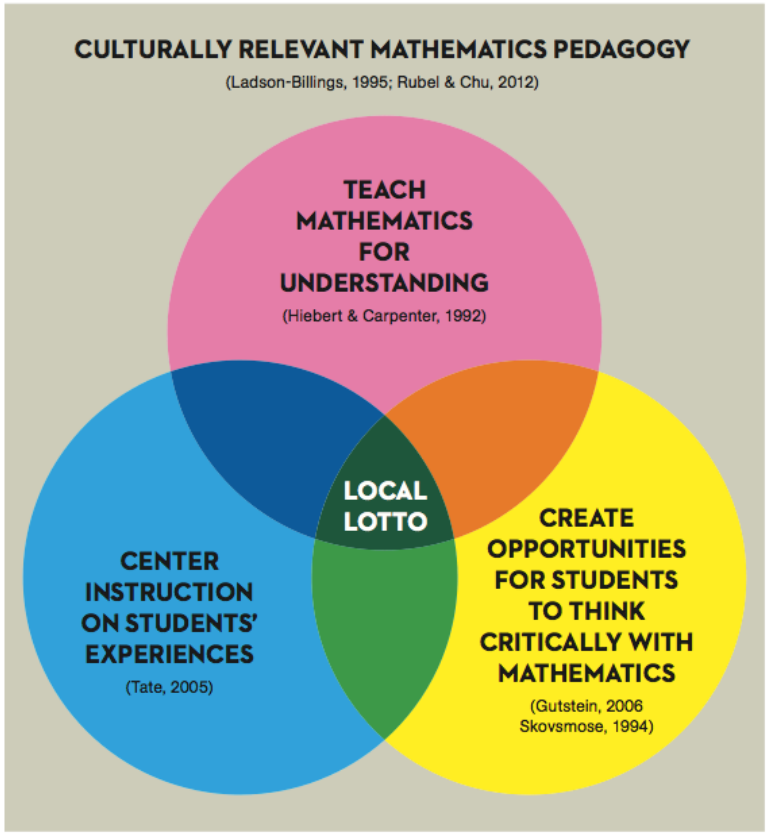
Critical, Place-Based Mathematics: Local Lotto

THEORETICAL FRAMEWORK



DESIGN PRINCIPLES TO INTEGRATE PLACE, CULTURE, & MATHEMATICS

1. **Mathematics as essential for understanding the phenomenon**	How does it work?	Students derive combinations formula to be able to understand the probability of winning the lottery.
2. **Spatial and quantitative components**	Where does it occur? How much or how often?	Students analyze and interpret quantitative information in maps, at various levels of scale.
3. **Subject dimensions**	Who is involved and how do they participate?	Students draw on personal experiences and interview community members about the lottery.
4. **Social justice ramifications**	Who is impacted and is it fair?	Students use mathematics to develop evidence-based opinions about the lottery.

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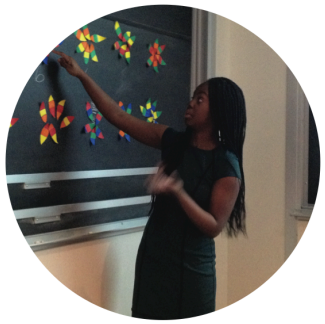
CURRICULUM & TECHNOLOGY

1. CHANCES

First, students play a series of games of chance and formulate ideas about the probability of winning each game. Next, students learn to find the probability of winning a game and work in groups to create a physical, collective tree diagram representing all possible outcomes in the "color pick" game. Students reflect about the probability of winning the jackpot, compare the probability of winning the various jackpot lotteries in New York, and consider what the probabilities mean. Finally, students use mathematics to respond to the New York Lottery's slogan: "Hey, You Never Know."

