Bebras-related/-inspired activities in Maynooth University 2018-2019

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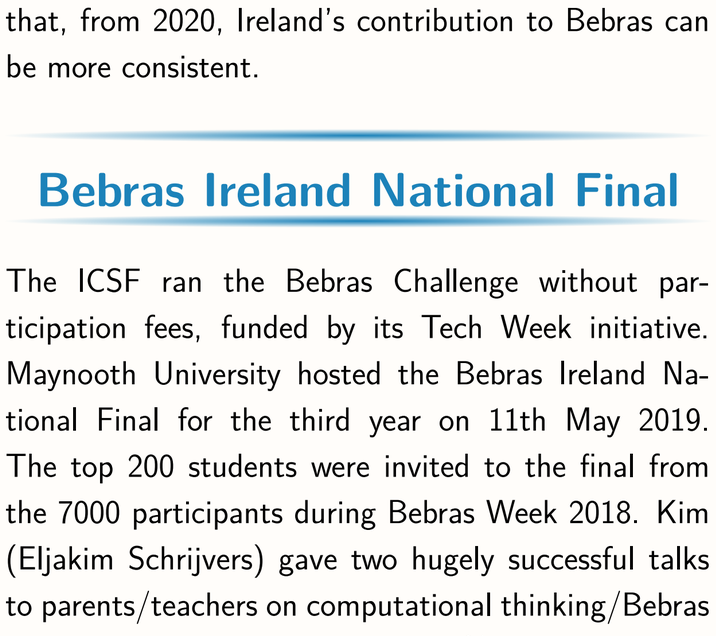
The Irish Computer Society Foundation (ICSF) is the national organiser for the Bebras Challenge in Ireland. Maynooth University is the academic partner selected by ICSF. Here, we summarise Maynooth University's Bebras-inspired activities during 2018-2019.

Group expansion

During 2019, the group interested in preparing Bebras tasks in Maynooth University will grow from one to seven (the academics named above). This means that, from 2020, Ireland's contribution to Bebras can be more consistent.

Bebras Ireland National Final

The ICSF ran the Bebras Challenge without participation fees, funded by its Tech Week initiative. Maynooth University hosted the Bebras Ireland National Final for the third year on 11th May 2019. The top 200 students were invited to the final from the 7000 participants during Bebras Week 2018. Kim (Eljakim Schrijvers) gave two hugely successful talks to parents/teachers on computational thinking/Bebras tasks. Of the 7000 participants, 49% were female and 51% were male. Of the second round winners (one in each of five different age groups) two were female and three were male. The feedback from pupils was a joy to read (e.g. below).



CS as an official subject

We have been involved in the introduction of computer science as an official Leaving Certificate subject (final high-school exam for 18-year olds) in Ireland, consulting during curriculum design, and in the assessing of qualifying standards for secondary school computer science teachers. We proposed Bebras tasks as a programming language-independent approach to teach computational thinking as part of the Leaving Certificate. As a result, selected Bebras tasks have been included in the resource pack sent to every new teacher of computer science in the country.

Training workshops for teachers

We have cultivated partnerships with teachers at primary and post primary schools around Ireland. The overall goal is to develop a primary- and secondary-level curriculum for computational thinking in Ireland. We have trained 100+ teachers on how to incorporate Bebras tasks into their classroom activities, gaining access to 10,000 confirmed students in their classes. This process has been very successful and feedback received from teachers and pupils has been overwhelmingly positive.

CS training - new teachers

Maynooth University has a long history of training secondary school science teachers. From 2019, MU will be the first university in Ireland to offer an option to train as secondary school *computer science* teachers. For the new B.Sc. (Education) degree, a new module "Computer Science Pedagogy" will have to be created — we intend to make extensive use of Bebras tasks for this.

Dynamic tasks

Inspired by the depth and quality of tasks produced by the Bebras community, we have started to develop what we call "dynamic" versions of Bebras-style tasks. Such tasks can be displayed at many (if not all) levels of difficulty I-VI. The instances of the tasks are computer-generated, so no two students in the same classroom should get the same instance of the task, even at the same level of difficulty. We use the staircase method to update difficulty, following how perceptual thresholds are measured in psychology. This ensures a balance can be struck between frustrating developing pupils (if the tasks increase in difficulty too quickly) and not sufficiently challenging advanced students (if the tasks get difficulty too slowly). Undergraduate students create dynamic tasks using Python and they are run in browsers using a full-featured Python interpreter written with JavaScript called Brython (www.brython.info) (example below).

"CT Obstacle Course"

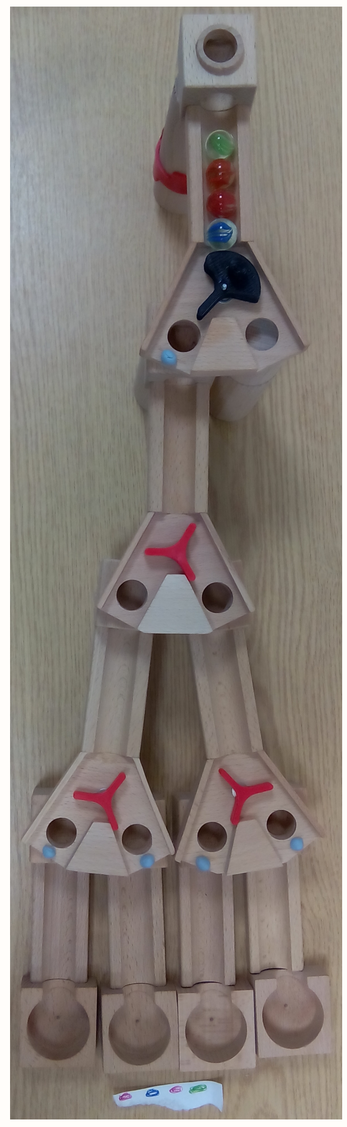
A "Computational Thinking Obstacle Course" was offered to the public during University public events. This activity, which draws selected Bebras tasks, displays A0 printed versions of the tasks arranged around the walls of a large room. Participants work in groups, and use an answer sheet to record their progress following a route of their choice through the graph of tasks. Some obstacles cannot be avoided: the correct answer for task 3 (for example) is needed to fully understand the question in task 11. At the end of the obstacle course, the indices of all of the correct answers are an anagram of a magic word that unlocks a secret treasure! Since 2015, this obstacle course has been delivered to 600 children and parents annually.

Pub quiz for adults

We were asked in 2019 by the Parents & Teachers Association of a local primary school to create a round of CS questions for their annual charity "pub quiz". We chose Bebras tasks (naturally). We guessed that Bebras tasks for 12-14 year olds would be about right for adults who had been in a pub for a couple of hours.

Physical realisations of tasks

We are planning to develop physical realisations of some Bebras tasks. We hope that these tactile tasks will help some young learners to better grasp abstract computational thinking concepts. I believe some in the Bebras community have already explored this concept. Please contact me (tomn@cs.nuim.ie) this week if you can help us with these, or would like to collaborate.



SFI-funded project plans

We have received funding from Science Foundation Ireland's Discover Programme (2019-2021) to promote computational thinking in primary and secondary schools in disadvantaged areas in Ireland. As part of this work, we will produce a computational thinking workbook for primary school pupils, in the style of existing Ireland primary school mathematics workbooks. A full-time person will be hired for two years, starting September 2019.

Bebras Task Workshop, May 2019, Hungary