

Moving Beyond Toy Cars: Creative Robotics

Angela Sofia Lombardo
Malpighi LaB, FabLearn Fellow
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Bologna,
Italy
www.malpighilab.it
angiulina1984@gmail.com

ABSTRACT

How can we help students engage in robotics activities going beyond the idea of robots as toy cars? In this demo session, I will share with participants how I've tried to figure out these questions while designing a Constructionist experience through robotics. I'll show participants some robotic creations made by my students, share materials and resources, as well as the design process I followed to provide kids opportunities to imagine, design, and express themselves creatively through microcontrollers, LEDs, motors, and sensors.

Tools, Skills and Materials

• Tools→mBlock • Tools→Microcontroller • Skills→Programming • Skills→Inventing • Materials→Sensors

Keywords

creativity; robotics; making; microcontrollers; inclusive

DEMO DESCRIPTION

Description of the Product/Project

While using off the shelf robotics kits are very convenient, I have observed that students who experiment with robotics kits by building and programming the suggestions offered in the directions, often a car, are less likely to imagine and create something far different from the car. Even if they only see the image on the box their ideas will converge in the direction of a car.

So, how we can help students imagine new things and express themselves creatively with off-the-shelf robotic kits?

I would like to share with FabLearn participants how I've tried to figure out of this problem by designing a Constructionist learning experience using mBlock and mBot, a popular robotic kit.

The learning path was designed to offer an experience of discovering and experimenting with each single component of the kit, starting from the mCore board to gradually explore actuators and sensors.

Students were invited to discover how each component works, to tinker with its code and to try to create a project that interacts with it.

At the end of every creative experimentation students reflected on the component by asking themselves, "How does the component work?" and "How can I use it into my next invention?" Those reflections were shared and discussed with the entire class to promote imagination and the exchange of ideas.

Then, kids were invited to work in groups to develop one of the ideas previously brainstormed, or a brand new one!

They were encouraged to explore and reflect on the result of each choice they made so they can have the chance to see themselves as inventors and learn about collaborative creative processes.

Target Audience

This demo is suitable for educators working in schools, museums, libraries, after-school programs, and other formal and informal learning environments who are interested in learning more about how to design a Constructionist learning experience with off-the-shelf robotics kits. The students I worked with were ages 11-15, but this can be generalized to all grade levels.

CONCLUSION

Lessons Learned

I've learned that when students have time to experiment with and reflect on the uses of individual components in a robotics kit, they are more likely to view the components as open-ended construction materials. It gives them the chance to create something personally meaningful and truly helps students learn about robotics and microcontrollers, rather than just racing to complete the robot as envisioned by the kit manufacturer.

Using this methodology, they understand deeply how actuators and sensors works and how to program them. Next time I'll work in designing an experience in which they can go deeper in experiments with sensors so that they can better understand how useful sensors are in controlling the behaviour of all other components.

Broader Value

The broader value is to illustrate the importance of designing and offering to students a learning environment that is safe, supports playful experimentation, and helps students take creative risks. Only in an environment like that can they work on creating something truly meaningful and inventing new things while developing a better understanding about technologies that surround them in their daily life. This is true not only for robotics, but can be generalized to any experience where kits provide a convenient option for providing materials for student projects, but may also inadvertently suggest to students that there is "one way" to use the materials.

BIOS

Angela Sofia Lombardo

Psychologist, Learning Experience Designer

CoderDojo mentor since 2013. Freelance maker educator for many schools and companies in Italy, designing Constructionist learning experiences, helping kids, teachers and educators express themselves creatively, invent new things, learn and have fun with every kind of tools and materials.