

# Experience with inquiry activities and their assessment at a lower secondary school in Slovakia

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# Introduction

- School reform in Slovakia have started since 2008
- The state education programme and school education programme
- Spiral way of building knowledge and skills was replaced by teaching blocks of topics
- The main part of education in physics is **active pupils' learning based on experimentation with elements of inquiry (textbooks)**

# How we implement IBSE

- Our school tries to carry out **activities that support ideas of IBSE**
- Types of activities
  - regular textbook activities, home assignments
  - special science events, e.g. **science open day** for parents, **science lessons** for elementary school pupils, **science conference** at school or at science institution
  - **activities in cooperation with science institutions**

# How we assess IBSE in school

The assessment of pupils work in the **regular school activities** based on the following ideas:

- Designing an experiment
- formulating of hypotheses about a problem
- conducting an experiment,
- searching for information from internet or books
- the pupils' ability to cooperate and work in a group

# How to melt chocolate

- home assignment
- the aim was to find the best way how to melt chocolate and find out the melting point
- Written report (Tools, steps of procedure, explanation, conclusion)
- Peer assessment by pupils from the same class who did not know the names of assessed friends,
- they used 5 scaled rubrics

## TOPENIE ČOKOLÁDY

**Pomôcky:**

- Kadička
- Skúmavka
- Čokoláda
- Voda
- Teplomer
- Liehový kahan
- Sklenená tyčinka


**5bodov**

**Otázka:** zistite pri akej t

**Vysvetlenie:**

Takýmto pokusom sme zistili rozsah, do ktorého sa dá topiť čokoládu. Rozsah sme dostali preto le

nemajú iba jednu teplotu t



Agátka

**Postup:**

1. Do kadičky nalejeme studenú vodu, a začneme ju zohrievať liehovým kahanom.
2. Do skúmavky nalámeme čokoládu na malé kúsky.
3. Sklenenou tyčinkou opatrne miešame

**Teplota topenia čokolády**

NIKOLAS

**POMÔCKY:**

2 misky, jednu väčšiu, a menšiu z materiálu ktorý dobre vedie teplo (sklo)  
vodu  
zdroj tepla  
teplomer  
čokoláda

**4b**

**POSTUP:**

väčšiu misku naplníme vodou asi do polovice, položíme nad zdroj tepla.  
položíme do nej menšiu misku v ktorej je čokoláda do vody ponoríme teplomer keď sa začne topiť, na teplomeri bude teplota topenia čokolády

**POZNÁMKA:**

Aby sme tento pokus nerobili len kvôli zisteniu teploty topenia čok, môžeme nechať čokoládu úplne roztopiť, pridať trochu masla a namočiť do nej banány nakrájané na kolieska napichnuté na špáratku. po vychladnutí obdržime skvelé domáce banány v čokoláde.

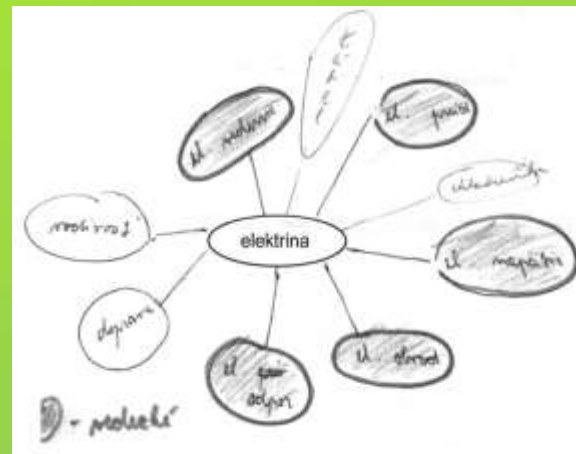
**5bodov**

# Which objects conduct electric current

## SAILS activity

Each pupil wrote a written report

- the concept map, **design of experiment**,
- Choosing tools
- **Tablet with different objects and of different materials** (tea spoon of metal, plastics, piece of wood, scissors, etc.)
- **hypothesis on conductivity** (conducts well, poorly, not at all)
- The **experiment** and **comparing** the results of experiment with **hypothesis**
- **Essay with topic** Why is electric current important for our life



