



Students' Success in the Bebras Challenge in Lithuania: Focus on a Long-term Participation

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Research questions

1. Are students interested to participate in the Bebras contest year-by-year?
2. Did students' results improve during a long-term participation?
3. Have task difficulties influenced students' participation?



Students and teachers are interested in BEBRAS

- ✓ Students' interest in solving puzzle-based informatics tasks, gamification, and attractive
- ✓ Introduction to informatics concepts basically without any requirement of pre-knowledge in informatics
- ✓ A part of learning/teaching process
- ✓ Teachers are willing to attract students' attention to the basics of informatics by solving short tasks



BEBRAS tasks in Lithuania

- ✓ multiple-choice questions
- ✓ open-ended tasks
- ✓ interactive tasks

The tasks were designed with a view to influence students' understanding of informatics concepts and developing some computational thinking skills, for example, execution of algorithms, representation of data and data analysis, problem solving, modelling, abstraction of structures and

processes. (Dagiene, V., Futschek, G.: Bebras International Contest on Informatics and Computer Literacy: Criteria for Good Tasks. In Informatics Education –Supporting Computational Thinking, pp. 19-30 (2008))



Long-term participation **2010–2015**

- ✓ A long-term participation is indicated in the sense of **six-year** continuity of participation and perseverance to be a success despite the task content and difficulty.
- ✓ The participation in the contest during the so-called Bebras week is a short-term activity due to the defined domain and time taken for task solving. Students have to solve tasks within 45 minutes; their willingness to solve tasks next year is not known.



Analysis

- The average of students' scores
- Difficulty levels of the given tasks
- Time taken for solving each task



Long-term participation

- ✓ Motivation to learn something new or succeed in solving tasks
- ✓ Abilities to compare the real life situation to practical task solving
- ✓ Interest
- ✓ Success
- ✓ Task difficulty



Data analysis

- ✓ Selecting data about participants of the Bebras contests from 2010 to 2015 and selection of students who participated in each challenge (6 years in turn).
- ✓ Comparing participants' results and time taken to solve each task.
- ✓ Reviewing tasks that were solved by the target group according to task difficulty and the average of students' scores.



Bebras challenge in Lithuania

Participants are divided into 5 age groups and solved from 18 to 24 tasks within 45 or 55 minutes.

Each task has one of the three difficulty levels (easy, medium, hard) as prescribed by developers.

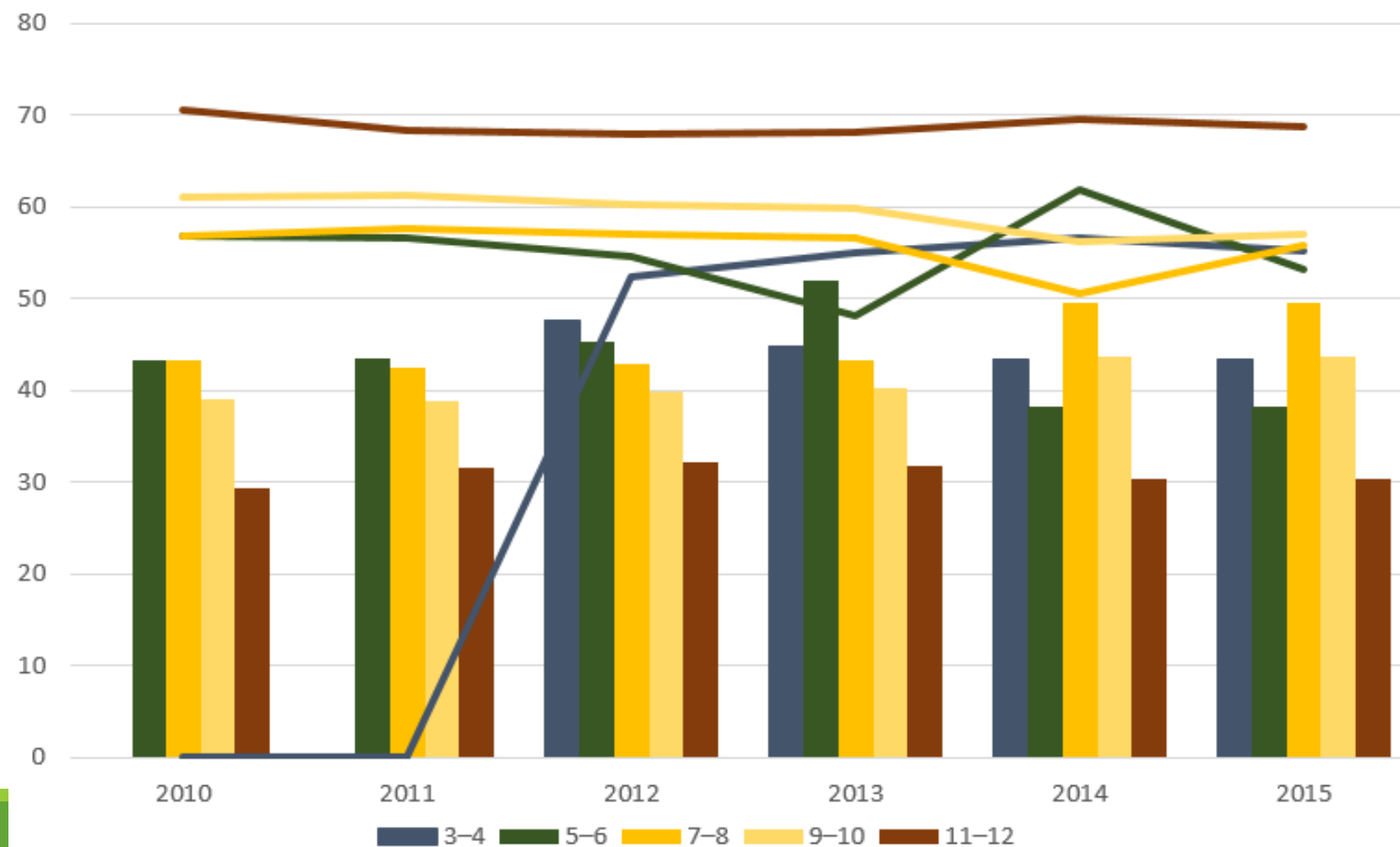
The set of tasks consists of 6 (or 8 in the case of the 24 task set) tasks of each difficulty level.

