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# Graph algorithms in primary schools?

**Lucia Budinská**

*lucia.budinska@fmph.uniba.sk*

**Department of Informatics Education, Comenius University,  
Bratislava**

# Bebras contest - iBobor

- In Slovakia since 2006
- Benjamins:
  - 5th – 7th grade (also 1st and 2nd grade SGS)
- Computational thinking + Digital literacy
- Gender differences
  - Boys: *harder tasks, spatial reasoning, guessing the answer*
  - Girls: *visually attractive tasks, social tasks*
  - Overall score: *no big differences in Slovakia*

# Innovated State Educational Programme 2015

- Representation and tools - Structures
  - organise data into structures (e.g. graphs, trees)
  - read and interpret data from structures

Visual literacy

- Algorithmic Problem Solving
  - solve problems,
  - select appropriate strategies,
  - look for examples,
  - think about different solutions...

Algorithmic thinking

# Graph oriented tasks

## Graph reading

pupils should:

- find the relationships between the data in the graph,
- analyse the graph with the use of some additional text information,
- analyse the finite number of options that are directly visible.

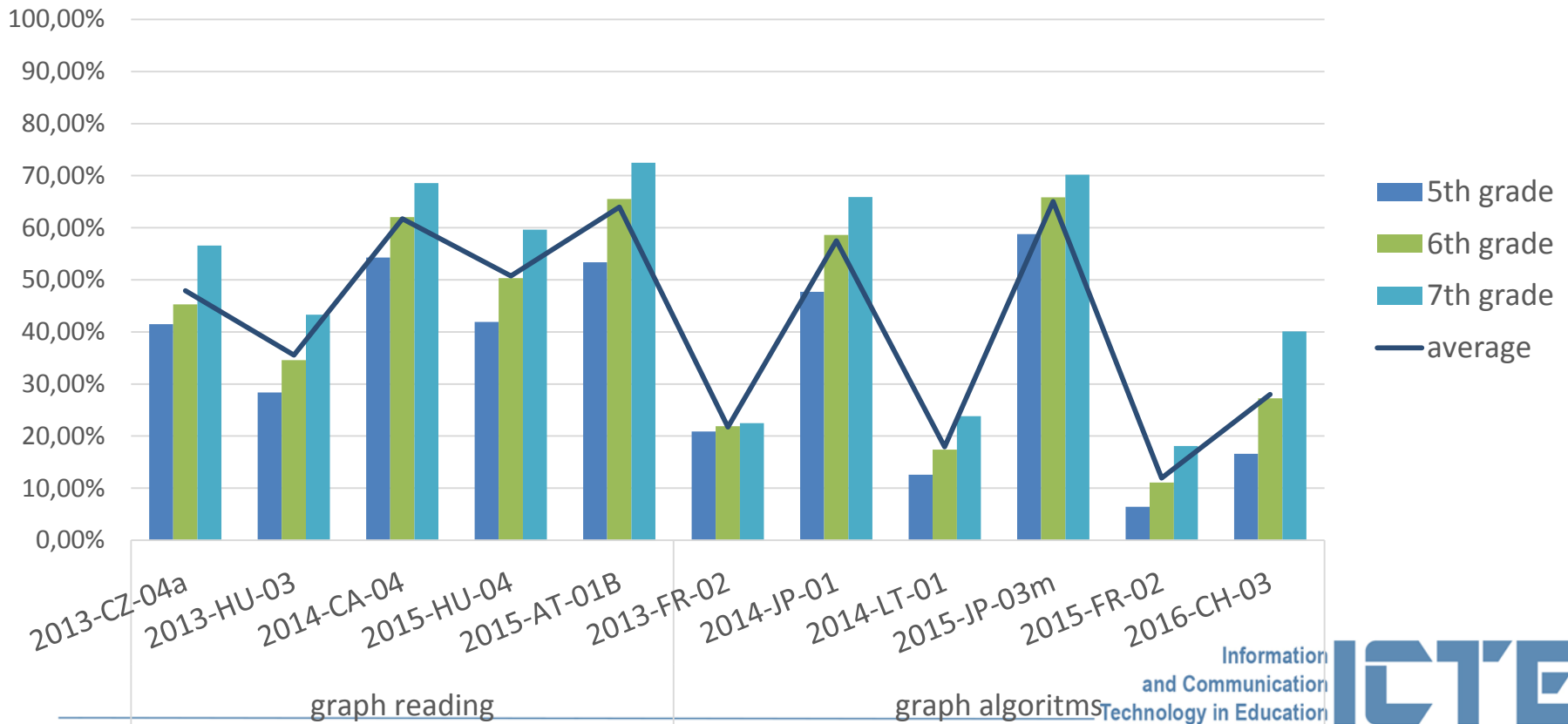
## Graph algorithms

pupils should:

- try out all the options,
- choose a suitable strategy,
- design a solution algorithm,
- analyse more complex graphs (weighted graphs, graphs with restrictions, etc.),
- create their own solution.