telesoľátka	hypotéza	Experimentálny výsledok			Typ látky
		vedie	slabo vedie	vôbec nevedie	
železná tyčička	áno	X			kov
lúča (drevo)	nie			X	plast
kov	dobro vedie			X	kov
lúča	nie		X		plast
kov	dobro vedie			X	kov
epoxyd	nie			X	plast
železo	áno	X			kov
lúča	dobro vedie			X	plast

# Assessing IBSE in cooperation with science institutions

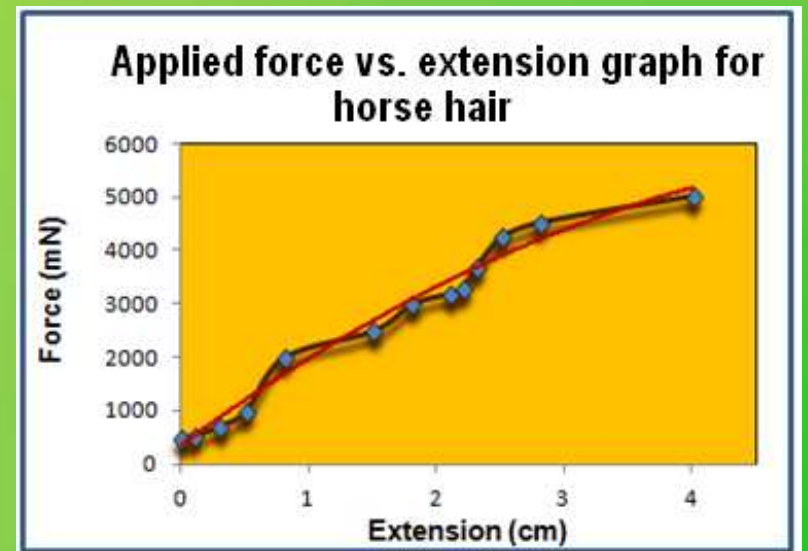
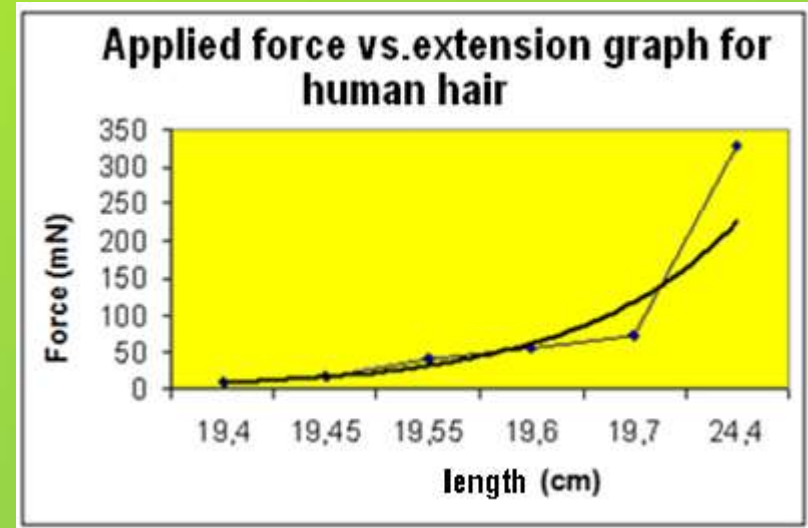
The assessment of pupils work in the **project activities in cooperation with Slovak academy of Science and University** based on the following ideas:

- attitude towards the inquiry activity, enthusiasm, drive,
- ability to work in a group
- level of knowledge, skills,
- planning investigation and collecting data
- search for information and presenting them
- explaining knowledge in front of different audience



# Human and horse hair

- In cooperation with the Institute of Physics, Slovak Academy of Science, 15 pupils of 7<sup>th</sup> and 8<sup>th</sup> grade.
- Pupils compared the shapes of the human and the horse hair, its thickness, load capacity and **extention under different applied forces.**



The pupils work on the project **was assessed by teacher and by scientist who cooperated** on this project .

