The role of inquiry activities in physics education at lower secondary school

Slávka Ropeková, Marián Kireš

Primary School L. Novomeskeho 2 in Košice, **Slovakia**

Institute of Physics Faculty of Science P.J.Šafárik University on Košice, **Slovakia**

INTRODUCTION

- Information society brings new challenges for implementation of changes in the educational system.
- All our activities aim at developing certain parts of Science literacy of primary school students in Physics.
- One of the options seems to be applying inquiry activities in computer based laboratory.

PRIMARY SCHOOL PHYSICS AT SLOVAKIA

- The content of Science curriculum is defined by the State Educational Programme according to ISCED 2.
  - content standard and educational objectives for each theme
- Physics (along with Biology and Chemistry) is part of a subject group called Man and Nature.
  - constructivist approach, active learning, solving problems, group work, and creating a positive attitude towards science

PRIMARY SCHOOL L.NOVOMESKEHO 2, KOŠICE

- Our primary school puts special emphasis on foreign languages.
- Physics is taught for a recommended minimum of 4 years, 198 hours altogether.
- The topic that we chose is called Heat and Investigation of phase transition
  - part of 7th grade Physics curriculum
  - physics is taught 1 lesson a week
  - in a class of about 25 students
  - national project Workshop
    - physics classrooms with modern educational tools such as interactive whiteboard

OUR SELECTION OF INQUIRY SKILLS FOR INQUIRY ACTIVITIES

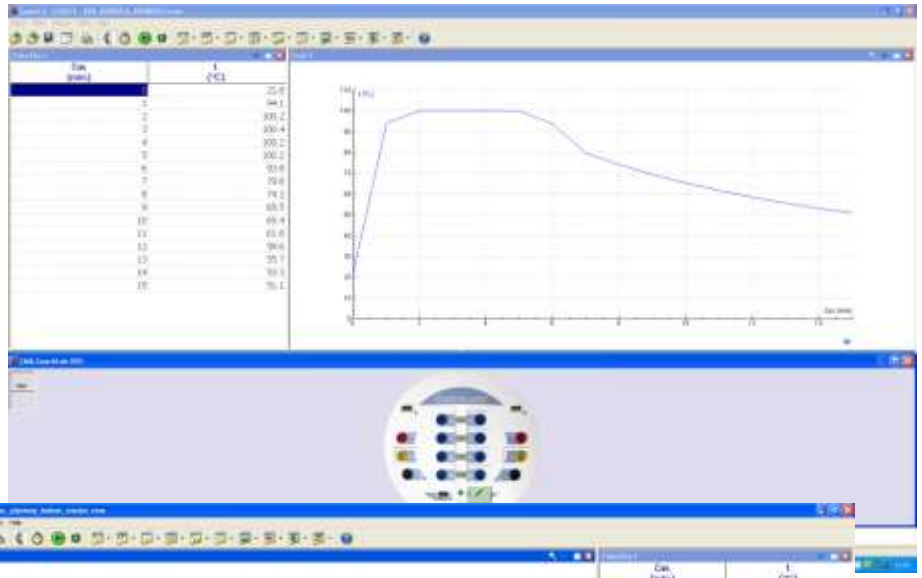
- Defining a problem
- Stating a hypothesis
- Measuring

