



USE CASE 03

Robot Building Workshop

Age & Level

Group of 20 students
Age 9-15 years old

Technopolis, a non-formal educational institution that fosters educational activities of new Technologies and STEAM. They would like to engage kids into some Robotics activities. Sofoklis, a facilitator from Technopolis likes the idea a lot and sets up a call for a workshop called 'We-build-Robots'. Sofoklis himself is very interested in technology and has built already robots for several years from many different materials. He and his colleagues are trained by an educational institution dedicated to enable people to hold STEAM workshops with kids. For this workshop, 20 students, aged 9-15, subscribed. Robotics is very popular amongst youngsters for the moment in Greece, thus it is not surprising for him that so many students subscribed. He expects that those that subscribed are very familiar with their mobiles including the different apps.

Primary Actor and Main Goal

From his previous experiences with students he knows that primarily the students are keen to play with "such a cool thing as robots" while their parents are happy to have some creative educational activities during the weekend for their kids.

Topic and Content

ASofoklis plans, to ask the students to assemble a robot, using lego pieces, blocks, rubbers etc. After that they shall use an Arduino kit, exploring different programs to make it work.

The "classroom" is divided in pairs of 2 or 4 kids each, depending on the use of tablets or laptops.

Sofoklis has decided that each group is working on the same project rather than each group taking over only a part of the project since he feels that the kids are more motivated if they are doing their own project from start till the very end. Also, all three objectives of familiarizing with crafts, the making and new technologies are tackled by all the students in that way.

Description of Environment and Possible Pre-conditions

The last times Sofoklis has performed the activity, each workshop usually took 6-8 hours divided in 2-hour sessions in subsequent Sundays. However, from the last evaluation Sofoklis received feedback from several parents, that they would prefer to have the kids there for 1, or 2 days so he decides to go for a 2 days workshop, 4 hours per day.

The course takes place in a vibrant, colourful open space venue, inside a lab consisting of one large table and some supplementary smaller ones to accommodate the whole group. Usually, the students find the venue exciting due to its particular shape and layout.

Sofoklis is not bound to any adaptation to a curriculum but there is a need for each workshop to be aligned with the strategic goals and educational program of Technopolis. Due to the fact that the workshops of Sofoklis is closely connected to STEAM, he is very much in line with the overall set goals.

Sofoklis has full support also in terms of raising awareness and participation in his workshop. For once there is a media plan, set up each semester, for the upcoming workshops. Press releases and invitations are sent to schools and to a subset of a large contact database. Also, printed booklets are made available as well as announcements through different (social) media channels.

Preparatory Work

For the workshop, Sofoklis needs an Arduino set and uses also Scratch and WeDo 2 for the programming. In case he needs other software, it is easy for him to install since there are no limitations of installation. He checks if the software is pre-installed and if the program runs also on the tablets. Also, Sofoklis buys the materials needed for the workshop.

Description of Activity

As students are doing research on components needed, Sofoklis starts off at the very first Sunday explaining the 20 students some basic understanding of terms such as "voltage", "current", "motor", and "sensors".

He asked the students to determine what their robot should do. With the given materials, one group decides to build a wheeled robot, that will act as a 'wheeled butler' carrying things in a small box. The students should determine the route of the robot towards a specific location by writing commands for moving forward, backward, left or right respectively. Sofoklis is summarizing with the students what materials they would need for their, driving' dustbin. The students are following a step-by-step printed direction. Although Sofoklis sees that they are sometimes struggling, he lets the students solve their issues themselves. Encouraging them to think cre-

atively requires sometimes quite some patients from him, but he makes them also stop at various points and check together their robot from time to time to help ensure they have configured things properly before moving on to next steps. Thus, while constructing the students repeatedly try it out in the room. During that process, they realize that their initial programming in Arduino is leading the robot in the wrong directions. They re-program their device again and again until they are satisfied and personalize by adding eyes on it. At the end of the workshop they present their 'butler' in front the other students, using it to carry some candy bar paper to the bin.

Success and Condition

At the end of the 2 days' workshop, all the groups were able to finalize their robots. Sofoklis had the impression that students had fun and joy by creating their own robots. Some even asked if they could do more and come again for creating an even more advanced robot.

Failure and Conditions

Only one student was not able to take part in the finalization of his robot since he had to leave earlier at the last day. Unfortunately, his robot never worked and the student left fairly unhappy.

Barriers/Facilitators

At the end Sofoklis ask the students if they have other ideas for workshops and what they would find interesting. He experienced, that the interest and curiosity of students as well as parents is limited because they are just not used to/ not familiarised with makers and the option they would have. Thus, they don't really know what to wish for. However, after this workshop, he was able to collect many different creative ideas from the students in all kind of areas not only technology, but also including art and other sciences.

Extensions

Sofoklis discusses with the students how the butler robot could reach the target more easily. They suggest to modify the algorithm of the robot in order to intercept remote commands via a Bluetooth interface.

Variations

Students are asked to propose different applications for their robot. So, they suggest to cover it with a shell made of colour paper in order to look like a ladybug. So, its route to the target becomes more amusing. The girls that are following the lessons find this alteration from butler to ladybug very artistic and pleasant.