

“Coding as a Playground: Programming and Computational Thinking in the Early Childhood Classroom” by Marina Umaschi Bers

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Sequencing With a Bee

Suzy is a 5-year-old kindergartener who loves mazes. Each day during choice time she draws mazes out on paper for her friends to solve or explores activity books that have mazes in them. On Tuesday morning, Suzy’s teacher, Mrs. McKinnon, reveals a big surprise to the kids at circle time: the class will be getting a new robot friend named Bee-Bot! Bee-Bot is a robot that resembles a yellow and black bumblebee (www.beebot.us). Bee-Bot has directional keys on its back that are used to enter up to 40 commands which send Bee-Bot forward, back, left, and right. Pressing the green Go button starts Bee-Bot on its way. Mrs. McKinnon gives the class a demo of Bee-Bot. She tells them that during choice time, she will bring students one at a time to help program Bee-Bot to move along the path on a colorful floor mat.

Later that day, during choice time, Suzy is happily scribbling away at a maze when Mrs. McKinnon calls her down to play with Bee-Bot. Reluctantly, Suzy leaves her drawing to join her teacher on the floor. Mrs. McKinnon shows Suzy the different buttons on Bee-Bot’s back: Forward, Backward, Turn Right, and Turn Left. To program Bee-Bot to move along the map, she shows Suzy how to press the keys in the right order. Next, she sends the program to Bee-Bot by pressing the Go button. She tells Suzy to give it a try.

“See, this is a map of a school,” Mrs. McKinnon explains, showing Suzy a large square map on the floor illustrating different places like the music room, cafeteria, and library. “Why don’t you try to program Bee-Bot to go to the music room?” Suzy presses the Forward button a few times and then presses Go. She watches Bee-Bot move straight along the map. “Oh no!” exclaims Suzy. “Why did Bee-Bot drive to the gym?” Mrs. McKinnon explains that Suzy should look at the map and then program the robot to follow the path. “Imagine that this map is a maze and Bee-Bot needs to get to the music room to beat the maze,” says Mrs. McKinnon. “Does Bee-Bot need to turn? When? Think about the order and sequence of instructions.”

Suddenly the process of programming makes sense to Suzy. She needs to tell Bee-Bot, by pressing the buttons on its back, to take a series of ordered steps to get to the music room. She starts by sending one instruction at a time to Bee-Bot instead of a long, complete program. She can’t remember all the needed steps and Bee-Bot, unlike KIBO, doesn’t provide a way for children to see the program they are sending to their robots. With her teacher’s help, Suzy tries out a few different strategies for problem solving, such as breaking down the large task into simpler, manageable units by just programming Bee-Bot to take one or two steps at a time. Eventually, she gets Bee-Bot to the music room. “Bee-Bot made it!” Suzy squeals with delight. Her joy of solving mazes has come to life with this colorful robot and she spends her choice time navigating along the different floor maps that come with Bee-Bot. The next day, when Mrs. McKinnon invites her to play with Bee-Bot again, Suzy refuses: “I already did all the mazes.” So, Mrs. McKinnon encourages her to design her own Bee-Bot floor maze for herself and her classmates to solve.