Bebras Contest for Blind Pupils

Ľudmila Jašková, Natátia Kováčová

Comenius University

Bratislava, Slovakia

Bebras Contest

- The **main aim** is to promote **interest in informatics for all** school students
- The competition has the **ambition to reach all children**
- But the tasks are generally **not accessible** to pupils with different types of **visual impairment**

Blind Pupils in Bebras Contest

- **Blind pupils – can't participate at all**
  - They use a **screen reader**
    - They construct the preview of the screen in their minds
    - The only kind of information they can work with is **text** and **sound**
  - For input they **use keyboard**
    - **not mouse**
  - Problems with
    - Important information **in images**
    - Non linear **tables**
    - Tasks referring to **colors**
    - Interactive tasks requiring **mouse input**
    - **Long sequence of elements**

Adaptations of rules and tasks

- **Less** tasks (9 – 3 easy, 3 medium and 3 hard)

- The tasks are presented **in a text document** on the computer
  - All relevant information is in a **text format**
  - There are **no images**
  - There are **no references to colors**
  - Information in **the tables is arranged linearly**
  - Solutions are entered **via keyboard**
  - **Shorten the sequence of elements**

Task with no change

Print photos

Jane wants to print out her photographs. Which device must be connected to the computer?

A. Speakers
B. Data projector
C. Printer
D. Microphone

Task Portholes for able-bodied pupils

The glass of the portholes is either clear or light-tinted. When looking through two such portholes, one will see clear glass, light-tinted glass or dark-tinted glass, as shown below.

The captain has installed portholes with either clear or light-tinted glass into one side of his new yacht as shown below.

Portholes on the other side are shown below.

A fisherman standing in an appropriate place on land can see through all the corresponding pairs of portholes on either side of the yacht. What kinds of portholes can the fisherman see?

In the following picture, drag the colors to color the portholes accordingly.

Task Cabins for blind pupils

There are 6 cabins in the boat. In each cabin, there are 2 radiators – one on the left wall and one on the right wall. The temperature inside each cabin depends on the state of the radiators.

- When both radiators are off, the cabin is cold.
- When one radiator is on, the cabin is warm.
- When both radiators are on, the cabin is hot..

One day, the radiators on the left wall of cabins 1, 4, 6 and those on the right wall of cabins 5, 4, 3, 1 were on.

What was the temperature in cabins 2, 4 and 6?

Overview of tasks in 2013

No	Name	Difficulty		Modifications
		Blind	Able-bodied	
1	Beaver book	Easy	Easy	None
2	E-mail address	Easy	Easy	None
3	Data transfer	Easy	Easy	None
4	Popular software	Medium	Easy	Image
5	Family tree	Medium	Easy	Image Interactivity
6	Ice-cream machine	Medium	Medium	Image Long sequence
7	Robot	Hard	Hard	Image Long sequence
8	Elevator	Hard	Medium	None
9	Text written backwards	Hard	Easy	Long sequence

