JOHN W. McCORMACK
MIDDLE SCHOOL

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CITIZEN SCHOOLS

A PARTNERSHIP TO **EXPAND STEM LEARNING**

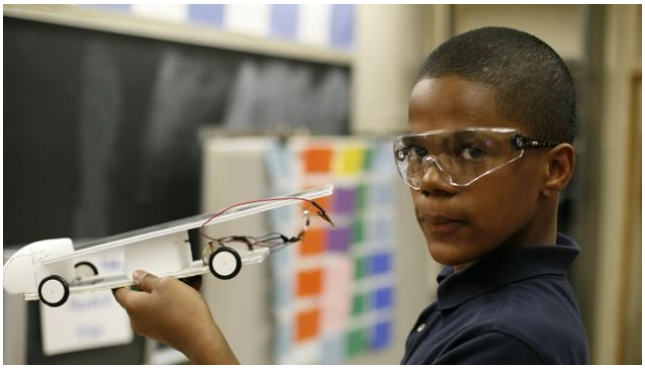
Citizen Schools' Expanded Learning Time model expands the learning day in science, technology, engineering, and math (STEM)

CITIZEN SCHOOLS
AT McCORMACK MIDDLE SCHOOL

The **John W. McCormack Middle School** serves 572 students from a large neighborhood in the Dorchester section of Boston, Massachusetts. Dorchester, where 42 percent of children come from low-income families, is one of the densest clusters of childhood poverty in the state, according to a study sponsored by the Boston Foundation. Eighty-five percent of families are headed by a single parent, mainly mothers, and at least 20 percent of the adults have no high school diploma. Poverty there is fueled by unemployment and low educational attainment, the study found.

Founded in 1995, **Citizen Schools** is a national nonprofit organization that partners with middle schools to expand the learning day for children in low-income communities. Citizen Schools mobilizes a team of AmeriCorps educators and volunteer professionals to teach real-world learning projects, called apprenticeships, and provide academic support in order to help all students discover and achieve their dreams. Through Citizen Schools' Expanded Learning Time (ELT) program, all students in a grade or school participate in Citizen Schools-led activities in the afternoon as part of an extended day.

In 2001, Citizen Schools began offering a small optional afterschool program at McCormack. The program grew modestly, serving a few dozen students each year, but the school itself struggled with proficiency rates that hovered below 50%. In 2010, Mike Sabin was appointed principal of McCormack and charged with turning the school around based on his track record as principal of the Edwards Middle School in Charlestown, Massachusetts. At the Edwards School, Sabin had enlisted Citizen Schools as part of another turnaround, asking the organization to serve all 6th grade students in its first ELT partnership. Citizen Schools worked with Sabin, school personnel, and other partners to help create a school-wide culture of achievement, engage corporate and community resources, and ultimately triple proficiency rates – effectively erasing the achievement gap for students. Drawing from their success at Edwards, Sabin asked Citizen Schools to expand to a full ELT model serving 220 6th, 7th, and 8th graders at McCormack beginning in fall 2011. In the 2013-14 academic year, Citizen Schools' ELT program is serving 321 students at McCormack, including the entire 6th grade. To help support this expansion, Citizen Schools secured a grant and a strong commitment to employee volunteerism from Google as a McCormack campus sponsor.



McCORMACK MIDDLE SCHOOL STUDENT BODY

Middle School (6-8) Enrollment: 572

Citizen Schools ELT Enrollment: 321

Economically Disadvantaged: 86%

English Language Learners: 50%

Enrolled in Special Education: 20%

Hispanic: 40%

Black or African American: 39%

Asian or Pacific Islander: 11%

White: 9%

American Indian/Alaska Native: 1%

STEM LEARNING AT McCORMACK MIDDLE SCHOOL

STEM programming became a major focus of the ELT program at the McCormack beginning with the 2012-13 year. The ability of Citizens Schools' STEM apprenticeships to bring real-world, project-based learning to life for students, combined with the need for more (and more diverse) STEM professionals, made a focus on STEM learning an obvious choice for Principal Sabin. As he wrote in a letter to the U.S. Department of Education, "By introducing students to professional scientists, offering them opportunities to explore STEM topics through real-world projects, and providing extra time to practice academic skills, Citizen Schools' approach helps to close opportunity and achievement gaps in STEM." As the principal of two Boston schools that have partnered with Citizen Schools to expand the learning day, Sabin believes that "Citizen Schools is helping to pioneer a promising new model for STEM education."