Our target group is 137 students who participated and solved tasks in all the 6 years of Bebras contests (2010-2015).



Participants' distribution in the Bebras contest 2010-2015

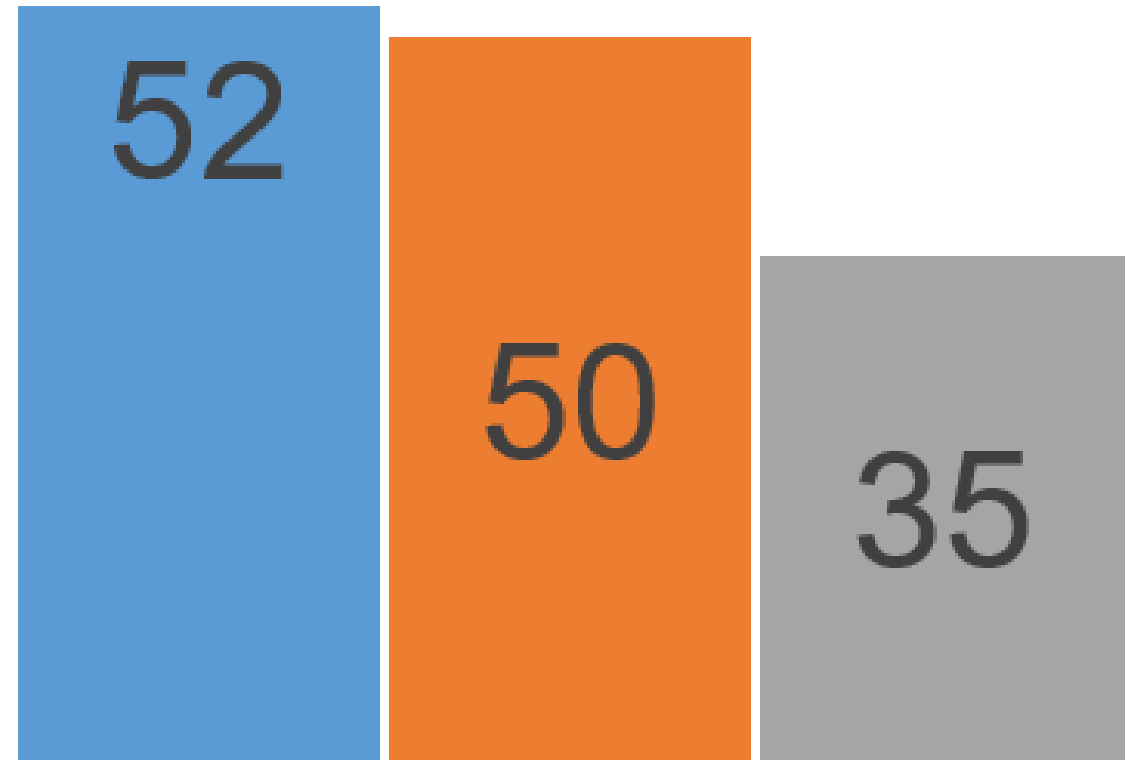
- Column – girls
- Line – boys



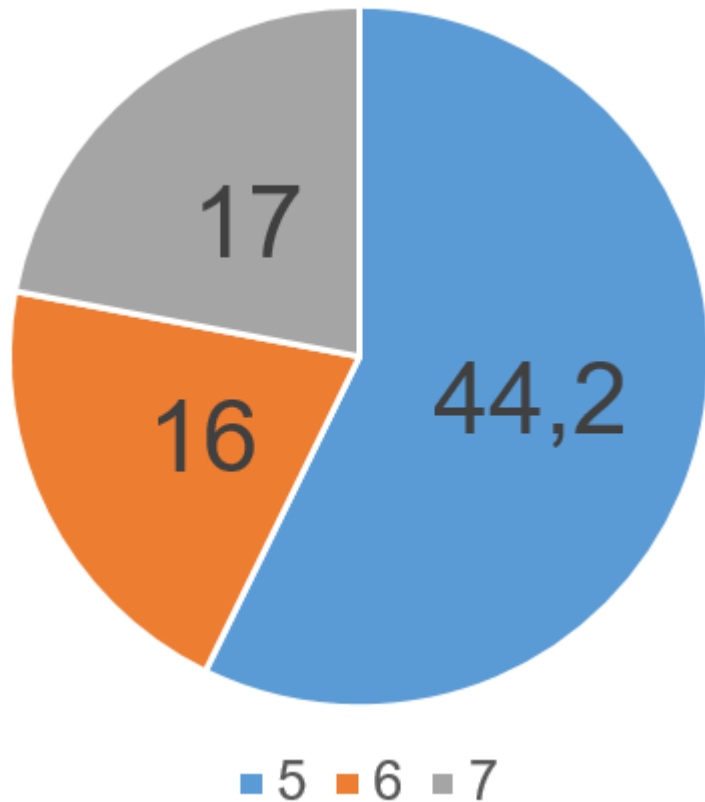


137 students participated in the Bebras contest 6 years in turn

- ✓ 52 participants started to solve tasks from the 5th grade and participated each year
- ✓ 50 participants entered at the 6th grade, and
- ✓ 35 participants started from the 7th grade.



The number of girls (percentage)



These numbers show that girls are interested in long-term task solving when they are involved from the earlier age (lower grades). Additionally, we see a tendency that boys are more interested in solving tasks and participating in contests.



The success in solving tasks

- ✓ 6 participants are able to solve correctly over 52.4 % of tasks during the Bebras contests in a long-term period (6 years).
- ✓ 10 participants are successful in 54% of tasks in the period of 5 years.
- ✓ 9 out of 137 participants achieve a success in solving more than 90% of tasks (students, who solved correctly over 90% of tasks, achieved the highest scores).

