

Talent management with graphical programming in secondary

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Abstract

My main intention is to renew the Kovács Mihály National Graphical Programming Competition and facilitate talented students to take part in it. Graphical Programming appropriate for pupils to try programming without much advance knowledge. Making beautiful pictures, funny animations or games can arouse students' interests in algorithmic problems. To promote this, I plan to prepare online courses for pupils. These courses will help to students to discover algorithmic thinking via problem-based learning methodology. My main questions are: How to identify talented students, how motivate them and how improve their knowledge in computer science.

Introduction

Graphical programming has a long history in Hungary. The first turtle graphic competition was organized in 1998 (National Logo Competition), for many years it was the scene of the first step for talented students to compare their algorithmic thinking. Unfortunately, the last few years the popularity of this competition decreases. My main intention is to renew the Kovács Mihály National Graphical Programming Competition and facilitate talented students to take part in it. Graphical Programming appropriate for pupils to try programming without much advance knowledge. Making beautiful pictures, funny animations or games can arouse students' interests in algorithmic problems.

Research question

- How to identify talented students in algorithmic thinking?
- How to arouse student's interest in computer science?
- How to motivate students to think about algorithmic problems?
- How to use explanatory methodology in introduction of the algorithmic thinking?

Methodology

In my previous work I analysed the Algorithm and Data Modelling Tasks of The Final Exams in Hungary [13], I solved the papers of years from 2005 to 2013. I examined the data structures and programming patterns which shall be apply during these exams. After that I made interviews with teachers who had taken apart making and correcting these tasks. I try to map the most common typical misconceptions of the students.[12]

With Hajnalka Torma we compared some online learning programming environments [11] such as Gidget, CodeHS, Programming with Carel and the course of Beauty and Joy of Computing on EDX. With Attila Mahler we organised an afternoon course for high school students, where they discover sorting algorithms with CS Unplugged methodology and visualise them with LibreLogo.[9-10]

The main methodology of my investigation is action research. I am collecting and analysing the data of Kovács Mihály National Graphical Programming Competitions. And I am planning to organize online courses for teachers and for students as well to help talented students to prepare for the competition [1]. In this course I want to apply explanatory methodology. The course elements will be videos, CS unplugged, and computational thinking tasks combined with quizzes, and graphical programming tasks as well. I will examine the effectiveness of the course with questionnaires and interviews. And of course, I will analyse the results of workshop participants on the competitions.

Related work

- [1]Á. Erdősné Németh: *From Logo till Olympiads Talent Management In Grammar School*. Theses of Doctoral Dissertation, University of Eötvös Loránd (2019)
- [2]J. Staub: *xLogo online – a web-based programming IDE for Logo*, Master Thesis, ETH Zurich (2016)
- [3]J. Hromkovič, G. Serafini, J. Staub: *XLogoOnline: A Single-Page, Browser-Based Programming Environment for Schools Aiming at Reducing Cognitive Load on Pupils*, In: ISSEP 2017, LNCS 10696, pp. 219–231, (2017)
- [4]J. Staub: *Programming in K–6: Understanding Errors and Supporting Autonomous Learning*, A thesis submitted to attain the degree of DOCTOR OF SCIENCES, ETH Zurich (2021)
- [5]L. Níkházy: *A Problem-based Curriculum for Algorithmic Programming*. In: *Central-European Journal of New Technologies in Research, Education and Practice* (2020), pp. 76-96
- [6]L. Níkházy: *The Joy of Thinking in Competitive Programming: A Curriculum Designed to Support Discovery Learning*. In: *XXXII DIDMATTECH 2019 – Proceedings : New Methods and Technologies in Education and Practice*. (2019) Trnava University. II/3.
- [7]Zs. Szabó: *Flowgorithm – Bridge Between Playful Programming and Digital Culture Matura Exam*, Theses of Doctoral Dissertation, University of Eötvös Loránd (2024)
- [8]T. Bell, I. H. Witten, M. Fellows: *CS Unplugged: An enrichment and extension programme for primary-aged students* (2015) http://csunplugged.org/wp-content/uploads/2015/03/CSUnplugged_OS_2015_v3.1.pdf
(utoljára megtekintve: 2024.10.14.)

Result So Far

[9]V. Mahler-Lakó, A. Mahler: *Improving computational thinking skills via sorting algorithms*, Budapest (2016), XXIX. DIDMATTECH 2016

[10] V. Mahler-Lakó: *LibreLogo és a rendezési algoritmusok (LibreLogo and sorting algorithms)*, Budapest (2016), Linux az oktatásban konferencia 2016 <http://lok.hu> (utoljára megtekintve: 2016.11.05.)

[11] V. Mahler-Lakó, H. Torma: *Programozást tanító online felületek és kurzusok vizsgálata (Examination of online programming learning course)*, Zamárdi (2015), INFODIDACT 2015

[12] V. Lakó: *Tanulói típushibák az informatika érettségi programozás feladataiban, Zamárdi (Misconceptions of students on programming exams)* (2014), INFODIDACT 2014

[13] V. Lakó: *Analysis of Algorithms and Data Modelling Tasks of the Final Exam in Hungary*, Eger (2014), ICAI 2014

[14] V. Lakó: *LibreLogo oktatási segédanyag (LibreLogo teaching handouts)*, 2013 <http://mek.oszk.hu/12700/12781/12781.pdf> (utoljára megtekintve: 2016.11.05.)

Open Questions

- I would like to get more ideas for my course curriculum.
- I would like to get feedbacks about the new conception of the Kovács Mihály National Graphical Programming Competition.