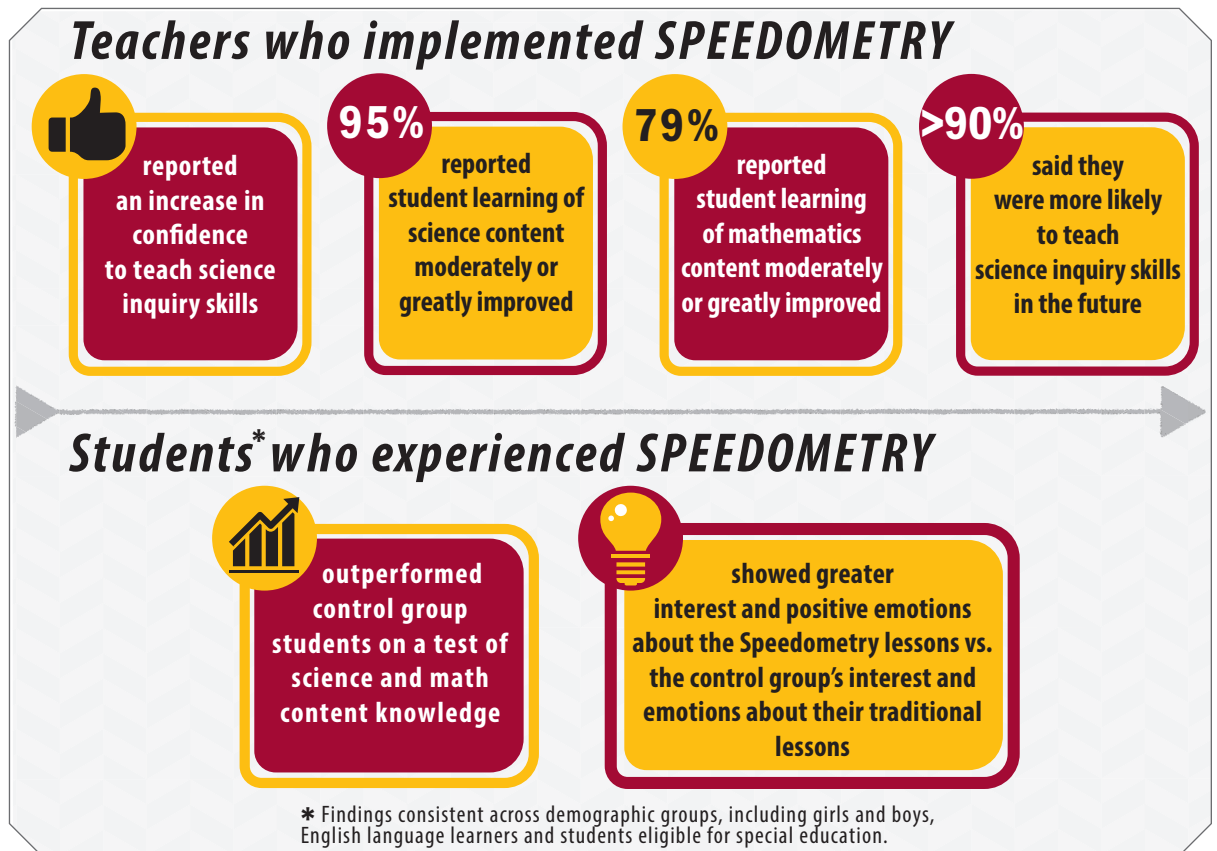
Two recent research projects at USC Rossier take full advantage of the power of play in the classroom. A curriculum called “Speedometry” brings science and math to life for fourth graders and is grounded by the research and assessment of leading Rossier experts in education. And “Mission: Admission” is an online game developed by researchers at the Pullias Center for Higher Education at USC Rossier (in partnership with USC’s Game Innovation Lab) that manages to bring fun to the intimidating process of college applications and financial aid.

What we are learning is that Speedometry and Mission: Admission don’t replace teachers or college advisers but rather equip them with tools to increase engagement.



Karen Symms Gallagher, PhD
Emery Stoops and
Joyce King Stoops Dean

WHAT THE RESEARCH SHOWS



Morgan Polikoff
Assistant Professor of Education

“Because we randomly assigned classrooms to receive Speedometry lessons, we can be confident that the differences we found are caused by the lessons. In short, the curriculum successfully met our objective to foster STEM interest and engagement for the students we studied.”

“Girls’ negative emotions about science and mathematics were found to decrease as a result of Speedometry, a particularly notable finding because decreasing negative emotions may have an even greater effect on girls’ sustained interest in STEM than would increasing positive emotions. STEM fields are overwhelmingly male, and greater engagement in math and science for girls at the elementary school level is critical to reversing this trend.”