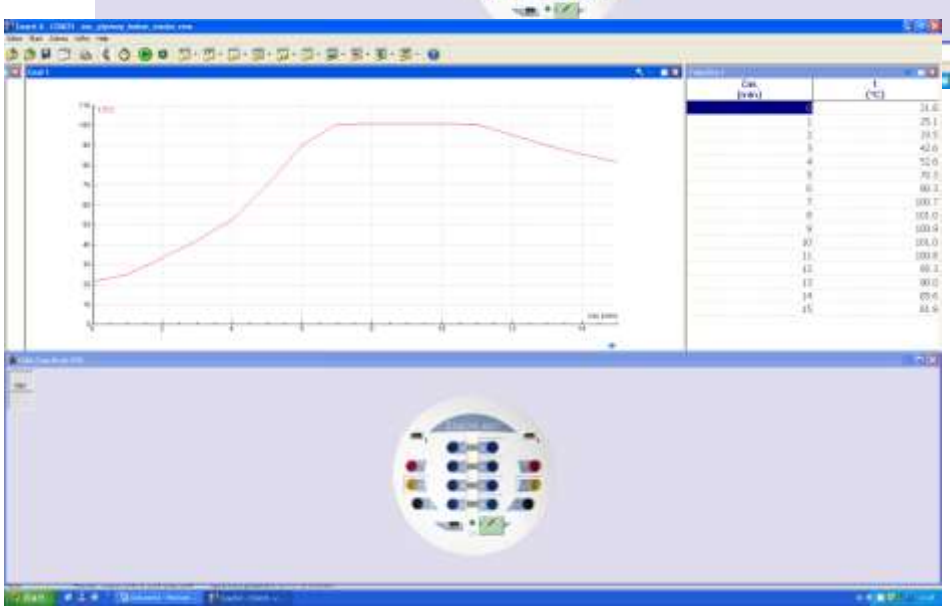
OUR SELECTION OF INQUIRY SKILLS FOR INQUIRY ACTIVITIES

- Data evaluation
- Peer discussion
- Implementation of the knowledge

INQUIRY ACTIVITIES AT LOWER SECONDARY SCHOOL PHYSICS

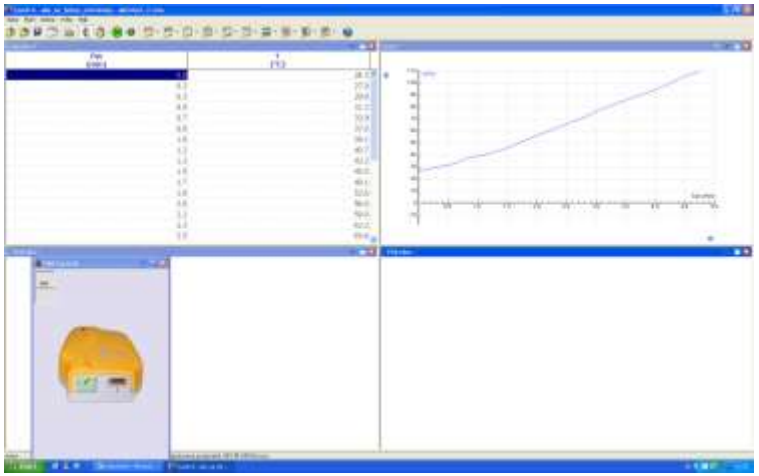
- Inquiry activities were tested on a sample of the 7th graders aged 13–14.
- Within the topic Investigation of phase transition we tested activities ***Boiling of a liquid, measuring of the boiling point of water.***

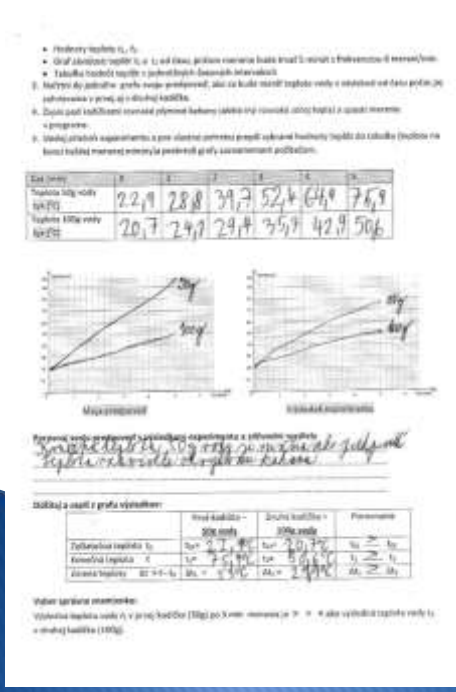




INQUIRY ACTIVITIES AT LOWER SECONDARY SCHOOL PHYSICS

- From the topic Heat we tested the activity *How the bodies warm up.*
  - group of 12 students who worked in 6 pairs
  - guided inquiry activities
  - software COACH 6 – temperature, table with data, graph showing the relationship between temperature and time

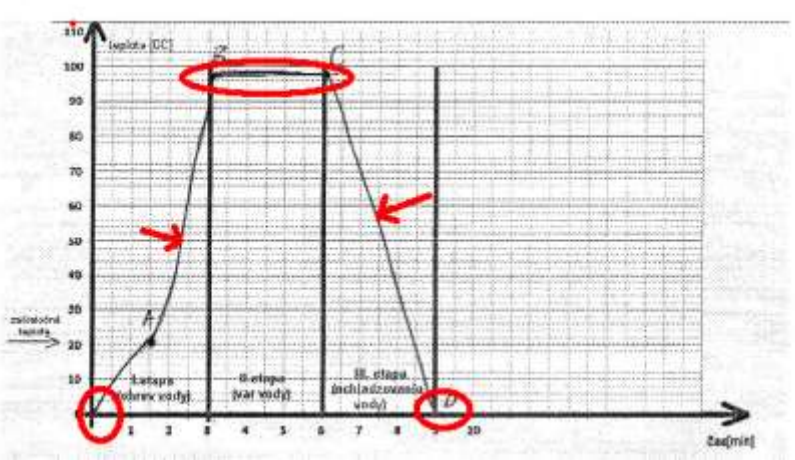


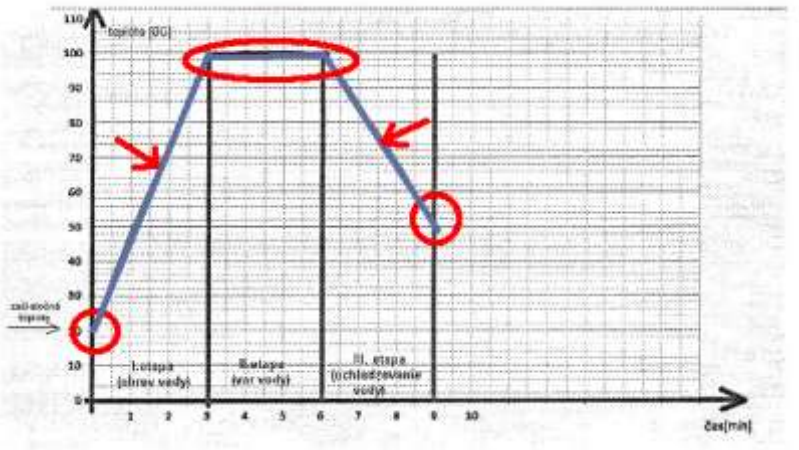


ASSESMENT OF INQUIRY ACTIVITIES

Since students are subjected to a guided inquiry activity where the stages of the lesson are assigned we propose to assess the task with the graph in activity *Boiling of a liquid, measuring of the boiling point:*

