Mathematics, 3D Printing, and Computational Thinking Through Work-Based Learning for Middle Schoolers (MPACT): An early-phase grant proposal addressing absolute priorities 1 and 3.

The goal of MPACT is to introduce work-based learning to middle grade classrooms through digital fabrication. We propose this as a new way of learning computational thinking (CT) and mathematics that will influence high-need rural students' views of their future in the workplace. We will accomplish this through a needs assessment, codesigning and implementing a project-based curriculum with a workplace setting, matching students with adult mentors, and testing the curriculum in 20 schools (with 20 comparison schools).

MPACT will serve approximately 6,000 grades 6–8 students. The majority will be high-need students—students who are minorities and/or qualify for free or reduced-price lunch and/or have disabilities and/or are English learners.

The overarching objectives are to

Develop three 12-lesson semester-long curriculum units based on workplace uses of 3D modeling and printing that address CT and mathematics standards, as well as spatial reasoning skills.

Create mentor/mentee relationships between adults who use 3D printing in the workplace and middle school students, to influence students' views of their future in the workplace.

Train and support mathematics and computer science teachers to implement MPACT using a 4-day workshop and a set of just-in-time professional learning activities.

Implement the curriculum in 20 schools (majority rural) with a majority of high-need students.

Test the promise of the program through a rigorous evaluation design that meets WWC standards, measuring students' learning of mathematics, CT, spatial reasoning skills, and any change in their views of the future.

SRI International, American Institutes for Research, and the San Mateo County Office of Education are partners in MPACT.