

# DEEP LEARNING THROUGH ROBOTICS

Schools cannot remain the same while the challenges, opportunities, and expectations for learners change. Teachers, as well as students, need to master different skills and embrace evolving technologies. Robotics is a unique system for learning that challenges us to teach and learn in new ways. It is a relevant, hands-on, minds-on approach designed to help students take ownership of the learning process and actively develop the problem solving and collaboration skills necessary to become creators. Through Robotics, we are providing CFSD students with the tools, skills, and strategies needed to address questions that currently may have no answer.

CFSD teachers are also learning to program and engineer robotic arms along with their students. They are guiding students in applying math and science concepts and supporting the development of deep learning proficiencies (e.g., critical thinking and problem solving, creativity and innovation, collaboration) and positive academic mindsets. They show students how to break down problems into small pieces, recognize patterns, discover principles, and design algorithms to solve similar problems. In doing so, they are developing “computational thinking” skills, helping students transfer learning to new contexts, and engaging them in rich content in innovative ways.

“Computational thinking” allows us to harness the power of computers to accomplish search, retrieval, and control tasks far beyond human capabilities. While students and teachers design and direct the autonomous behavior of robots, they are imagining and exploring possibilities, mastering the logic of programming languages, and taking charge of technology.

**CFSD is igniting student engagement and energizing learning through real-life problem solving and challenges in Robotics!**

# THE RATIONALE FOR ROBOTICS IS COMPELLING

- Curiosity and Discovery: No age is too young for being actively engaged by and interested in robotics.
- Problem Solving: Beginner students experience satisfying achievements right away. They learn problem-solving strategies and higher-order thinking in a gradual, self-motivated way as they move through and accomplish more challenging tasks.
- Collaboration and Perseverance: Students discover the value of collaboration and perseverance. Sharing ideas, building on one another's contributions, and persisting through difficulties leads to insight, innovation, and success.
- Creativity and Innovation: Robotics tasks and projects encourage students to think outside the box and require them to experiment, integrate, and apply math and science concepts, and demonstrate mastery of new learning.
- Relevant and Hands-on: Robots are already part of everyday life – in our homes, workplaces – sharing our world. *“On the ground and in the air, Robots, robots everywhere! . . . Up in space, beneath the seas, Robots make discoveries . . .”*
- Programming and Coding: Focus on conceptual understanding is essential preparation for a future with increasingly complex and autonomous technological systems to learn, trouble-shoot, and manage.
- Critical Thinking: Solving engineering and programming challenges is highly effective in developing critical and creative thinking competencies and lasting interest in STEM (science, technology engineering and math) subjects and fields.
- Project Management: The LEGO Robotics system is so versatile that it is used worldwide for teaching at all levels of education and for research, modeling, and product development by universities, industries, and science organizations, including NASA.