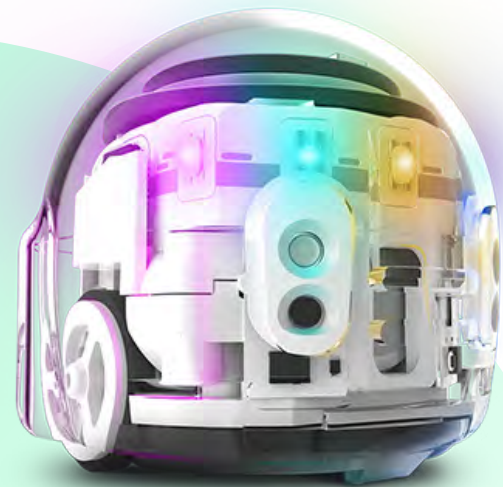# ozobot®

STEAM
made simple

Five stories about engaging all learners, anywhere, with Ozobot.

This collection of Ozobot customer stories and independent studies is for you if:

> You oversee curriculum, STEM/STEAM programming, or a grade level team for a public or private school district or after school program. ✓

> You're looking for ways to promote equity and give more students access to 21st century skills. ✓

> You want to learn how coding and robotics can increase engagement in math, ELA, and other content areas. ✓

Contents

Introduction

STEAM has gained ground over STEM as an essential component of 21st century education, and for good reason. As an interdisciplinary approach to learning spanning Science, Technology, Engineering, the Arts, and Math, it takes the form of hands-on projects that, according to a Carnegie Mellon study, can improve engagement and retention up to 6x. STEAM also has the power to boost top job skills like coding, creativity, and critical thinking, leaving students prepared even for careers that don't exist today.

The global COVID-19 pandemic, however, has raised potentially more urgent concerns about unfinished learning in core content areas, such as math and ELA. Research shows it has exacerbated opportunity gaps in these areas, leaving school and district leaders with tough decisions to make about how to shape priorities and direct resources in the coming years.

But educators shouldn't have to choose between short- and long-term priorities. The following customer stories and studies demonstrate how Ozobot makes it easy to increase student engagement in core content areas without sacrificing STEAM. By expanding STEAM beyond makerspaces and supplemental programs and integrating it into every classroom, we can ensure that all children have an opportunity to create the future.

About Ozobot

Ozobot makes it easy to teach coding and STEAM and integrate them into all subjects, anywhere. Students code Ozobot robots two ways–on screens with blocks and screen-free with colors. Teachers use Ozobot Classroom to assign ready-to-run lessons that are fully flexible for in-person, remote, self-guided, and direct instruction.

Trusted in
30K+
K-12 Schools

95%*
of users report increased student engagement

74%*
teach core subjects

* Source: Educator Survey

# Strengthen attendance and address learning gaps with after school

The **Anchorage School District 21st Century Community Learning Center (CCLC)** serves 900 K-6 students across 11 after school sites, in one of the nation's most diverse districts. Over 100 languages are spoken among the population. Many students enrolled in the Center's after school program face homelessness or food insecurity and are English Language Learners. Since their school day includes a 2-hour ELA block, after school is focused on math and science interventions.

In the face of these challenges, Anchorage SD's after school students are highly engaged, thanks to a robust program put together by Center Director Marcy Richards and her team of site coordinators and teachers. As Richards puts it, "nobody comes to after school to do another math worksheet." Instead, Center staff pre-teach lessons to build student confidence and use hands-on STEAM activities, LEGO Education, and other tools to boost engagement.