Gale Sinatra
Professor of Education and Psychology
& Associate Dean for Research

“Promoting STEM Interest, Enjoyment, and Learning through Standards-Aligned Curriculum and Play: Speedometry Evaluation Final Technical Report” was prepared by Julie Marsh (associate professor), Morgan Polikoff (assistant professor), Gale Sinatra (professor and associate dean for research), Cathryn Dhanatya (assistant dean for research) and Susan McKibben (project manager) along with USC Rossier graduate students Taylor Allbright, Robert Danielson, Hovanes Gasparian, Quynh Tien Le, Ananya Mukhopadhyay and Tyron Young. An executive summary is available at tinyurl.com/speedometry-ex-summary.

Speedometry curriculum development and testing was funded by the Mattel Children’s Foundation. The foundation was not involved in the design, implementation or analysis of the research and had no influence over the reporting of results. Although Hot Wheels cars were used in the pilot study and subsequent trial, the curriculum can be conducted with other toys, including household and classroom items. The curriculum and home-based activities are available for free in both English and Spanish on the Speedometry website (hotwheels.com/Speedometry).

Rising *to the* Challenge

Pullias Center's "Mission: Admission" is a game changer

USC ROSSIER'S PULLIAS CENTER FOR HIGHER EDUCATION strives to improve the odds for underserved high school students, not only getting them into college but making sure they persist and graduate.



Developed in partnership with USC's Game Innovation Lab, the Center's online game "Mission: Admission" leverages play to help high school juniors and seniors navigate the complicated college application process. In February, researchers brought the game to 27 school districts throughout Southern and Northern California, including Los Angeles, San Diego, Sacramento, Riverside, Coachella, Oakland and Santa Maria.

Thirty Title I high schools took part in the "Mission:

Admission Challenge" created in conjunction with Get Schooled, a nonprofit dedicated to using media, technology and popular culture to motivate young people to improve high school graduation rates and empower them to succeed in college.

During the Challenge, juniors played the game, explored the Get Schooled site and filled out surveys to assess growth in knowledge; seniors earned points by completing their FAFSA/California Dream Act applications. Students could earn individual prizes by participating in Challenge activities—or prizes for their school such as "unlock the box" cash awards. The top scoring school won a celebrity principal for a day.

"We know that students who have played 'Mission: Admission' are more knowledgeable about applying to college," said USC Rossier Research Associate Professor of Education Zoë Corwin, co-director of the project. "Previous research showed the game positively affected students' college-going efficacy and college knowledge. We are now focused on understanding the effects of the game on tangible college outcomes—and examining how an online, play-based intervention can be implemented and effectively maintained at the school level."

Interim study findings illustrate a wide spectrum in how schools approached implementing the online college access tools largely dependent on a school's digital infrastructure, administrative support and teacher buy-in. Barriers to students' engagement with the game tools included lack of access to computers/tablets and Internet. Students responded favorably to the playful nature of the game and social media platform—as well as the school-wide incentive structure.

One Northern California teacher shared, "It's been a fun game, and we definitely plan on making it a permanent part of our curriculum, even without the contest!"

Housed at the USC Rossier School of Education, the Pullias Center has been at the forefront of college access and completion research for the past two decades. Most recently, researchers have studied the role of game-based learning on college aspirations and college-going efficacy, thus building scalable, engaging ways to support first-generation and underserved students as they learn about college.

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“We know that students who have played Mission: Admission’ are more knowledgeable about applying to college.”



Zoë Corwin
Research Associate Professor of Education

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In fall 2014, the U.S. Department of Education awarded a \$3.2 million grant (RA#P116F140097) to the Center as part of the First in The World Program, which is intended to spur the development of innovations in the education sphere as they pertain to postsecondary outcomes, college affordability and evidence-based practices.

Over the next two years, researchers will be tracking the effects of participating in the “Mission: Admission Challenge” on participants’ FAFSA completion, college application submissions and postsecondary enrollment. Research partners on the randomized-control trial study involving 60 schools include USC’s School of Cinematic Arts, the Get Schooled Foundation, the California Student Aid Commission, UC Merced’s Center for Educational Partnerships and the outside evaluation firm of Augenblick, Palaich and Associates.

Joining Corwin on the project team are William G. Tierney, Wilber-Kieffer Professor of Higher Education and co-director of the Pullias Center; Gale Sinatra, professor of education & psychology and associate dean for research; Tattiya Maruco, project manager; Amanda Ochsner, postdoctoral scholar; research assistants Robert Danielson, Suneal Kolluri and Antar Tichvakunda; Carlos Galan, outreach adviser; Monica Raad and Diane Flores, administrative support.

For more information, visit www.uscrossier.org/pullias/research/projects/college-games/.



Students at a high school in downtown Los Angeles take a break from chess to play a different type of game, “Mission: Admission.”

Research Grants

Awarded between November 2015 and March 2016

Patricia Burch received a grant of \$49,990 from the Spencer Foundation for a project titled “The Role of Tutors in Blended Learning for Disadvantaged Students in India.”

Jerry Lucido received \$704,209 from the College Advising Corps for his Southern California College Advising Corps project at the USC Rossier Center for Enrollment Research, Policy, and Practice.

Katharine Strunk received \$681,886 from the Laura and John Arnold Foundation to study the impact of teachers’ unions.

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