# Results

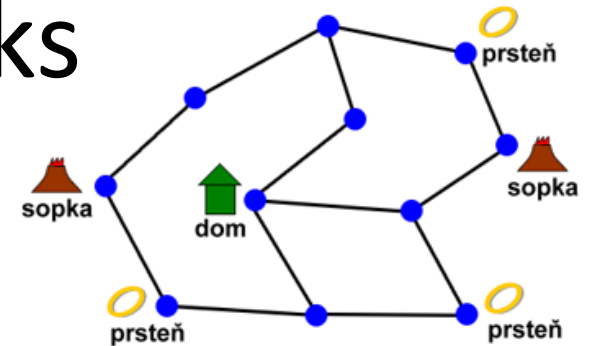
- 2013/14 – 2016/17 - 11 tasks
- 83 175 contestants - 53% boys



# Difficulty of tasks

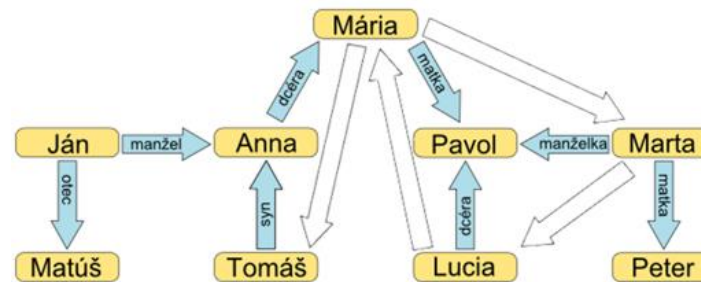
- **Most difficult tasks:**

- Great number of possible solutions
- Interactive tasks
- Optimisation
- BFS



