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how to raise an Inventor

Erasmus+ KA2 Strategic partnerships for school education project
"How to Raise an Inventor. Technology and engineering learning material for schools"

Project no.: 2017-1-LT01-KA201-035284

MODULE DESCRIPTION AND RECOMMENDATIONS FOR TEACHERS

<table>
<tr><td>Name of the module</td><td>micro:bit MAKER lessons</td></tr>
<tr><td>Creators</td><td>DevLab Academy (the Netherlands)</td></tr>
<tr><td>Main topics</td><td>Learning to program a micro:bit with additional components, in order to make nice things</td></tr>
<tr><td>Available in these languages</td><td>English, Dutch, Polish, Lithuanian, Latvian</td></tr>
<tr><td>Recommended age group</td><td>11-14 years of age</td></tr>
<tr><td>Length of the course</td><td>Min. 14 lessons, maximum 38 lessons.</td></tr>
<tr><td>Duration of each lesson or project</td><td>Tool consists of 7 projects.
Each project consists of Lesson 1 (2 hours) and Lesson 2 (2-4 hours).
The time for the second lessons (part 2) can be longer, depending on the ideas of the students. As a teacher you can add an extra step in the second lessons, where you check the necessary time.</td></tr>
<tr><td>Required hardware</td><td>micro:bits, servo-motor, RGB led, wires, speaker and some basic building materials like paper, wood, etc.
To have an easy start, see also: https://learn.sparkfun.com/tutorials/getting-started-with-the-microbit/all
Approx. costs for purchasing required hardware:<table><tr><td>1 micro:bit</td><td>€17.50</td></tr><tr><td>1 usb-cable</td><td>€2.00</td></tr><tr><td>1 batteryholder</td><td>€2.00</td></tr><tr><td>Some wire</td><td>€1.00</td></tr><tr><td>RGB-led</td><td>€0.25</td></tr><tr><td>Servomotor</td><td>€4.00</td></tr><tr><td>Piezo speaker</td><td>€2.00</td></tr></table></td></tr>
<tr><td>Required software</td><td>Just go to https://makecode.microbit.org/
The programming environment is fully web-based, so no need to install any software
Alternatively there is a Windows10 app which also enables micro:bit programming.</td></tr>
<tr><td>Required skill level (pupils)</td><td>No programming skills required before start</td></tr>
<tr><td>Required skill level (teachers)</td><td>Some introduction in micro:bit and micro:bit block editor programming required.
Workflow of the editor must be clear to the teacher.</td></tr>
<tr><td>Skills developed in the module</td><td><table><tr><td></td><td>Lesson 1</td><td>Lesson 2</td></tr><tr><td>Creativity</td><td>*</td><td>*****</td></tr><tr><td>Technological and engineering</td><td>***</td><td>****</td></tr><tr><td>Critical thinking and problem solving</td><td>**</td><td>*****</td></tr><tr><td>Communication</td><td>*</td><td>***</td></tr></table></td></tr>
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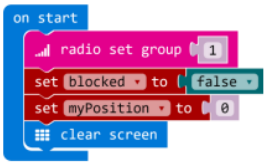
What pupils will learn?	They learn “Computational Thinking” which is defined as: “reformulating problems in such a way that they can be solved with computer technology” and applying these skills on self-invented making projects
The structure of the course	7 predefined making lessons, each of them in another application ‘world’, each followed by a working canvas in order to apply the learned skills on a self-invented project
What is different about this teaching material comparing to others for the same topic?	The challenge to convert lessons learned into self made projects, stimulating creativity in combination with computer technology
What teaching materials do pupils get?	Instructions either on paper or online in the editor environment
What teaching materials do teachers get?	Accompanying teacher guide
How to reach the material?	Material can be found here: https://www.micro-bit.nl/maker-eng

Examples of the material	**1 Did you know?** One of the biggest flower auctions in the world can be found in the Netherlands. Every day, millions of flowers and plants are sold there. When they are sold, these plants will be shipped to every corner of the world. Imagine if you went to a (flower) auction. The price of the flowers is going to decrease gradually, and whoever presses the button first will buy the flowers. You want to buy these flowers, but obviously you also want to pay the lowest price possible. That's why you need to choose the right moment to press the button: not too early and not too late. Such a button is also used during a quiz. **2 This is what you are going to make**  You are going to make buttons so that you will be able to play in a quiz. We'll program these buttons in such a way that you will know who has pushed first. --- **6 A quiz for the entire class** Now we are going to connect all micro:bits with each other. To do this, you need to enter the following code on your micro:bit:  When starting, the radio will be set to group 1. All micro:bits will be in the same radio group. Let's make two variables: *blocked* and *myPosition*. When starting, you are not blocked yet. ---  Take the two pieces of cardboard, and wrap aluminium foil around them. Then, put a stripped cable underneath the foil of both pieces. Take one A4 sheet and cut out a circle, and fold the sheet around the bottom cardboard. Make sure that the foil is still visible in the middle through the circle you just cut. Take another A4 sheet and cut out one more circle. Foil it around the other cardboard, just like you have done before. Only this time, draw a button on the other side of the cardboard on the exact spot where the foil is still visible.
Recommended projects	If you have limited time, skip all the second lessons. Important projects not to be skipped: - Project 2: Throwing a dice - Project 3: The wire loop game - Project 6: The quiz
Organization of the course	- Let the students work in small groups. 4 students is the maximum for one group.

	- Change the groups for each project.
For teachers with no prior experience in the topic	- See Document: Start - Explore the micro:bit – Teacher - Build all the projects yourself first! - Learn yourself from: https://microbit.org/teach/
Additional material for teachers	Can be found here: https://www.micro-bit.nl/maker-eng
Suggested next topics for pupils to get into after this course	We suggest doing more micro:bit related projects, both guided and open. After sufficient experience in block programming you can switch to text-based programming, just by clicking the JavaScript button in the micro:bit script editor.
Support	If you need assistance with the module, please contact Chris Dorna (chris@codekids.nl) or Lex van Gijsel (lex.van.gijsel@devlab.nl). We would also be happy to receive your feedback about the module, photos and videos of using our learning material in your classes.