Teaching Informatics: Activities-based Model

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MOTIVATION

Inspiration, brought by more than 10 years' experience, has developed Bebras challenge from a single contest-focused annual event into a multifunctional challenge and an activities-based educational community building model. The Bebras community aspiration is to wrap up serious scientific problems of informatics and the basic concepts into playful tasks, inventive questions in the way attracting students' attention.

Our goals:

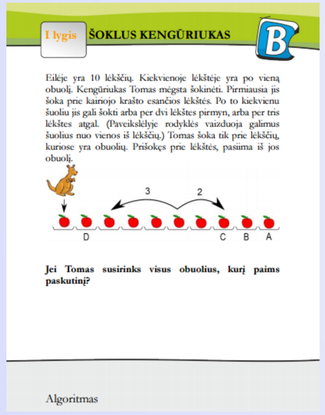
- to help teachers explain basic informatics concepts in an appropriate way for students.
- to improve Lithuania teachers' competencies.

METHOD

A long-standing problem, discussed by several researchers, is how to teach an introduction to theoretical informatics to secondary school teachers, including preservice and in-service teachers, lacking informatics knowledge and sufficient mathematical background. A preferred method of solving tasks from the Bebras challenge is suggesting that teachers participate in workshops based in Lithuania during the practical teacher training. Teachers were asked to complete the task, and while doing it they were guided to discover and understand informatics concepts. Each new informatics concept is connected to realistic situations of a particular task. This method is based on constructionist learning approach, when teachers could learn in both ways: through developing (constructing) tasks, and through analyzing their solutions and explaining the essence of these tasks and why it's informatics (deconstructing) [1].

We choose the set of informatics concepts to be introduces from 5 to 9 grades. Concepts are divided into 5 categories according to the draft of new informatics curricula in Lithuania. The list of concepts can be found in Lithuanian Bebras website.

Concepts are provided with short description and Bebras task examples, which could be downloaded as playing cards. These cards can encourage teachers and students not only to think about the correct answer or how to teach/learn certain concepts, but they inspire to work together (teachers and students, students and students, etc.), collaborate in decision-making and try to find the best task solution.



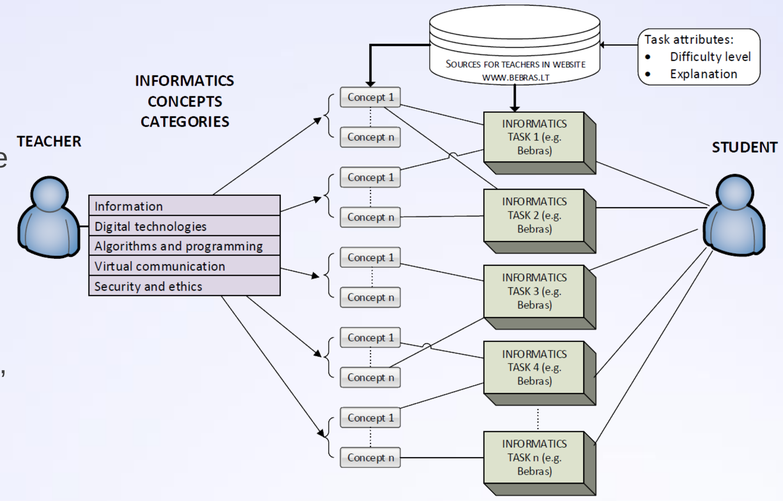
The playing card's example (www.bebras.lt)

List of proposed informatics concepts for teachers

INFORMATION	Binary numbers; compression; classification; parity
DIGITAL TECHNOLOGIES	Pixels
ALGORITHMS AND PROGRAMMING	Algorithm; array; branching; brute force; command; deadlock; finite-state machine; graph; logic operations; loop; optimization; parallelization; programming; public key cryptography; robots; search; shortest path; sorting; stack; tree; variable
VIRTUAL COMMUNICATION	Social network
SECURITY AND ETHICS	Passwords

Informatics activities–based model

The model is based on finding the concepts in task and explanation of how it really works as well as to motivate students to share their own ideas, experience and understanding. We hope that informatics activities based on the concepts searching in the concepts map with playful examples will motivate teachers to rethink the teaching process, not forgetting that all attention will be based on students' collaboration, understanding and analysis.



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REFERENCES

1. Dagiene V., Futschek G., Stupuriene G.: Teachers' Constructionist and Deconstructionist Learning by Creating Bebras Tasks. In: Conference Constructionism'16, Bangkok, Thailand, pp. 257-264, 2016