Starting in 2020, the Center needed a new solution in order to adapt to virtual learning. Richards' biggest challenge was finding a solution that could be implemented quickly, without putting added stress on teachers. Plus, looking ahead to school reopenings, she wanted that same solution to address learning and opportunity gaps exacerbated by COVID-19.
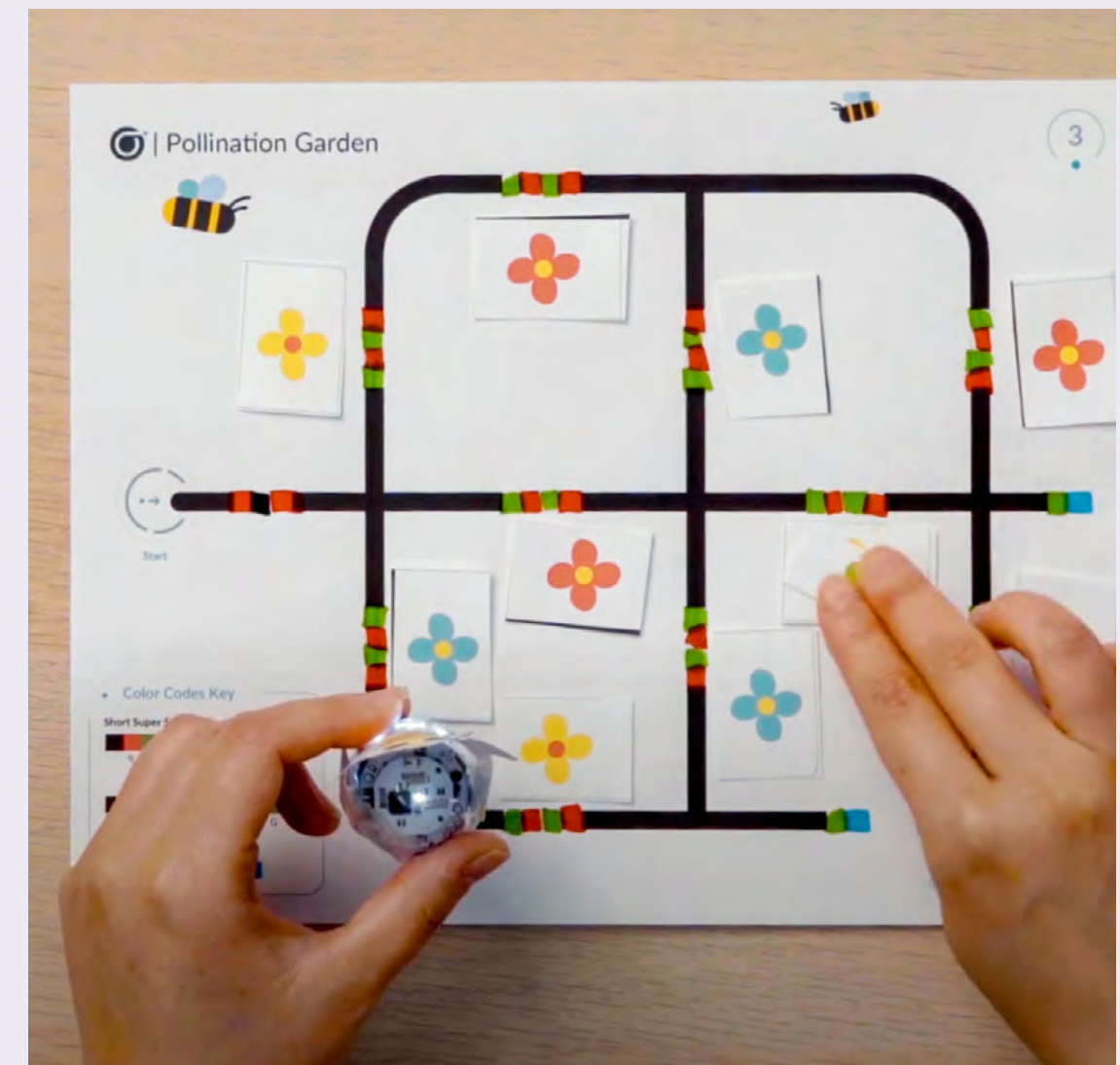
Building an Ozobot Program

Marcy Richards and her team knew **Ozobot's Hybrid Program** was a great fit for their short- and long-term needs. The Center had past successes with other robotics solutions, including Kinderlab Robotics for K-1 and LEGO Education for grades 2-6, but Ozobot stood out because it was easy for teachers to learn, didn't require sending small parts and pieces home to students, and addressed all grade levels with a single solution.