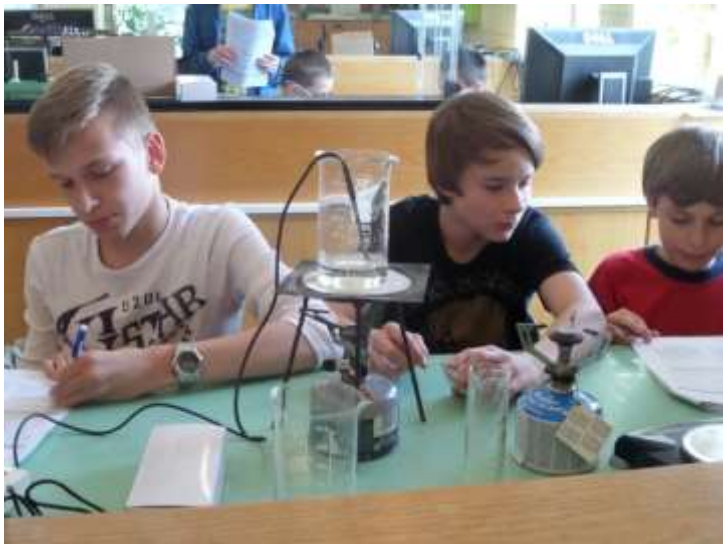
- Predicting a graph showing the relationship between temperature and time in which we can evaluate four possible statements:
  - the beginning of the graph – at what temperature students began to draw their prognosis, that is the initial temperature of water
  - graph curve at the boiling point, the constant temperature
  - slope showing the heating up and cooling down of water, when both phases take the same amount of time, we expect the slower cooling down to be marked,
  - the end of graph – the prognosis of the final temperature of water,
- Interpretation of graphic results of the experiment





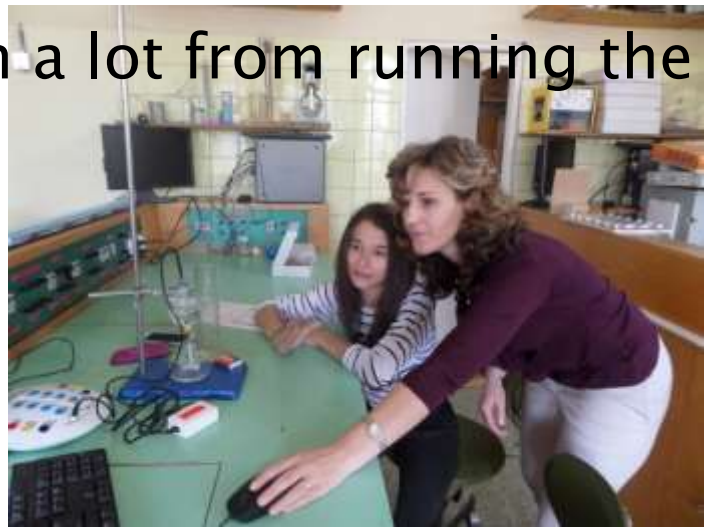
BENEFITS FROM INQUIRY ACTIVITIES FOR PUPILS

- braking down Physics fundamentals into playful activities,
- developing manual dexterity,
- interconnecting a Physics experiment with digital technologies that are suitable for the tested age group ,
- increasing motivation to discover different natural phenomena,
- creating a positive attitude towards Physics.



BENEFITS FROM INQUIRY ACTIVITIES FOR TEACHERS

- Preparing these inquiry activities involves completing a considerable amount of time-consuming tasks
  - prepare some worksheets
  - tools needed for the experiment
  - evaluate students` work at the end
- Other difficulties that have to be dealt with include classroom management, explaining different methods and introducing essential health and safety requirements.
- However, teacher can also gain a lot from running the experiment
  - teacher asks questions
  - observes students
  - leads discussions
  - pays individual attention.



CONCLUSION

- Our goal was to perform a pilot test of guided inquiry in a laboratory equipped with a computer within chosen Physics topics in the 7th grade at a primary school.
- Students had a chance to conduct guided inquiry and measure with the help of a computer for the very first time.
- Positive feedback received from our students as well as successful completing of the tasks are a reason for creating new activities and testing method IBSE in Physics at a primary school.

REFERENCES

- *The SAILS project*. Web pages available on http://sails-project.eu
- *The Establish project*. Web pages available on http://www.establish-fp7.eu

- Thanks for your attention