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





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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

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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