Up to 90% of Anchorage's after school program teachers are also school-day teachers, so their capacity was a deciding factor. "We couldn't come along and say, 'In your spare time, we're going to add a lot of PD for you,'" says Richards. "When [we learned] we could get up and running with Ozobot in 1-2 hours, that was it. The learning curve on products like EV3 is much more robust." Plus, going 1:1 with the Ozobot Hybrid Program allowed staff to send bots home without having to worry about multiple parts or distributing specific models to specific grade levels.
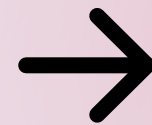
The Results

Center staff have utilized **Ozobot's Learn Anywhere Lessons**, which are flexible for in-person, remote, or hybrid instruction thanks to student-facing instructional videos and are focused on math, ELA, and science standards. "The district's been really positive," says Richards. "We got some kudos that we didn't falter with our programming during COVID." Some Anchorage students actually show up for their school day just to attend after school, meaning the Center helped maintain the District's absenteeism rate of 5.5% for the 19-20 school year. Richards attributes this success in part to using robotics as a tool to teach content areas way beyond computer science.

> *In our philosophy–and this speaks to the curriculum Ozobot provides as well–we view robotics and coding as tools for lots of different academic interventions. Just because it's a robot doesn't mean that it can't teach geography, math, art, or ELA. The robot is an engaging tool that students love, and you can use it to teach anything.*

Marcy Richards
Program Director
Anchorage School District 21st
Century Community Learning Center

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Key Benefits

- **One Bot for All Grade Levels**
  Screen-free Color Codes for younger students and OzoBlockly visual programming for older grades

- **No Small Parts**
  Easier class management versus builder-based robotics solutions

- **2-Hour Professional Development (PD)**
  Simplicity of 2 Ways to Code and related PD ensures educator success without stretching capacity

Tools and Resources

- **Ozobot Hybrid Program**

- **Learn Anywhere Lessons**

- **21st Century Community Learning Centers – Info & Funding Opportunities**

See Also

Tengler, Karin, Barbara Sabitzer, and Oliver Kastner-Hauler. "**FIRST PROGRAMMING WITH OZOBOTS - A CREATIVE APPROACH TO EARLY COMPUTER SCIENCE IN PRIMARY EDUCATION.**" *INTED2020 Proceedings*, March 2020, 5156–62.

"The simple introduction to programming Ozobots means that even younger children can work with the small robots and thus gain initial insights into problem-solving thinking skills. Their appearance and their ability to follow lines are fascinating and motivating. This might be a way to get students interested in programming and computer science. Due to its various applications and tasks from the children's everyday life and world, the Ozobot can not only be integrated well into lessons in different subjects."

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Promote 21st century skills anywhere (even offline!)

Ken Kaplan is a Special Educator at **Byram Hills High School** in Armonk, New York. With about three decades of experience in education, including eight years teaching in New York City, he is passionate about introducing new technology in the classroom.

Kaplan has used VEX Robotics and Ozobots for years to give all types of learners, including autistic student populations, an opportunity to develop 21st century skills. A **University of Ostrava** study confirmed that Ozobot is effective for teaching programming across a wide range of grade levels, including upper grades. At Byram Hills, Ozobot projects go beyond programming to teach creativity, collaboration, communication, and critical thinking as well.

In 2019, Kaplan started working with **Crossing Thresholds**, a non-profit education organization that builds primary and secondary schools in the Kibera district of Nairobi, an underserved urban area that's home to 1.5 million people. Kaplan had a big vision to pitch to Crossing Thresholds' founder, Carter Via: to launch a robotics program at two of their schools, informed by the successful robotics implementation at Byram Hills. The only problem was that neither school had access to computers or WiFi.

BYRAM HILLS
CENTRAL SCHOOL DISTRICT

crossing *thresholds*

Building an Ozobot Program

In spite of the technological challenges Crossing Thresholds schools and their educators face, Ken Kaplan was confident he could launch a robotics program and make a meaningful impact with **Ozobot Classroom Kits**. "I knew that Ozobots would [...] be utilized because I didn't need any other technology."

Of Ozobot's 2 Ways to Code, screen-free **Color Codes** are commands that students can make with markers on paper. With Color Codes, students can control an Ozobot's speed and direction, and even turn the bot into a timer. After working with Via to come up with a teaching plan—and a period of fundraising—Kaplan set out to bring robotics and coding to Crossing Thresholds' students.