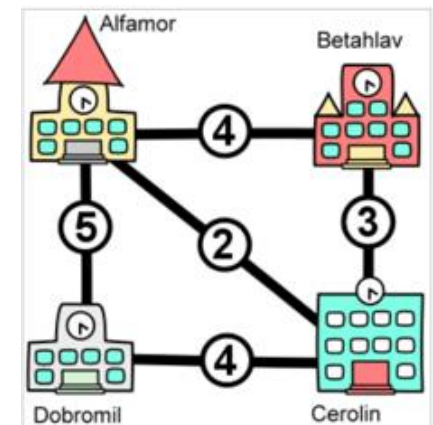
- **Medium tasks:**

- Reading oriented graphs
- Combination of graph and text information

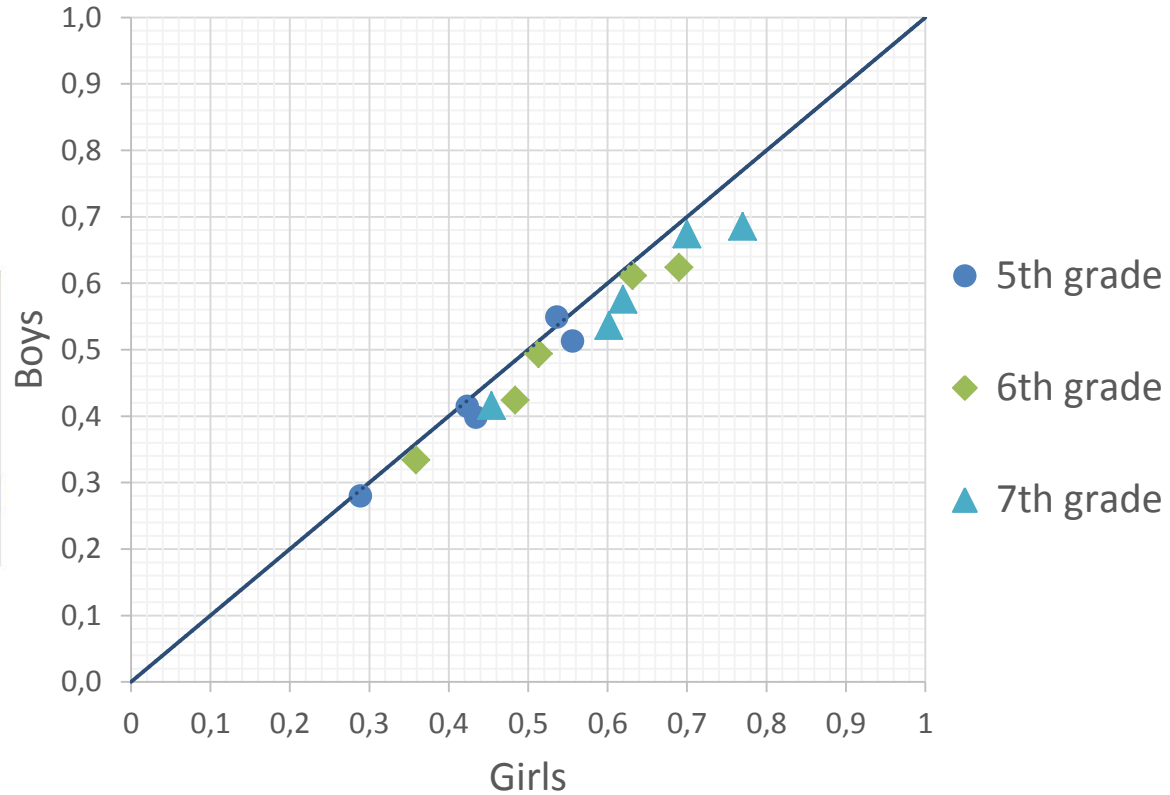
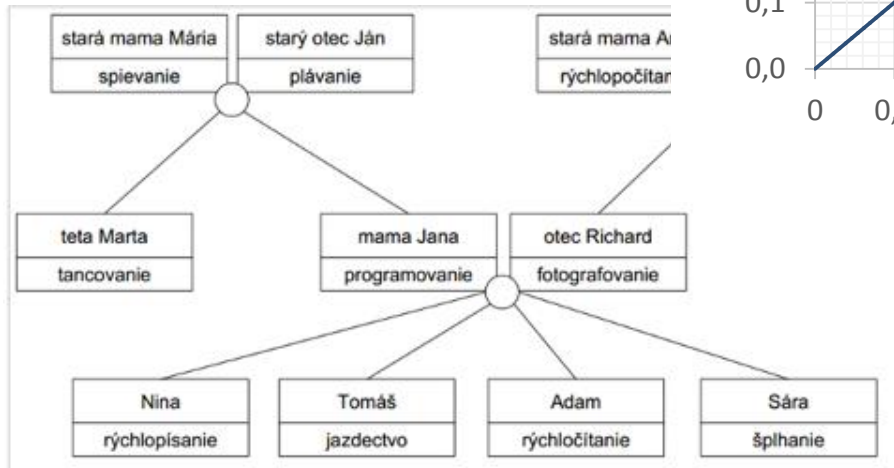
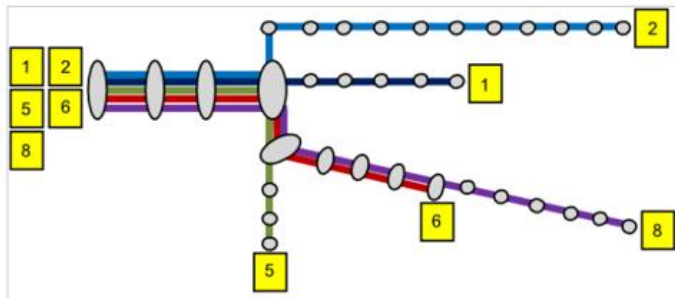
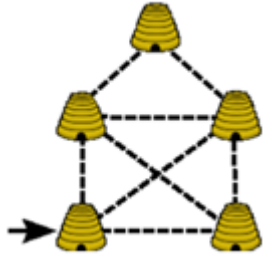