Pat Kirby, Citizen Schools Chief Operating Officer and Executive Director of Citizen Schools Massachusetts during the launch of the McCormack ELT program, suggests that STEM learning serves as an "engagement tactic for kids." Citizen Schools' apprenticeships in science and technology are exciting and fun for students and connect in a powerful way to "real-world applications of their academic learning." This is borne out by the popularity of STEM apprenticeships among students at McCormack when they make their apprenticeship selections each semester. In the most recent academic year, 55% of all apprenticeships at the McCormack are in STEM fields.

The STEM Learning Model

Apprenticeships are the cornerstone of Citizen Schools' STEM learning program at the McCormack Middle School. Students explore new fields and career opportunities alongside community volunteers – called "Citizen Teachers" - who share what they know and love through hands-on, project-based learning. Working with these volunteers, students program smartphone applications, film and edit documentary films, engineer solar cars, and design marketing campaigns. Each apprenticeship culminates in a public celebration of learning and civic engagement known as a WOW!. McCormack students select two apprenticeships each semester, with each meeting for 90 minutes weekly (see McCormack-Citizen Schools Schedule below). Volunteer experts teach apprenticeships selected from the growing curriculum library curated by Citizen Schools staff, or work with staff to design a new apprenticeship with the goal of building both content knowledge and 21st century skills. In the STEM learning model, all students have the chance to experience a STEM apprenticeship, and many choose to participate in several during their time in the program.

STUDENT IMPACT IN STEM AT McCORMACK

- **89%** of students beginning the year with an A or B grade in math maintained or improved their grade
- **79%** of students showed improvement in 21st Century skills
- **88%** of apprenticeships at McCormack were rated high quality
- Cumulative **12 percentage point increase** in math proficiency rates (2012-2013)
- **Estimated 3 additional months of math learning** in an academic year according to a national external evaluation of Citizen Schools' ELT programs being conducted by Abt Associates

STEM LEARNING
AT McCORMACK MIDDLE SCHOOL

Math skills are also fundamental to student success in STEM fields. In daily "Math League" sessions, students complete lessons that are based on the McCormack math curriculum and mapped to state and Common Core standards. Math League is led by Citizen Schools' staff and AmeriCorps educators, known as Team Leaders. Team Leaders meet with McCormack math teachers on a weekly basis, utilizing school data and Citizen Schools' daily exit tickets to identify individual students' needs and customizing the Math League scope and sequence to target skills where students require the most support. For up to five additional hours each week, Citizen Schools students review daily math lessons, build upon basic skills, and gain expertise in areas of challenging academic material. As additional support for math learning, Principal Sabin created a position for a specialized Math Coach and hired former long-time McCormack math teacher Amy Kiley, who works closely with both McCormack and Citizen Schools staff to coordinate regular school day math lessons with the specialized academic assistance provided in the extended day program.

STEM Apprenticeship Examples

Science Club for Girls

Despite making up nearly half of the U.S. workforce and half of the college-educated workforce, women hold less than 25% of STEM jobs. The Science Club for Girls apprenticeship seeks to address this gap, and inspire interest in STEM particularly among female students. Utilizing teamwork, creativity, problem-solving, and academic knowledge, the Science Club for Girls apprenticeship creates a safe environment for students at McCormack to explore the world of math and science. Students work independently and in teams to explore the world of structure using geometry and physics, particularly the strength and function of triangles in architecture. They build a giant geodesic dome and present their process, findings, challenges, and successes to teachers, families, and volunteers at their WOW! presentation.

	Monday	Tuesday	Wednesday	Thursday	Friday
7:15-1:40	McCormack Regular School Time				
1:40-1:45	Transition to Citizen Schools				
1:45-2:45	Academic League: Math & ELA	Academic League: Math & ELA	Academic League: Math & ELA	Academic League: Math & ELA	School-wide Meeting Time
2:50-4:10	Teacher-Designed Student Choice Lessons	Apprenticeships	Teacher-Designed Student Choice Lessons	Apprenticeships	Team Leader Preparation Professional Development

STEM LEARNING
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Lego Robotics with Google

Robotics is a rapidly growing field in computer science. Through applied knowledge of computer programming (NXT), research and design, developed problem-solving skills, and intense collaboration with team members, students constructed their own robots and a research presentation that resulted in a unique solution to an identified problem presented in the robot challenge. *Lego Robotics* is one of many apprenticeships taught by Google employees at McCormack—since 2011, eighty "Googlers" have taught 25 apprenticeships to more than 450 McCormack students.