Kaplan was in Kenya for four days and taught four classes each day. However, he and Via collaborated to create a curriculum that could be taught long after Kaplan left. This meant engaging teachers and administrators to explore coding with Ozobot so they could pass the lessons on to their students. One teacher sat in on all of Kaplan's classes and carries on his lessons within the school today. Periodically, this teacher messages Kaplan on WhatsApp to share ideas about overcoming hurdles and continuing to teach 21st century skills screen-free.

2 Ways to Code make Ozobot flexible enough to integrate with other content areas and teach coding and STEAM anywhere, from suburban New York to **rural Kansas** to the center of Nairobi.

Students of all abilities and all learning styles can benefit [...] from the utilization of Ozobots, whether they have a strong foundation in coding, or [not...] It offers an amazing entry point for people to enter the robotics world with little other necessary tools. You don't need iPads, don't need laptops, don't need WiFi–you don't need anything other than paper, markers, and your imagination.

Ken Kaplan
Special Educator
Byram Hills Central School District

Key Benefits

- **Screens Optional**
  Color Codes engage learners with just markers and paper

- **Interdisciplinary Learning**
  Lessons go beyond coding/CS to math, ELA, the arts, and more subjects

- **Accessible Price Point**
  Solutions starting at $99 per bot

Tools and Resources

- **Ozobot Classroom Kit**

- **Intro to Color Codes Lesson 01**

- **Intro to Color Codes Lesson 02**

- **Intro to Color Codes Lesson 03**

- Fojtik, Rostislav, "**The Ozobot and education of programming,**" *New Trends and Issues Proceedings on Humanities and Social Sciences*, Nov 2017.

Inspire girls to pursue STEAM careers

The **Agnes Irwin School** is an all-girls college preparatory school for PreK–Grade 12 in the Greater Philadelphia Area. At the school's iWonder Lab, Lower School Director of Technology Integration and Innovation Kimberly Walker focuses on innovative programming that gives girls more opportunities in science, math, and STEAM. Second graders use robots to design parade routes, PreK girls prototype inventions that solve problems for nursery rhyme characters, and first graders participate in "Genius Hour." Her colleagues run the STEAM Studio, focused on engaging middle and upper students.

"Research suggests that women are underrepresented in STEAM fields and careers," says Walker, who has over fifteen years of experience in both private and public school settings. "Our STEAM programming is designed to ignite creativity and curiosity and directly address the STEAM gender gap. By establishing a program that spans grades Pre-Kindergarten all the way to grade 12, we can create a supportive STEAM ecosystem that responds to the needs of our students at different stages of their development."

In 2020, Walker and the iWonder Lab team had to quickly transition to hybrid learning, and started seeking a flexible solution that could keep their program thriving for years to come.

Building an Ozobot Program

Kimberly Walker and the Agnes Irwin School became one of the first programs to pilot the Ozobot Hybrid Program and go 1:1 with STEAM robots. While following a hybrid model, this allowed Agnes Irwin's teachers to send bots home with students for virtual learning, while continuing to engage students in the classroom several days per week as well.

Their first step was teacher training, with a comprehensive virtual PD session that's included for Hybrid Program customers. In that session, teachers were introduced to both of **Ozobot's 2 Ways to Code**–with and without screens–and learned how to access and implement **Learn Anywhere lessons**–standards-aligned, instructional video lessons designed to make it easy to integrate coding and CS into math and ELA and teach within hybrid models.

From there, Walker and team were able to confidently manage hybrid classroom environments throughout the school year. "Regardless of where our students have been physically located during the school day," she says, "their learning experiences have been a blend of teacher-facilitated lessons and independent exploration using their Ozobot 1:1 kits." In one example, teachers and students spent two class periods working through the **Dreidel Bot lesson**, then used it as inspiration for creating their own winter games to share with their families.

We searched for options that would support our commitments to academic and programmatic excellence, an enhanced student experience, and the social emotional well-being of our students.

We found the Ozobot [Hybrid] program to be the best fit because of its highly-rated, multimodal approach to coding; its standards-aligned curriculum; and the opportunities for independent and shared exploration among students.

We're thrilled to be offering a ready-to-learn program to our students that includes educator training and support."

