1, 2, 3, code ! - Cycle 1 activities - Lesson 2.4. Challenge: Get Thymio through a maze

Summary	Students build a maze and must find all possible ways to get Thymio through it.
Key ideas (see*Conceptual scenario*)	"Robot" • A robot is a machine that can interact with its surroundings. • A robot can perform actions: move, make a sound, produce light, etc. • A robot has sensors that let it perceive its surroundings.
Inquiry-based methods	Observation, experimentation
Equipment	For each group: • A Thymio, with its batteries charged For the class: • Large sheets of white drawing paper, black paint, small paint rollers (4 cm wide) • Black fabric ribbons (4 cm wide): These should be tested as results can vary depending on the fabric (cotton, silk and wool work) • Objects that can be easily moved around and used as obstacles for Thymio (cubes, books, etc.) For the teacher: • Handout 8 (used in Lesson 2.1) • The poster created during the previous lessons • A stopwatch
Glossary	Sensor, wheel, route, maze
Duration	30 min

Preparation

Before the lesson, the teacher sets up a maze using cubes, books, etc. on the classroom floor. Obstacles should be between 5 and 6 cm high to be detected properly by the side sensors and heavy enough that Thymio will not move them by accident if it runs into them. The path should be around 20 cm wide and the turns not too sharp. The maze can be open (with an entrance and an exit) or closed. The teacher places the Thymio robots (turned off) on the tables for each group.

Starting the activity

The teacher presents the maze to the class. Their challenge is to have Thymio run the maze. (For open mazes, place Thymio at the entrance and have it go out the exit; for closed mazes, have the robot do a complete round through the maze.) Each group can suggest a method and apply it to see if their strategy works.

Experiment: Guiding Thymio through a maze (in groups)

If necessary, the teacher can bring out the poster and describe the five behaviors seen during the previous lessons:

• Can you use the green mode? What do you do? (Yes, you can: You have to guide Thymio step by step around the maze, using your hand or an object placed just in front of the robot.)
• Can you use the red mode? (Same as above, but you have to push it)
• Can you use the yellow mode? (Yes, the robot explores and avoids hitting the maze walls to eventually reach the exit.)
• Can you use the purple mode? (Yes, you have to guide it step by step using the forward, right and left buttons, but you have to be quick and precise to do it correctly.)
• Can you use the turquoise mode? (Yes, you have to draw a black route or place a black ribbon inside the maze.)

Teaching note:

• You could also use the blue mode, but since Thymio reacts to sound in this mode, the exercise can be very noisy!

If all the groups come up with the same ideas, the teacher can use the above questions to suggest that certain groups try other possibilities to cover all five options.

Students prepare a route for turquoise Thymio. Kindergarten class, Caroline Fayard, Paris

Group discussion

Each group tries out its solution. One possibility is for the teacher to time how long it takes Thymio to run the maze.

After doing at least five tests with all five modes, the class will notice that Thymio is able to get through the maze more or less by itself.

If the teacher timed the different exercises, the class can create a podium, ranking the modes from fastest to slowest. If they were not timed, students can vote on the mode they found to be the fastest, easiest, most entertaining, most leisurely, etc.

Conclusion

The class summarizes together what they learned in this lesson:

- *Thymio can always get out of a maze, either alone or with the help of a person.*

Further study

Kindergarten students may want to try other mazes and shapes to see how Thymio reacts in more complex environments. This will give them a chance to handle Thymio more as to create their own mazes.