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Bebras

A Contest to Motivate Students to Study Computer Science and Develop Computational Thinking

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Abstract

We need to prepare our young generation to live, work and function in the world of technology. By that we mean teaching them skills such as computer literacy and understanding technology inside (computer science). While these skills are necessary, they are not sufficiently regarded by the knowledge society - we need to develop Computational Thinking (CT) skills. The international contest on informatics and computer fluency named BEBRAS (Beaver in English) may be the key to the potential of science knowledge and attractive way to bind up technology and education. The first Bebras contest was conducted in Lithuania 2004. Now more than twenty countries have joined. Problems (tasks) are the keystone of the contest. Attraction, invention and surprise should be desirable features of each problem presented to competitors. The problems have to be selected carefully, taking into account the different aspects of each problem. We are going to discuss examples of tasks from previous contests.

Keywords

computer science, informatics, informatics concepts, computational thinking, tasks solving, contest

INTRODUCTION

Attracting youngsters to choose a study of informatics or computer science has always been a challenge for computer science educators. The idea of developing competitions on informatics and computer fluency for school students was raised in Lithuania in 2003 (Dagiene, 2005; 2006).

The main goals of the Beaver contest are to promote students' interest in informatics (i.e. computer science; an equivalent terminology often used in Europe) and information and communication technology from the very beginning at school and to motivate students to learn and master computers (Dagiene, 2006; Dagiene, Futschek, 2008). Specifically, the idea was to encourage students to understand computers deeper and to use computational thinking (Wing, 2006) and modern technologies more intensively and creatively.

The Bebras contest is an Informatics contest for all secondary school students that is performed at school at computers and offer 18 to 24 problems to be solved by the students within 45 to 55 minutes. There are different task sets for the age groups Benjamin (grade 5–6), Cadet (grade 7–8), Junior (grade 9–10) and Senior (grade

11–12). The contestants are usually supervised by teachers who may integrate the contest in their teaching activities.

CT is a term coined by Jeanette Wing (2006) to describe a set of thinking skills that are integral to solving complex problems using a computer in the knowledge society. CT helps to understand how to deal with problems, and to realize when it is time to ask a computer scientist to help to solve a problem efficiently. CT shares elements with various other types of thinking: algorithmic thinking, engineering thinking, design thinking, etc. It is important to discuss opportunities and challenges of CT in school context. Also it is very important to train teachers in order to achieve these skills.

The International Bebras Contest is a very ambitious contest. It does not test pre-knowledge or specific skills learned at school. In contrary there are only problem solving activities, no pre-knowledge is necessary. The students may learn aspects of informatics concepts in the way of solving Bebras tasks. The better the problem-solving skills the better are the results. The more tasks the students have worked on the more they have learned.

Our workshop will start with a YouTube film, recorded during the Bebras workshop 2012 - <http://www.youtube.com/watch?v=yEjm6g8RkQ8&feature=youtu.be>

The next part will be a discussion on tasks: how to create them, what are good Bebras tasks, why they are Informatics tasks, etc.

In the third part of the workshop we will ask the participants to solve a set of tasks and create an idea of a new Bebras task.

This workshop will enable participants how a contest may help to explore, understand and evaluate concepts of informatics.

List of Content:

- Aspects of Computer Science (Informatics) and Computational Thinking.
- Outline of “Bebras International Contest on Informatics and Computer Fluency”
- Learning through a contest
- Example tasks that support different aspects of informatics
- The challenge to design such tasks
- The experience of some participating countries

Duration of workshop: 2 hours

Expected audience:

IT teachers, teacher educators, educational scientists.

REFERENCES

- Dagiene, V. (2005) Competition in Information Technology: an Informal Learning. In EuroLogo 2005: the 10th European Logo Conference. Digital Tools for Lifelong Learning, Warsaw, Poland, 28–31 August, pp. 228-234.
- Dagiene, V. (2006) Information Technology Contests – Introduction to Computer Science in an Attractive Way. In Informatics in Education, vol. 5, no 1, pp. 37–46.
- Dagiene, V. (2008) The BEBRAS Contest on Informatics and Computer Literacy – Students’ Drive to Science Education. In Joint Open and Working IFIP Conference. ICT and Learning for the Net Generation, Kuala Lumpur, pp. 214–223.
- Dagiene, V., Futschek, G. (2008) Bebras International Contest on Informatics and Computer Literacy: Criteria for Good Tasks. In: R. T. Mittermeir, M. M. Syslo (Eds.), Informatics Education – Supporting Computational Thinking. Lect. Notes in Computer Science. Vol. 5090, Springer, pp. 19–30.

Wing, J.M. (2006). Computational thinking. *Communications of the ACM*, 49(3), 33–35.

Biographies



Valentina Dagiene is a professor at the Vilnius University. She has published over 150 research papers and the same number of methodological works, has written more than 60 textbooks in the field of informatics and ICT for secondary schools. Her main research topics are informatics and ICT curricula, teaching algorithms and programming, technology enhanced learning, computing education research. She is national representative of Lithuania in IFIP TC3 also member of IFIP WG 3.1 and 3.3 as well as SIG 3.9 and vice chair of IFIP TC3. She is Editor-in-Chief of international journals “Informatics in Education” and “Olympiads in Informatics”.



Gerald Futschek is a professor at Vienna University of Technology where he is highly involved in teacher education. He gives there lectures and labs on Software Engineering, Algorithms and Data Structures, Computer Programming, Software Verification and Informatics Didactics. He has organized the yearly Bebras contest in Austria since 2007. He was involved as group leader in all international Bebras workshops so far. He is national representative of Austria in IFIP TC 3 and he was president of the Austrian Computer Society during the last 4 years.

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