Kimberly Walker
Director of Technology
Integration and Innovation
Agnes Irwin School

Key Benefits

- **Flexible for In-Person, Remote, & Hybrid**
  Designed to transition with students in and out of the classroom

- **Standards-Aligned Lessons**
  CSTA, ISTE, NGSS, CCSS, and more

- **STEAM Meets Social-Emotional Well-being**
  Tiny bots delight students of all ages and Learn Anywhere lessons incorporate social-emotional check-ins

Tools and Resources

- **Ozobot Hybrid Program**
- **Learn Anywhere Lessons**
  - **Dreidel Bot Lesson**
- **Innovation at The Agnes Irwin School**

See Also

Román-Graván, Pedro & Hervás-Gómez, Carlos & Martín Padilla, Antonio & Fernandez Marquez, Esther. "Perceptions about the Use of Educational Robotics in the Initial Training of Future Teachers: A Study on STEAM Sustainability among Female Teachers." *Sustainability*. 12, no. 10 (2020): 4154.

"This study concludes that working with the robotic kits was a great success among these female students, who showed very positive perceptions toward educational robotics before and after carrying out the experience. We knew about their previous motivation before interacting with the robotic kits, but we did not know if, once they worked with them, they would maintain that level of perceptions…In some of the comments they made after the experience, they stated that a larger number of hours should be dedicated to this type of practices, and they wished that these competences were included in the female teacher training program. We totally agree with Achiam and Holmegaard [9], who stated that it is the schools which can help to modify the current patterns and introduce gender inclusion criteria, since very few female students enter STEAM degrees, due to their general lack of interaction with educational robotics [5,12]. This would greatly contribute to reducing the gender gap in terms of accessing STEAM careers [2–4]."

Transition between remote, in-person, & hybrid learning

Cascade Christian Schools (CCS) is an independent, interdisciplinary PK-12 school system in Washington state. With nearly two decades of experience teaching applied science in classrooms, in camps, and everywhere in between, STEM Teacher and Educational Designer Rene Perry leads Cascade Christian's successful STEM Program. In 2019, their 6th grade team problem-solved to automate a mini OzoFarm with a classroom set of Ozobots, a project which helped propel CCS to being named a **Project Lead the Way Distinguished School**.

On the other side of the US, Maine's **Lewiston Public Schools (LPS)** is a district serving six elementary schools, a middle school, and a high school. Like Cascade Christian, they have long prioritized STEM and computer science, with a goal to create an accessible and equitable K-12 computer science pathway by 2023. Alicia Biggs, Lewiston's Computer Science Coordinator, leads this charge.

All schools and students faced huge challenges and obstacles to learning during COVID-19, and Cascade Christian and LPS were no exception. The innovative educators at both school systems were left wondering how to maintain their long-term commitments to STEM and CS while also adapting in necessary ways to the priorities of educating during and after a pandemic.

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Building an Ozobot Program

Rene Perry and the Cascade Christian team immediately knew that Ozobot could help them navigate COVID-19 because of past successes. Perry also knew unboxing new bots would be a nice social-emotional boost for students. "When I place an Ozobot in front of a young learner," she says, "what I see on their face is joy!" CCS went 1:1 with Ozobot for sixth grade, with a plan to rotate the bots into other grade levels. "I can adapt Pre-K curriculum to incorporate programming by using the bots' lines and Color Codes," says Perry. "Meanwhile, OzoBlockly poses challenges for the older elementary students." Perry has even created an Ozobot as Patient Zero activity to help students reflect on the events of 2020.

At Lewiston, Ozobots were primarily utilized in settings like STEM class prior to COVID-19. In the early days of the pandemic, LPS broke down existing Classroom Kits and sent bots home so middle school students could use Ozobots to prototype solutions to real-world problems. One student designed a prototype for moving bulky items. "Even in a remote setting," says Biggs, "the student was still able to fully participate in the engineering design process activity using Ozobot." Now, LPS is piloting the Ozobot Hybrid Program–also for sixth grade–by integrating Ozobots across content areas to provide engaging, hands-on experiences even during remote/hybrid learning.

Ozobot's portability and ease of use allowed Lewiston to quickly adapt our learning experiences to a remote/hybrid setting. Alongside the quality of Ozobot's physical product, their customer service also shines.