Solar Cars with MIT and Cognizant Technology Solutions

The *Solar Cars* apprenticeship at McCormack guides students to design, build, test, revise, and explain the process of building a solar car. Students build their knowledge of solar energy and car mechanics, master a design and engineering process, and use data from trial runs to create a functional and efficient solar-powered car. Through applied knowledge of the engineering process, mathematical skills, and car transmissions and gears, students work in small teams to construct solar cars with the goal of racing them in a Junior Solar Sprint competition.

I have been an AmeriCorps Teaching Fellow for a year and a half and have taught six different apprenticeships. This fall, I had the privilege of supporting the Solar Car apprenticeship, where students learned about friction and gear ratios. We covered concepts such as solar energy and why it was imperative that the axle support be cut using exact dimensions.

Within a few weeks, students started coming into my office during their snack and their lunch. They started staying even later on Fridays to work on their solar cars and asked if they could take their cars home to tinker with over the weekend. For an extra hour, every day, teams would hunch over their tiny cars, discussing which gear ratio would help their car drive faster, and how to angle the solar panel to harness the maximum power of the sun. It was clear that they were hooked.

Our WOW! culminated in a race during the school day at lunch. There were at least 100 students who stood as spectators and cheered for their friends' cars. While not every student walked away with a win, I know that every student walked away proud of the work they completed.

Jessica Wertheim

Citizen Schools AmeriCorps Teaching Fellow

STEM LEARNING AT McCORMACK MIDDLE SCHOOL

Pizza Science

The *Pizza Science* apprenticeship was designed by long-time Citizen Teacher Bob Mersereau, who has led 19 apprenticeships at eight different Citizen Schools campuses over the past eight years. "It has to be exciting," Bob says. "It can't just be more school. It has to be something that grabs [students'] attention. So we cook something they like – pizza!" In Pizza Science, students learn the science behind the culinary processes of making a pizza, such as how yeast and the fermentation process cause dough to rise and how herbs complement tomatoes. They use math to figure out proportions and measure ingredients, and then build their own pizzas with their new understanding of how different components of food work. Last year, Bob convinced his son, a professional chef, to teach *Pizza Science* with him, and this year the students went on a field trip to Bob, Jr.'s restaurant to see a real working kitchen and talk with the staff.

As Citizen Schools establishes STEM programming and Expanded Learning Time in partnership with high-need schools like McCormack Middle School across the country, one key lesson learned is that these challenging endeavors, to be successful, require a long-term commitment from all constituents - deep and lasting partnerships among districts, schools, providers, funders, and the community at large. Citizen Schools and its partner schools are proving that when that time and commitment exist, they are able to ignite moments of discovery for students that lead to significant academic achievement, change students' trajectories for the better, and close the opportunity gap.

Any team or any partnership takes multiple years to build because not only do you need the theme, you also then need the quality of instruction and you need to build up the traditions around something. It's so important, and it's not that easy to develop. You need good Citizen Schools instructors. You need good partnerships. You need curriculum in place. You need a lot of different things for this to go well. And so, a long-term commitment to doing it is needed.

Especially in a challenging school with a lot of specialized population, you don't just drop a theme down and have it go really well. You might be able to do that in an advanced work class, but for us [at McCormack] it's a multi-year effort, so it's very important to keep the commitment to that. We need commitment from Citizen Schools, from funders, and from our corporate partners - the partners who provide the staffing to make this work over time.

It's all stuff that's not in the curriculum. The STEM apprenticeships are completely valuable experiences that are not in the [school day] curriculum and they're not in the extracurricular lives of our students. So they are almost completely filling in the [opportunity] gap. Whether it's robotics, whether it's financial literacy, all of that is absent from the kids' schooling and generally their lives outside of school as well.

Mike Sabin

Principal of McCormack Middle School