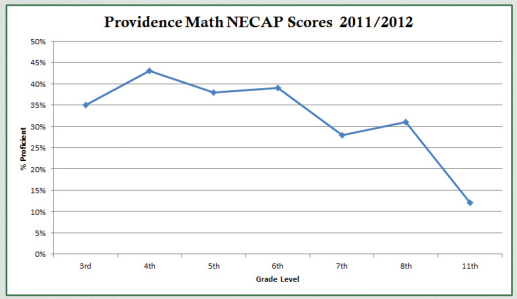
learning exchange

Finding new ways to motivate students to learn • Nabeel Gillani and Amit Jain

Inspiration

Math education in Providence presents a serious challenge. Only 35 percent of Providence third graders scored proficient or better in math on the 2011-12 NECAP, compared to 60 percent of third graders across the state. By high school, students fall even further behind: an abysmal 12 percent of Providence eleventh graders scored proficient or better, compared to 30 percent statewide.

From speaking to educators in Providence, we learned that much of this learning loss occurs in middle school. The statistics again substantiate this anecdotal evidence.



Teachers universally cited student disengagement as a serious barrier to math education. Accordingly, we started Learning Exchange in the hopes of engaging middle schoolers by answering a simple question: "Why should I care?" In other words, we hoped to show children how to get excited about their classroom learning. The goals of Learning Exchange took shape as follows:

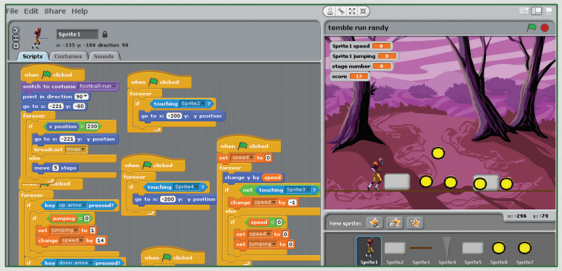
1) To build **mentoring relationships** between Brown students and Providence learners
2) To get students **engaged in creating projects** and learning exciting new skills
3) To connect **mathematical and analytical thinking** to these projects in order to make math more relevant for students

All Learning Exchange classes are structured within a project-based approach, with abundant analytical tie-ins throughout the experience. Curricula are intentionally crafted to get students to gain excitement about their learning, demonstrate ownership of their projects, and better understand the broader relevance of mathematical thinking.

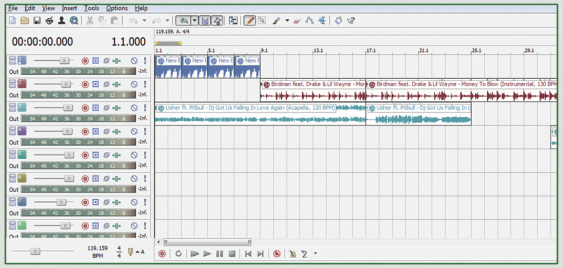
Action

Learning Exchange started as a four-week pilot at Bridgham Middle School in Spring 2011. We then evaluated outcomes and recalibrated for the fall, when we moved to DelSesto Middle School and offered two ten-week courses each in digital music and computer programming. In Spring 2012, we offered one course in each subject at both DelSesto and Nathanael Greene Middle Schools, for a total of four courses across two schools.

Students in the computer programming course use Scratch, a visual programming interface developed at MIT, to create their own games and animations. Students quickly realize that solving math problems that involve character positioning, movement, and interaction are critical to developing cool applications, like the one depicted below:



Students in the digital music course use Roc, a drum machine webapp created by Aviary, to learn the basics of beats and instrumentals before diving into ACID Music Studio, a music mixing program by Sony, to mix their own beats with instrumentals and vocal tracks from their favorite songs. Students develop an intuitive understanding of rates of change and ratios through learning and utilizing music theory concepts like tempo and pitch.



At the end of each session, students completed projects that combined the varied skills they had learned over the course. In the computer science class, students created intricate games such as an advanced version of Pong, Brick Breaker, and even Temple Run. In the music course, students created mashups of their favorite songs, cut, tempo-matched, and pitch-shifted. Programming students received USBs with their creations and a Scratch installer file, while music students received albums of the class's mixes.

Results

Learning Exchange's focus on motivating students makes evaluation fundamentally centered on qualitative assessment. One dimension of the program's impact is piqued interest in the learning possibilities afforded by programming or music mixing. For example, at Nathanael Greene, both eighth graders in the computer programming course expressed a deep interest in taking computer science courses in high school. One parent cited her daughter's excitement, while another explained that their younger son had watched his older brother programming in Scratch at home, leading him to program on his own as a result. In the music course, most students expressed a similar desire to take music-oriented courses in high school.

Learning Exchange also places a strong emphasis on designing, implementing, and presenting creative projects. To congratulate students on their hard work and showcase their efforts, Learning Exchange held an end-of-session fieldtrip to Brown in early April. Here, students presented their projects in an exhibition setting, enthusiastically demoing their games, animations, and music mixes for each other, their parents, and members of the Brown community. At the event, one student gave a speech about how Learning Exchange helped her increase her performance in math class and gain a deeper appreciation for the subject.