Alicia Biggs
Computer Science Coordinator
Lewiston Public Schools

I found the simplicity and size of an Ozobot to be very advantageous! An Ozobot is a one-inch coding robot that can be used in a small workstation. It's clear dome makes the bot super easy to clean.

Rene Perry
TEM Teacher & Educational Designer
Cascade Christian Schools

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Key Benefits

- **Flexible for In-Person, Remote, & Hybrid**
  Designed to transition with students in and out of the classroom

- **Desk-Friendly Size**
  One-inch robots are just the right size for students

- **Best-in-Class Customer Service** With an educator-obsessed company culture

Tools and Resources

- **Ozobot Hybrid Program**

- **Learn Anywhere Lessons**
  - **Ozobot as Patient Zero Lesson**

- **Project Lead the Way Funding & Grant Opportunities**

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Engage students with autism and behavioral challenges

Finding ways to motivate and engage children with autism spectrum disorder (ASD) can be challenging, as educators have to help them navigate differences in communication and social skills, sensory processing, and learning styles that can vary significantly from one ASD student to another.

As more and more school systems put resources toward understanding the ways ASD students learn, however, they're finding ways to foster these students' unique strengths–like attention to detail, visual discrimination, and strong long-term memory. All of these skills can be advantageous in STEM careers and students with autism tend to have affinities for STEM subjects. Their overall college enrollment rates, however, **remain much lower** than their peers.

Three researchers, Andrea DeFreese and John Wright from **Vanderbilt University** and Victoria F. Knight from **University of British Columbia**, set out to understand whether exposing students with ASD to STEM subjects in earlier grades might help mitigate this problem, ensuring more talented autistic individuals can shape the future of technology and other industries. Their findings were later published in the **Journal of Autism and Developmental Disorders**, a peer-reviewed medical journal.
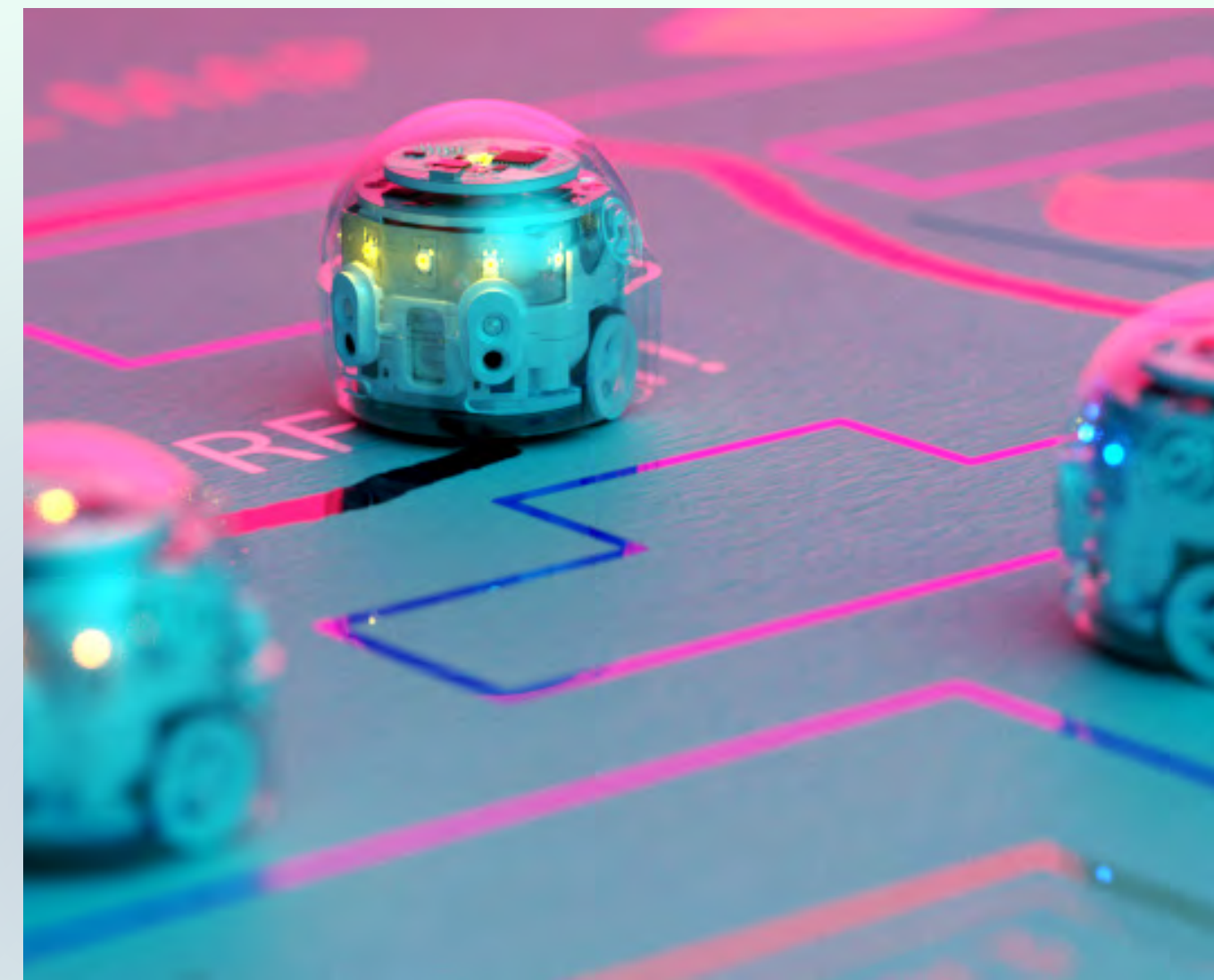
Individualizing education with Ozobot