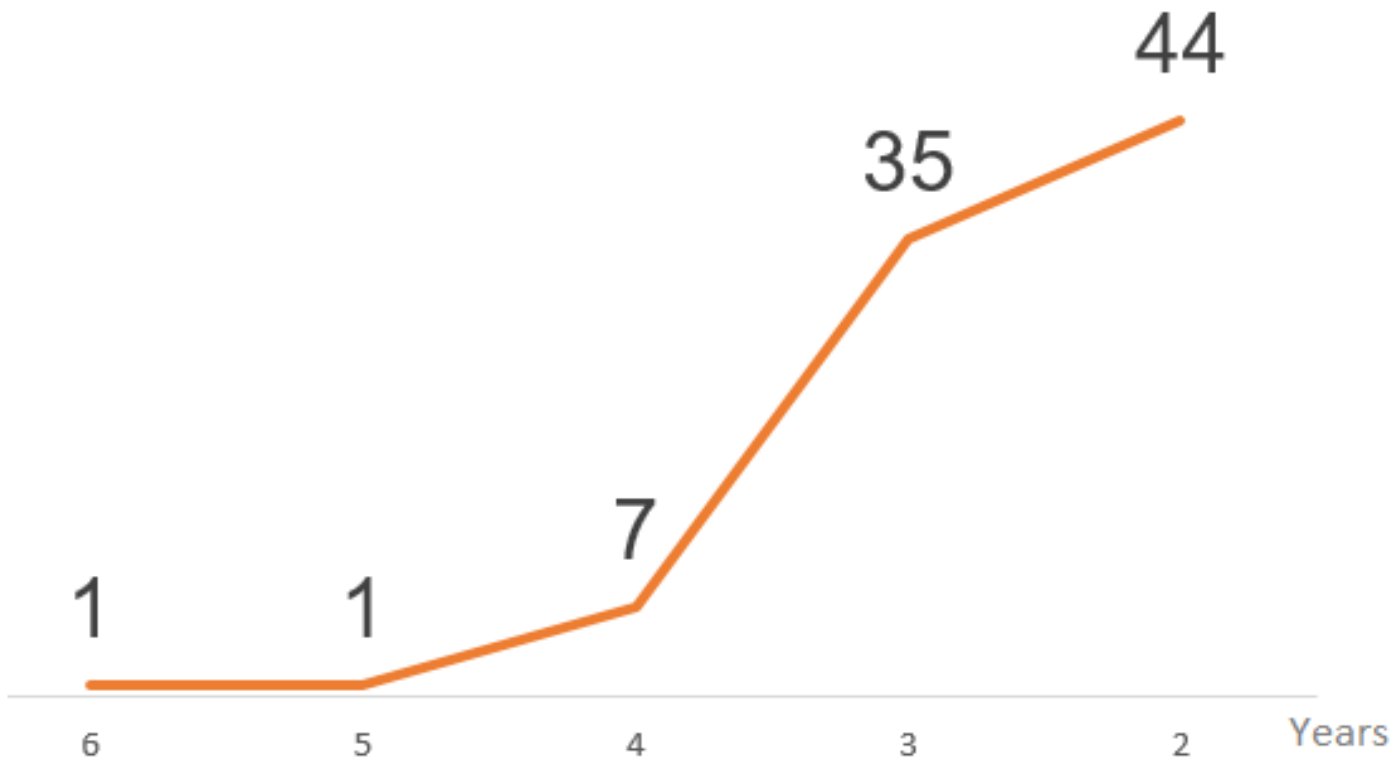


The success in solving tasks

- ✓ One participant has solved over 90% of tasks correctly 5 years in turn and achieved the highest score 2 years in turn.
- ✓ Most of the participants with the best results are in grades 8-12.
- ✓ 4 out of 137 participants have achieved the highest score.
- ✓ Only 2 girls have solved over 90 % of the set of tasks.

The success in long-term participation

Most of these students tried to solve more tasks correctly in grades 6-9.





Students results

- ✓ More students solve the tasks correctly each year, except 2014 and 2015 (grade 9-10).
- ✓ The participants are not able to solve “hard” tasks very well in grades 9-12 (solvability of tasks decreased up to 19 %).
- ✓ The participants who have solved tasks in a long-term period are able to achieve better results. They collect higher scores than the average of groups
- ✓ The participants tend to have higher results in the 11th and 12th grades



Value of Task Difficulty

- The value of difficulty is considered as a ratio between the number of correct answers and the total number of answers
- Lower values indicate more difficult tasks and higher values indicate easier tasks
- The value of difficulty 1 indicates a very easy task and a task with the value of difficulty 0 indicates a very difficult task.



Value of Task Difficulty

- Tasks of the „medium” and “hard” level are too difficult for students. The most part of tasks has a high value of difficulty.
- The tasks provided for participants in 2014-2015 have the lowest value of task difficulty
- The value of difficulty of tasks, that represent algorithmic thinking, varied from 0.1 to 0.7 in each grade.



Time taken for task solving

- ✓ The time average was about 102 seconds solving easy tasks and 105 seconds were spent to medium tasks.
- ✓ The participants solved difficult tasks about 109 seconds.
- ✓ Students spent more time for solving interactive tasks:
181-220 seconds (87-103 s for multiple choice tasks)



Conclusion

- ✓ Students grades 3-8 are the most active participants in the Bebras contest. The lowest number is in the grades 11-12, especially girls.
- ✓ Students who solved less than 50% of tasks correctly continued their participation in the challenge despite the fail on previous years.
- ✓ The value of the tasks difficulty is related to students' success.



Thanks for your attention!