NOISE POLLUTION IN PROJECT TEACHING

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Nowadays, the trend is to search for topics that are able to join together Science subjects and to look at one topic from various field of Science teaching subject. Especially, the environment is the most common use word. This poster shows some activities from project teaching how teach students about noise pollution and its influence on the human health. These project activities was made for the future physics teachers to show the possibilities of linking up knowledge from different subjects and use ICT technology as well.
In the first activity, the USA TV show "The Doctors" provides motivation. Then the students test their hearing, search information about noise pollution and an effect on human health, do a creative work with searched information and using art to present it. There is also an experimental part where the students use their mobile phone to measure noise pollution around school or home and do conclusion out of their measured results. The poster presents activities that are integrated in project teaching.

★ Activity 1 - Motivation

The ability of understanding English of Czech pupils is not satisfying in comparison with other countries. So it is important to create interdisciplinary relation with English and make good use of motivation in learning English language.
In this time the TV show "The Doctors" produces some English short videos that can be use in lessons of Physics in this topic. In the videos, they are solving problems, for example of Ear Ringing Diagnosis [1].

★ Activity 2: Testing hearing

This activity obtains easy testing hearing. The teacher test student ears separately and for two different frequencies (deep and high).
What do you need?
Quiet classroom and longer than 10 meter, track with lines of one meter distance, sound level meter, deep and high words (in Czech: the deep words contain vowel "u" (e.g. hůl, ucho, auto), high words vowels "i", "e" and consonants "š", "ž", "s", "z" (e.g. měsíc, tisíc, číslice).
Process:
The students are 10-12 meters from teacher who whispers words (30 dB). Firstly the right ear is tested. The second ear is covered by hand. The teacher whispers one deep word. The students that didn't hear the word clearly they go closer and the teacher whispers another deep word. The student goes so closer until he/she hear the word clearly. When a student heard the word, notes the word and the distance for later checking. (It is fun to test 8 students together because they know that they hearing is a bit destroy by listening to loud music)
The healthy human ear can hear whispering from the distance of 6 meters.

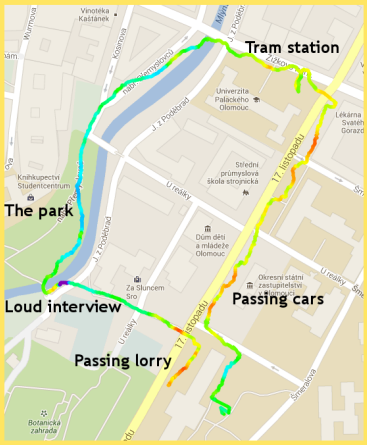
★ Activity 3

In the topic, there are some question interesting for pupils that can be solve by searching information on the website. According to the interest of pupils, they can work at a poster and afterwards present it. Here are some interesting topics.
? Can the fish hear ? (which animals has a ability to hear?)
? How can the noise destroy our hearing?
? The negative impact of noise pollution on human.
? How to protect our hearing.
? Senescence and the impact on hearing
? Frequent wearing earphone and listening to music has an impact on our health (review of earphone)

★ Activity 4: Walking with Labquest Vernier and sound level meter

We did a measurement with LabQuest 2 Vernier and sound level meter around our school to analyze the noise. With the LabQuest we measured GPS coordinates and level of the noise.
The measured data were exported from software Logger Pro 3.6.1. into Google maps (see the map). The coloured line shows change of the sound level during the walk. The purple and blue parts of the lines are the most silent place (30 dB) and the red place in the line are the noisiest
We tried to identify the most noisiest and the most silent places. The values you can see in the table.

The origin of the noise	The sound level
Passing cars	65 - 72 dB
Tram station	80 - 85 dB
The park	40 - 45 dB
Passing lorry	65 dB
Loud interview in distance 1 m	68 dB



★ Activity 5: The measurement of noise using cell phone or sound level meter

The aim of the activity is to motivate pupils to observe situation around home, in the city or school. This generation (Y) is using mobile phone all the time, so this activity has the task to found one more application to use smart phones in learning process.
We use free application; Noise meter (see figure) and Sound Meter.

★ Activity 6: Creating a city map in a motto " The life without damaging noise "

According to activities, the pupils have a picture about noise pollution in their lives. The goal is to reflect what should be near their home and which type of services should be further. In this easy activity the pupils create a map that has to obtain houses, factory, motorway, airport, park, athletic stadium, railway station, river and wind power plant.

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INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

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References: [1] The Doctors: http://www.thedoctorstv.com/videolib/init/7366 [cit 1.7.2013]