DeFreese, Knight, and Wright chose Ozobot and Color Codes for their research which they conducted by working with a student with ASD, attention deficit hyperactivity disorder, and an emotional behavior disorder. As an easy entry point into coding, Color Codes help ensure students experience early success with programming concepts, cause-and-effect, and even debugging before they advance to programming an Ozobot robot with the OzoBlockly editor.

In the resulting study, DeFreese and team found that early intervention into teaching coding to a student with ASD and severe problem behavior was "effective, feasible, and engaging." Their findings have already been put into practice by classroom educators, like Special Educator Ken Kaplan in Part 2, who has used Ozobot to engage autistic students in STEM interventions while also developing interest in other content areas.

For one project, Kaplan and the Byram Hills High English teacher had female students with ASD write original stories. Then, students programmed Ozobots to bring their writing to life, and used the film department's green screen to drop their Ozobot protagonists into specific settings.

DeFreese, Knight, and Wright concluded that "interventions are needed to both explicitly teach and capture the interest of these students from an early age, especially for those students who also have challenging behaviors."

Steve used markers to create code on paper and immediately tested the effects of his skills by placing the robot on the tracks and codes he created. [...] When Steve was initially unsuccessful at an attempt to calibrate, draw tracks, or code, he often continued to try until he was successful or he asked for help. Resiliency and communication of needs were skills his teachers were surprised he engaged in during this intervention.

"Teaching Robotics Coding to a Student with ASD and Severe Problem Behavior," *Journal of Autism and Developmental Disorders*, February 2019.

Key Benefits

- **Easy Entry Point**
  Patented Color Codes make it easy for teachers and students to get started

- **Active Learning**
  Engagement is boosted across learning styles with hands-on projects

- **Standards-Aligned Lessons**
  Can be scaffolded and individualized to meet student needs

Tools and Resources

- **Ozobot Evo**

See Also

Wright, John C., Victoria F. Knight, Erin E. Barton, and Meghan Edwards-Bowyer. "**Video Prompting to Teach Robotics and Coding to Middle School Students With Autism Spectrum Disorder.**" *Journal of Special Education Technology*, 2019, 016264341989024.

"The purpose of this study was to research the feasibility and effectiveness of using VBM to teach robotics coding [with Ozobot] to middle school students with ASD and ASD/ID. Robust social validity data was gathered and examined to better understand the validity of STEM intervention for students with disabilities. All student participants rapidly acquired the targeted robotics coding skills, and stakeholders viewed the procedures as feasible and effective for teaching students with ASD and ASD/ID."

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Our Account Executives are STEAM specialists. **Reach out** for a quote, help expanding an existing program, or a guide to federal and state funding resources Ozobot qualifies for.

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