- **Easy tasks:**

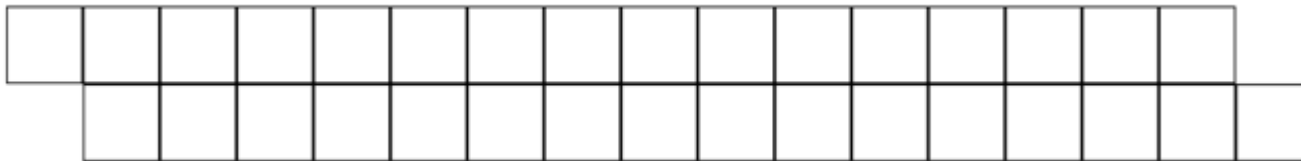
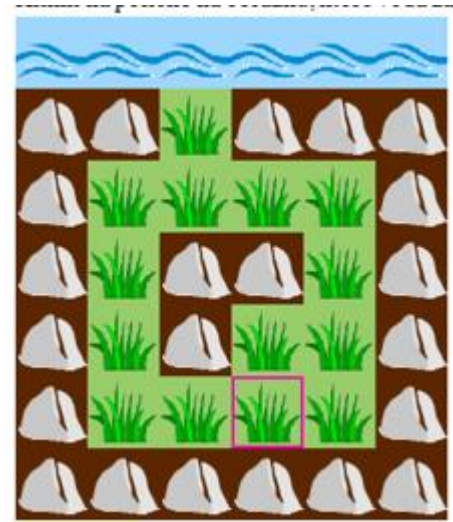
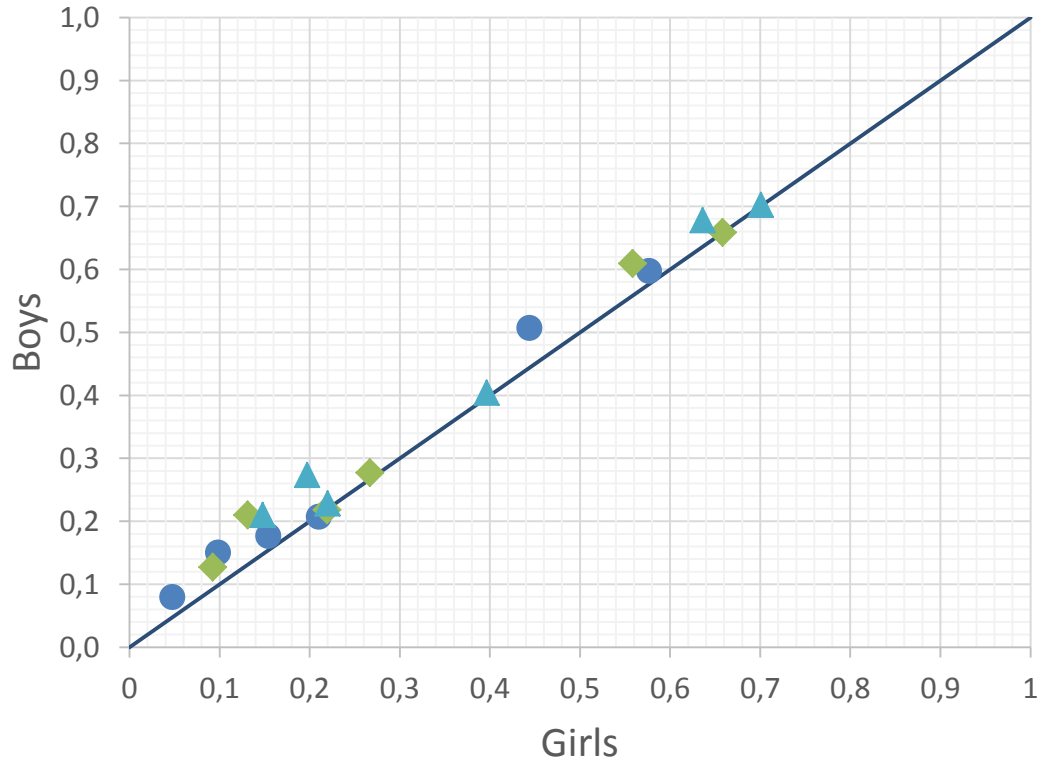
- Reading single graphs
- Minimal or shortest path (a few options)



# Graph reading group



# Graph algorithms group





# Conclusion

- Girls better in graph reading tasks
- Boys better in difficult tasks – good strategy
- Why is it important?
  - Visual literacy -> digital literacy
  - Algorithms, strategies -> computational thinking
- Graph algorithms in primary school?



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**THANK YOU FOR YOUR  
ATTENTION**

[Lucia.Budinska@fmph.uniba.sk](mailto:Lucia.Budinska@fmph.uniba.sk)