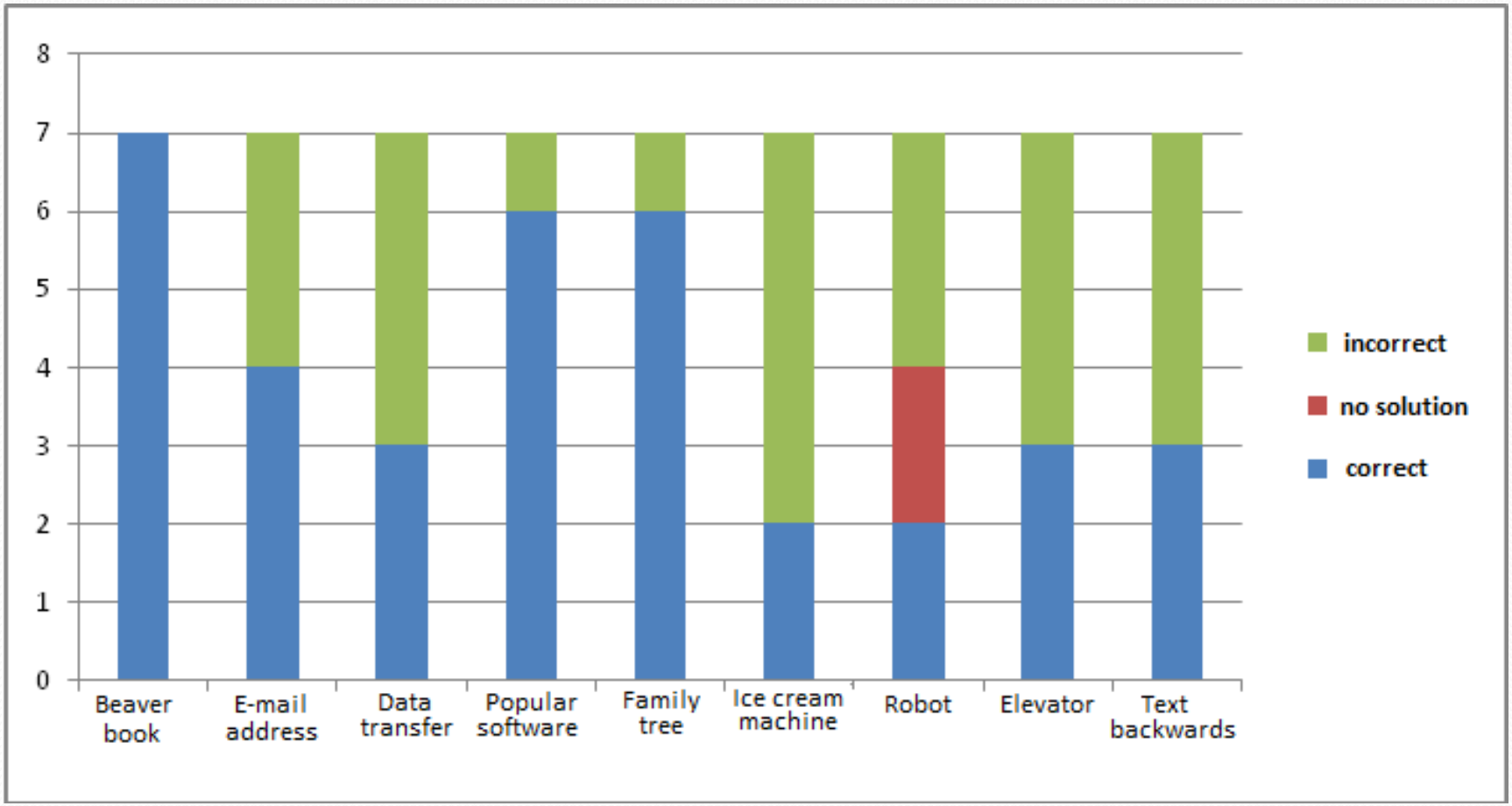
Overview of tasks in 2014

No	Name	Difficulty		Modifications
		Blind	Able-bodied	
1	Places to play	Easy	Medium	Image
2	Print Photos	Easy	Easy	None
3	Identification card	Easy	Easy	Table Long sequence
4	Sorting brushes	Medium	Easy	Image Long sequence
5	Shopping	Medium	Medium	Image
6	Find photos	Medium	Medium	Image Long sequence
7	Numeric snake	Hard	Hard	Image Long sequence
8	Cabins	Hard	Medium	Image Long sequence Colors
9	Lady Beetle	Hard	Hard	Image Long sequence

