

# In the Community

## A Better Match

As the father of two school-age children, Adam Wierman knew that Pasadena Unified School District's open-enrollment process was not optimal. "I couldn't help but notice that it wasn't particularly well designed," says Wierman, a Caltech professor of computing and mathematical sciences. "There was a huge opportunity, I thought, to improve."

PUSD's open-enrollment system allows parents to participate in an annual lottery for the chance to get their children into non-neighborhood schools. The problem, Wierman says, is that the process was both inefficient and prone to gaming by anxious parents. Eager to come up with a better algorithm to support the district and its parents, Wierman collaborated with Caltech social scientists Federico Echenique, the Allen and Lenabelle Davis Professor of Economics; and Laura Doval, assistant professor of economics. Both had experience with similar problems in the area of school choice assignment.

With the team's new and improved algorithm, which rolled out in early 2019, families not only were more likely to get their top match but also were more likely to keep their children in their school district rather than enroll them in private or charter schools.

PUSD's previous open-enrollment system involved two rounds of applications and offers, in between which families found out whether they had been admitted to private schools as well. The existence of so many non-public-school options in Pasadena provided an additional wrinkle that made the problem interesting to the Caltech researchers.



From left: Federico Echenique, the Allen and Lenabelle Davis Professor of Economics; Laura Doval, assistant professor of economics; and Adam Wierman, professor of computing and mathematical sciences.

Some parents would also attempt to manipulate the system: instead of listing schools in order of their actual preference, they would estimate which schools had a larger number of open slots and then rank those first.

To tackle the problem, the Caltech group came up with a new algorithm that incorporated several changes including an increase in the number of schools families can list from five to unlimited. "When there's a limitation, you tend not to list schools that have very few slots available," explains Wierman. "Once you go to unlimited, there's no reason not to just list every school in the order that you prefer them."

Another significant change was aimed at families who might leave the district. Historically, families participated in one round in which they were asked to rank the schools and were given an initial assignment. If they were unhappy with that assignment, they could enter a second round during which they

could resubmit their preferences. The catch was that they had to give up their original assignment.

In the new system, families rank the schools just once; if they are not fully satisfied with their initial assignment, they can move on to the second round but are guaranteed that they will not lose their original seat until and unless they are given a seat in a school they ranked higher.

Data from PUSD show that these changes to the algorithm had a significant impact, even in its first year. The number of families matched to their top choice went up by 10 percent overall, with even greater improvement at particular grade levels: 97 percent of high school families and 80 percent of middle school families were matched to their first choice. PUSD is continuing with the changes for its upcoming open-enrollment season.

This new program could be helpful to other school districts, says Doval, since the issues it addresses are "by no means exclusive to Pasadena."

—Judy Hill

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