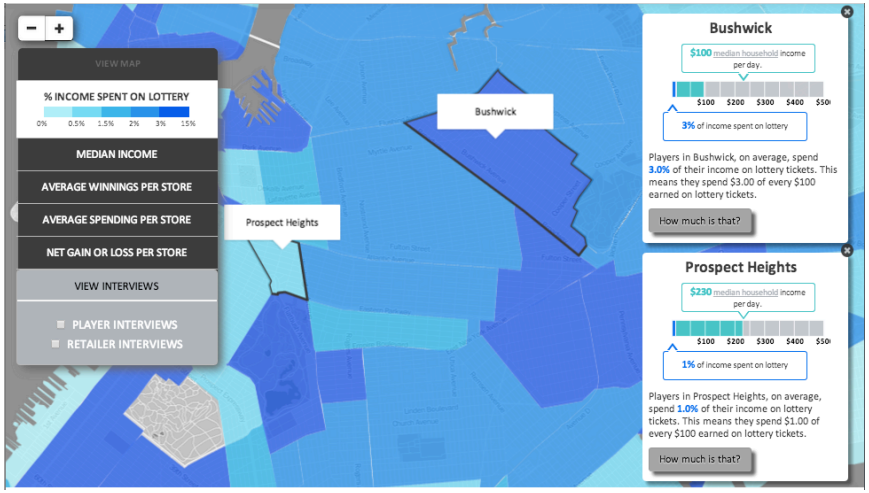


2. LOTTERY IN OUR CITY: INTERVIEWS

Students actively explore the theme of the lottery through journalistic interviews. Small teams of students use the tool on data-enabled tablets while taking various routes around their neighborhood to collect quantitative data about their neighbors' lottery ticket purchase habits and the volume of sales at neighborhood stores, as well as qualitative data about their neighbors' opinions about the lottery.

3. LOTTERY IN OUR CITY: MAP ANALYSIS

In the next phase of the curriculum, students analyze an interactive choropleth map of the city to address questions of the lottery's local and aggregated impact. The visual, geographic representation provides an intuitive window into the data, enabling students to identify patterns and analyze the large-scale effects of the lottery as a system by building on geographic knowledge they already have about their city.



4. OPINIONS: STUDENT "TOURS"

Finally, students synthesize mathematical analyses, qualitative interview data, and quantitative map data in order to formulate their own opinions. Using the tool, students create multimedia narratives to teach others about what they learned.

Some may say that the lottery is a tax on the mathematically illiterate, which is unjustified statement because the lottery company omits essential information that can most likely persuade people not to play the lottery.For example many lottery players may not know that they lose 29 out of 30 times because that information isn't displayed or highlighted. The whole truth would be necessary before any one can make the aforementioned statement, providing all the 'nitty griddy' details about the lottery plays a larger role in the outcome of how much people play the lottery.

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ADDITIONAL RESOURCES FOR TEACHING THE LOTTERY

Journal Articles

Crites, T. (1994). Using lotteries to improve students' number sense and understanding of probability. *School Science and Mathematics, 94*(4), 203–207.

Horwitz, K. (2013). The bulldog lottery. *Mathematics Teacher, 106*(9), 720.

Noone, E. T., Jr. (2000). The probability of winning a lotto jackpot twice. *Mathematics Teacher, 93*(6), 518–519.

Rubel, L. (2013). The Mathematics of Lotteries. In E. Gutstein and B. Peterson (Eds.) *Rethinking Mathematics: Teaching Social Justice by the Numbers* (pp. 236–237). Milwaukee, WI: Rethinking Schools.

Tools: Lottery Simulator

Lottery Simulator – General: http://www.mungermack.com/lottery/

Lottery Simulator – Mega Millions: http://www.getrichslowly.org/blog/lottery/

Other

Ellenberg, J. (2001, August 31). Is Powerball a Mug's Game? *Slate*. Retrieved from http://www.slate.com/articles/life/do_the_math/2001/08/is_powerball_a_mugs_game.html

Video: Lotto Zone, Center for Urban Pedagogy: http://welcometocup.org/Projects/UrbanInvestigations/LottoZone

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