



*Bold*

*Ideas*

# Robotics: Empowering Jewish Creators

■ by **JUDY MILLER**

Miller shows how robotics can be much more than an exciting way to engage students in STEM learning. Students can use robotics in all subjects to create dynamic models that represent the values and activities they want to display.

Abraham Joshua Heschel wrote, “Our concern is not how to worship in the catcombs but rather how to remain human in the skyscrapers.” At Columbus Jewish Day School, a new robotics curriculum has provided a way for students to find the “human in the skyscrapers” through its potential for creativity and self-directed learning. Bringing STEM education into our integrated Judaic and general studies curriculum not only prepares students for a changing world, it enables them to be the changers of that world as they view it through the lens of Jewish knowledge.

In partnership with the Battelle Company, we launched a pilot robotics curriculum for students in kindergarten through third grade. The program was so successful that it was expanded to fourth through sixth grade with the generosity of the Wasserstrom Science and Technology Fund. “As science and technology continues to become a greater piece of our daily activity, it is even more important that our children learn these skills at a younger and younger age,” said Eric Wasserstrom, a CJDS parent.

Several years ago, I was introduced to Marina Bers of Tufts University, who served as a keynote speaker at a North American Jewish Day School conference. Marina is a professor in the Eliot-Pearson Department of Child Development and the Director of DevTech Research Group at Tufts, the 2005 recipient of the Presidential Early Career Award for Scientists and Engineers and the author

of *Blocks to Robots: Learning with Technology in the Early Childhood Classroom*. Bers’s presentation at the conference inspired me to learn more about robotics, and to investigate how it could be successfully implemented in early elementary grades.

We reached out to Bers and brought her together with Battelle, a global research and development organization based in Columbus, Ohio, to concretize a plan for CJDS. Parent volunteers and teachers underwent intensive training by Bers. Using her methods, students are using Lego blocks and laptop computers to engage in building and programming robots. Battelle’s commitment to science, technology and innovation made them a natural collaborator for this pilot program. Battelle saw us as a pilot school for this innovative pedagogy; in the words of Eric Fingerhut, vice president for education and

STEM learning at Battelle, “CJDS will serve as a demonstration site to scale this proven best practice in central Ohio and beyond.”

Battelle provides funding and support for a multitude of STEM educational programming in schools. With their generous financial backing CJDS was able to purchase robotics kits and laptops for Kindergarten through third grade. Battelle’s funding also paid for staff devel-



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opment and parent volunteer training with Bers. Using her framework, our educators created units that integrated robotics into their established curriculum. Beginning with the engineering design process, students learn to build and program robots in conjunction with science, literature, social studies and Jewish studies.

Each grade at CJDS has an essential question that guides the year’s learning and activities. Exploration of the first

Examples of student’s designs include a robot programmed to turn its head away from distracters, a robot that takes a deep breath and rolls its head to relax and refocus, and a robot that rolls away from a negative situation and “drinks” from a water fountain made out of non-Lego materials.

grade essential question, "How do we build a community?" led the class to base their robotics unit on kibbutzim. Liat Shaked, our community shlichah, spent time with first graders teaching them about the structure of kibbutzim and the many activities that take place within the kibbutz community. Liat helped the students create maps of their own kibbutzim, which are on display outside their first grade classrooms.

As an extension of this unit on community, the first grade robotics unit challenges the students to build and program robots that would be elements of a kibbutz. Students are collaborating to create a piece of playground equipment using Legos, the first step to get a feel for the building materials. In their next robotics sessions first graders will refine how they will translate the ideas of community into functioning robots.

Third graders have already presented their final robotics projects to friends and family. The robotics unit is based on the social-emotional curriculum *Superflex*, created by Michelle Garcia Winner. The curriculum includes characters called the Unthinkables, who exhibit inappropriate behaviors that invade our brains and subvert healthy social behavior. The behaviors-characters include inattentiveness (Brain Eater), over-sensitivity (Glassman) and mean-spiritedness (Mean Jean). The hero, Superflex, is totally flexible and can think of many different solutions to one problem. CJDS has been using the *Superflex* curriculum to help students learn to identify and articulate destructive social behaviors and then role play to devise possible responses and solutions.

The third graders designed and programmed their Lego robots to respond appropriately to an Unthinkable by using one of the strategies developed in class. Examples of student's designs include a robot programmed to turn its head away from distracters, a robot that takes a deep breath and rolls its head to relax and re-focus, and a robot that rolls away from a negative situation and "drinks" from a water fountain made out of non-Lego materials, a requirement of the robotics curriculum.



Sixth graders integrated their science research into engineering fields with their study of robotics. Students researched different types of engineering, including audio, mineral and environmental engineering. They looked at the kinds of work each type of engineer might do, the education required and other interesting aspects for each field. Then they presented their robotics unit at the science fair. They built a robot to illustrate a specific aspect of their research. For example, one student researched mining engineering and

built a drilling robot, which required him to figure out how to use the same motor to make the drill bit spin fast while the machine moves forward slowly.

This robotics curriculum enhances our goals of delivering academic excellence, promoting critical thinking and inspiring creativity all in an inquiry-based learning environment. This program is the kind of hands-on, next-level learning that will prepare our children for the 21st century. ■

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