This assesment was based on

- work with the **apparatus**
- the level of presentation and argumentation within the discussion at the **science conference**



# How crystals grow

- in cooperation with the Technical University and with Slovak academy of science

## The project involves :

- **the visit of the University** mineralogical collection.
- **Creating own different colour crystals** made by evaporating saturated water of salt solutions
- **investigated the properties of crystals** (shape, crystalline structure, colour, etc.)
- **present the results** at pupils' science conference.

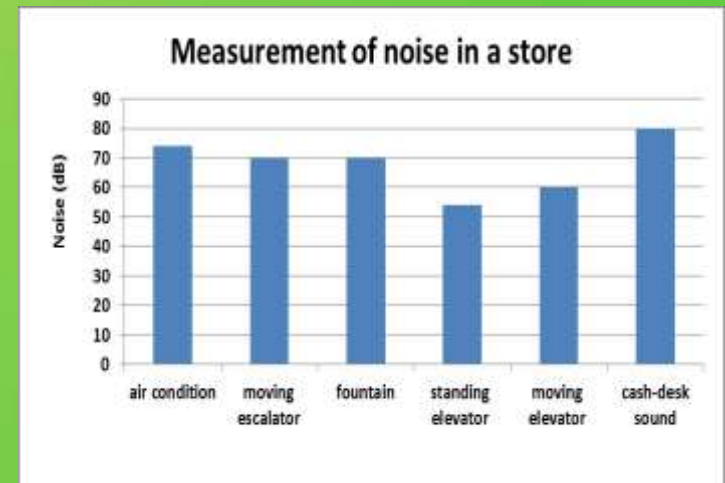
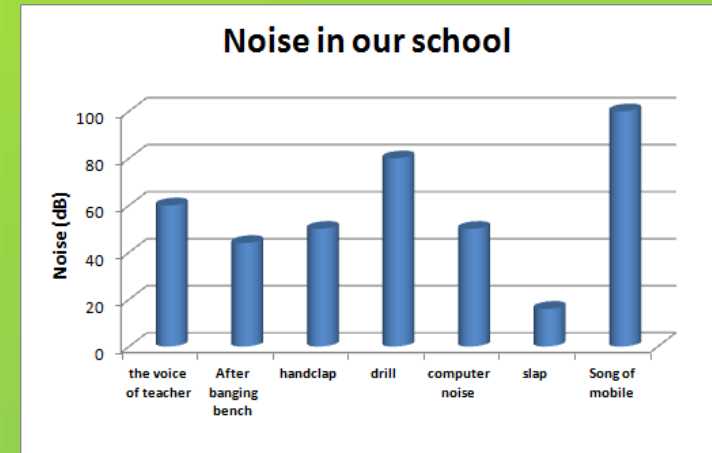


**This project was assessed by teacher and also by scientist, who cooperated on this project . The evaluation was based mainly on activity of pupils, their level of knowledge, of the level of presentation on conference**



# How noisy is our school and its neighbourhood

- in cooperation with University
- the sound level meter..
- **The project consisted of inquiring :**
- **the noise at school** -voice of teacher, noise of PC, school corridor, etc
- **noise at home** - washing machine, refrigerator, etc
- **the noise in the supermarket** - air condition, fountain, elevator, etc.
- **the noise on a street and means of transport** - quiet and noisy street, tram, bus and bus station, etc.



## The assessment of the project was based also on

- the pupils' creativity,
- originality in exploring different noise
- tabular and graphical evaluation of the noise level
- suggestions on protection against noise



# CONCLUSION

- The physics became more interesting for pupils but also for teachers.
- Pupils look forward to these lessons.
- Physics became more fascinating not only for pupils who like physics, but also for the others who were inspired by science presentations of their peers.



**Thanks for your attention**