Chapter 20
Local Lotto:
Mathematics and Mobile Technology to Study the Lottery

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EXECUTIVE SUMMARY

Local Lotto is a 14-session curriculum designed for high school students to learn mathematics through an examination of the local lottery. The curriculum is organized around investigations of how local lottery games are won, who plays, how many people play, and where lottery revenues and prizes are distributed. A web-based application is integrated into the curriculum to allow students to explore the lottery in their school neighborhood, examine local lottery data, and assemble and justify their own arguments about the lottery. In this chapter, the authors describe technology's role in shaping a rich curriculum that engages students in investigating a local phenomenon while also addressing the content and practices of the Common Core State Standards of Mathematics. The chapter concludes with an outline of the challenges of integrating custom technologies into mathematics curricula and provides recommendations for future work.

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ORGANIZATION BACKGROUND

Learning Mathematics of the City In the City (LMCITY^2) is funded by the National Science Foundation's Discovery Research K-12 program to develop and pilot-test innovative resources to support high school students' learning of mathematics. Its first module, *City Digits: Local Lotto*, was developed through a collaboration of three organizations: 1) mathematics education researchers from the City University of New York's Brooklyn College; 2) a team of interactive designers whose work focuses on civic data and who have an institutional affiliation in Urban Planning from MIT's Civic Data Design Lab; and 3) informal learning environment designers with a focus on art, design, and civic engagement from the Center of Urban Pedagogy, a nonprofit education and advocacy organization. The module has been pilot tested in two iterations at a high school in a low-income urban neighborhood, and revisions to the module were made after each iteration.

THEORETICAL FRAMEWORKS AND PERSPECTIVES

The primary objective of LMCITY^2 is to engage students in urban schools in learning mathematics through a critical examination of a local context using technological tools that allow them to explore data about the issues they are studying in the places they are observing them. Mobile technologies provide a unique means to connect students to these contexts by opening up new ways to investigate "place." The GPS capability in mobile technologies enables the geo-recording and analysis of multimedia information. This creates opportunities to analyze highly local phenomena in ways that were previously not possible. Thus, the use of such technologies has the potential to blur the boundaries between in- and out-of-school learning and, at the same time, disrupt traditional notions of technology's role in a mathematics curriculum.

Despite the prevalence of digital technology in society in general, public schools rarely take full advantage of emerging technologies' unique affordances for collaborative and exploratory learning. Scholars have long argued that the use of technology in education has the potential to engage and motivate students (Warschauer, 1996) and to disrupt classroom learning by providing access to rich interactive content, active learning, rapid feedback, and links to the outside world (Clark, 1994). Yet in the classroom, technology is typically treated as a means for increasing the efficiency and effectiveness of traditional pedagogical methods rather than as a catalyst for testing new ones (Roschelle et al., 2000). For instance, the central technology in the classroom has traditionally been the blackboard or projector, which helps a teacher lecture while students listen; today, the interactive whiteboard preserves this instructional model (Collins & Halverson, 2009). To take full advantage of technology's potential to disrupt classroom learning, it is crucial for instructional designers to both create technologies that afford for new modes of learning and develop new pedagogical models to assist teachers in leveraging those technologies to support learning goals.

Meanwhile, wireless networks and affordable mobile technologies have made Internet access nearly ubiquitous, even within low-income communities; 89% of Americans have some form of Internet access at home (Ito et al., 2010). Yet there are persistent gaps in technological literacy between low-income students and their peers because schools in low-income communities lack the resources and support