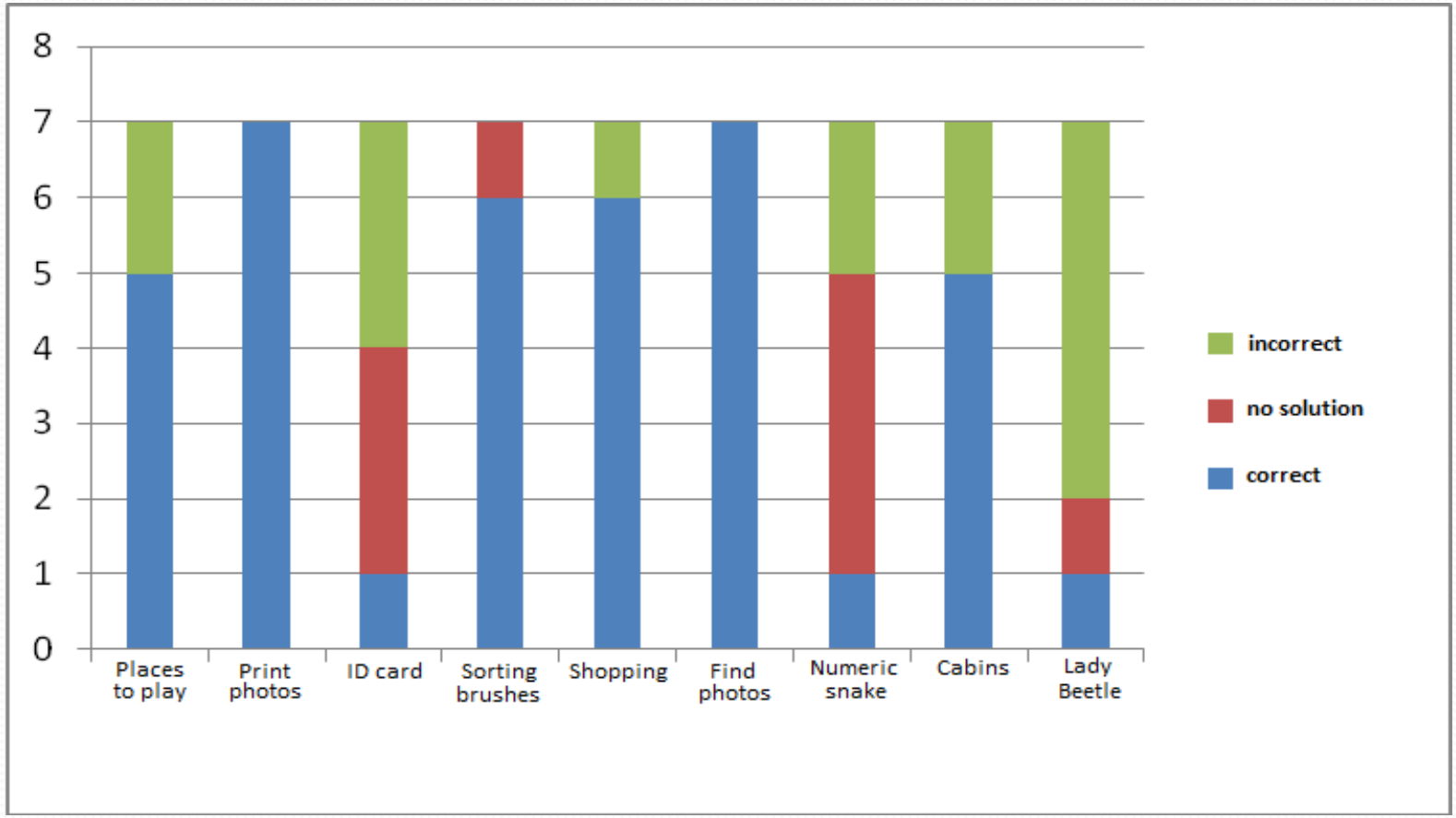
Verification

- **What tasks are appropriate for blind students?**
  - intelligibility, appropriate format, formulation, level of difficulty
- **What affects the success rate of blind pupils?**
  - age, the presence of visual imagery, the level of computer skills
    - **Contestants - 7** lower secondary school pupils
      - 5 blind (3 since their birth)
      - 2 with heavy visual disorder

Success rate in 2013



Success rate in 2014



Contest in 2013 - Factors

Order in competition	Grade	Visual imagery	Computer skills
1	7	Yes	very good
2	9	Yes	very good
3	5	Yes	very good
4	7	Yes	medium
5	5	No	medium
6	8	No	weak
7	7	No	weak

Contest in 2014 - Factors

Order in competition	Grade	Visual imagery	Computer skills
1	8	Yes	very good
2	8	Yes	very good
3	6	Yes	very good
4	8	No	medium
5	8	No	medium
6	7	No	weak
7	5	Yes	very weak

Conclusions

- The success was **independent of age** (or grade)
- Pupils with good results are able to use **visual imagination** (visual imagination is desired for solving most tasks)
- Pupils who use computer often and have very good **computer skills** were the most successful

Plans

- To undertake **extensive qualitative research** (case study)
- To check out the tasks with **more pupils** (special schools in our country and abroad)
- To **find concrete recommendations** enabling to create tasks **for all pupils** (principles of universal design of learning)

Thank you for your attention

Ľudmila Jašková, Natália Kováčová
jaskova@fmph.uniba.sk
natalia.kovacova@fmph.uniba.sk
Comenius University
Bratislava, Slovakia